

RESEARCH ECOSYSTEM

2024



2024

RESEARCH
ECOSYSTEM

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RESEARCH ECOSYSTEM

2024

RESEARCH ECOSYSTEM 2024

is a publication edited by Centros Culturales de México, A.C.
and Bona Terra, A.C., Universidad Panamericana.

This report an overview of the scientific ouput resulting from research conducted
between January 1 and December 31, 2024.

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Hecho en México / *Printed in Mexico*

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PRESENTATION

Dear campus members,

It is with great satisfaction that we present our Research Ecosystem 2024, a document that, in addition to featuring the scientific production of our institution, it now also incorporates information on the different pillars of the General Vice President's Office for Research.

In this publication, we included the achievements made by:

- The Corporate Innovation and Transfer Department
- The Coordination of External Funding
- Rankings Coordination

looking forward to strengthen the holistic and strategic vision of this important facet of our university research activities.

In this period, for the first time, we have exceeded 400 scientific publications indexed in Scopus and Web of Science, thus strengthening our presence in the international scientific community. It is worth noting that more than 55% of this production is published in high impact indexed journals, belonging to the Q1 and Q2 quartiles, which demonstrates the commitment to excellence of our researchers to provide quality knowledge and global relevance.

Likewise, we continue the promotion of active search for external financing, applied innovation and institutional positioning in international rankings, all of which are key elements that contribute to our university's position as a benchmark in the field of private higher education in Mexico.

We are grateful to all our campus members for their constant effort and commitment to excellence, and for making these achievements possible and motivate us to continue moving forward zealously.



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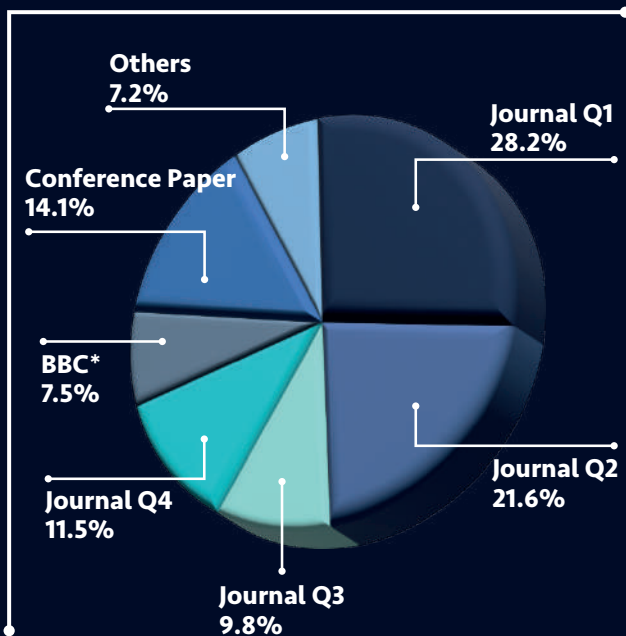
IMPACT IN NUMBERS



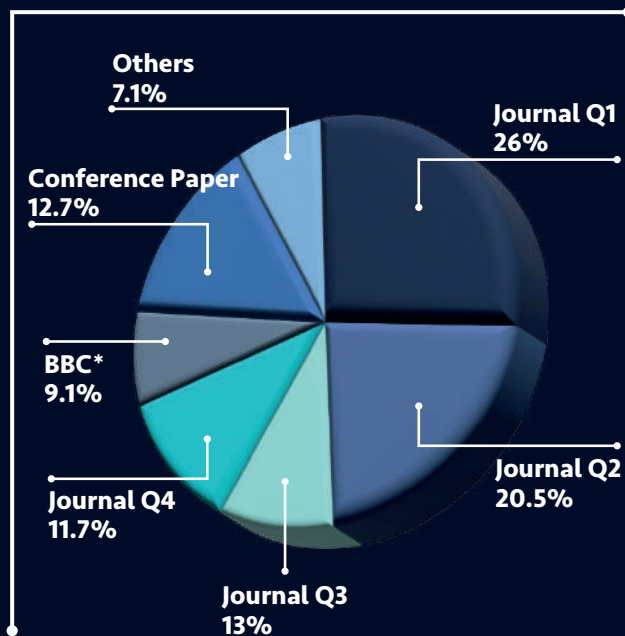
QUALITY 2022, 2023 & 2024

Source: own preparation with data from Scopus

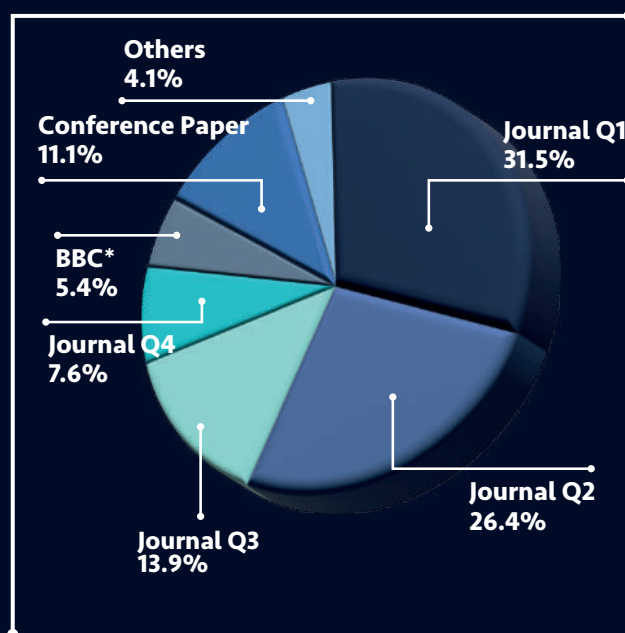
2022



2023



2024

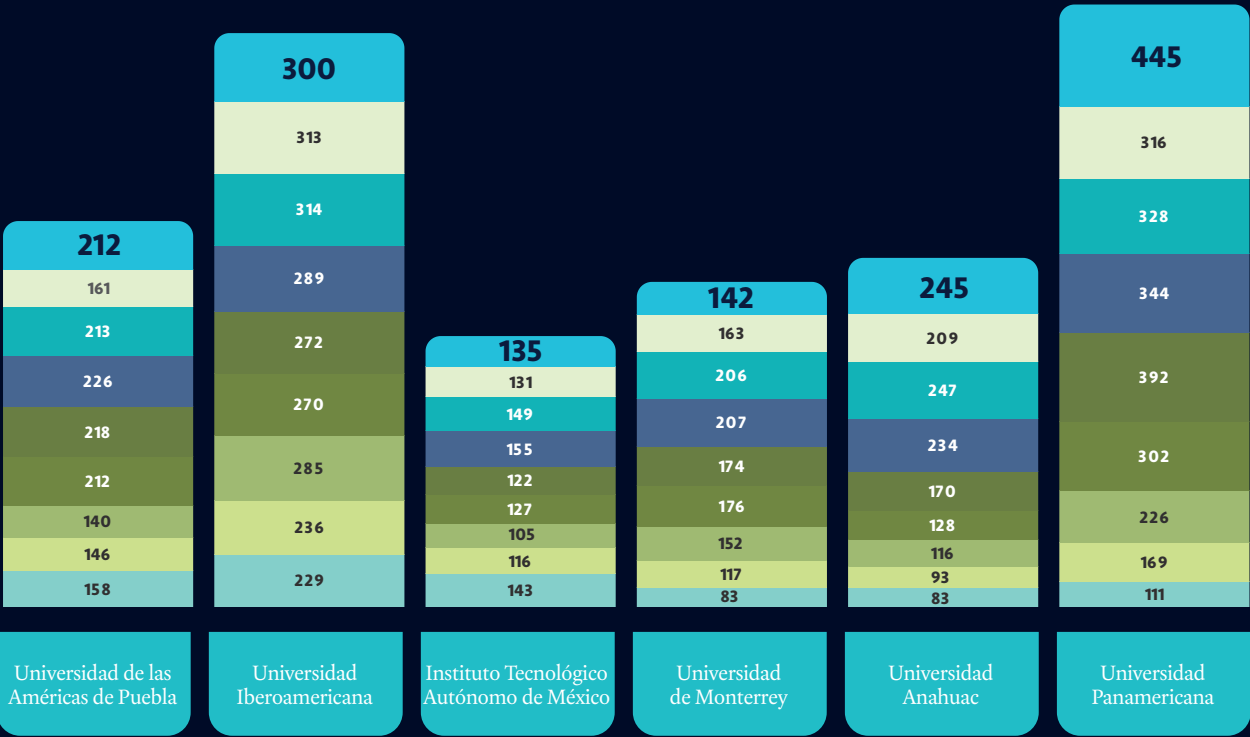


*BBC: Book & Book Chapter

BENCHMARK PUBLICATIONS

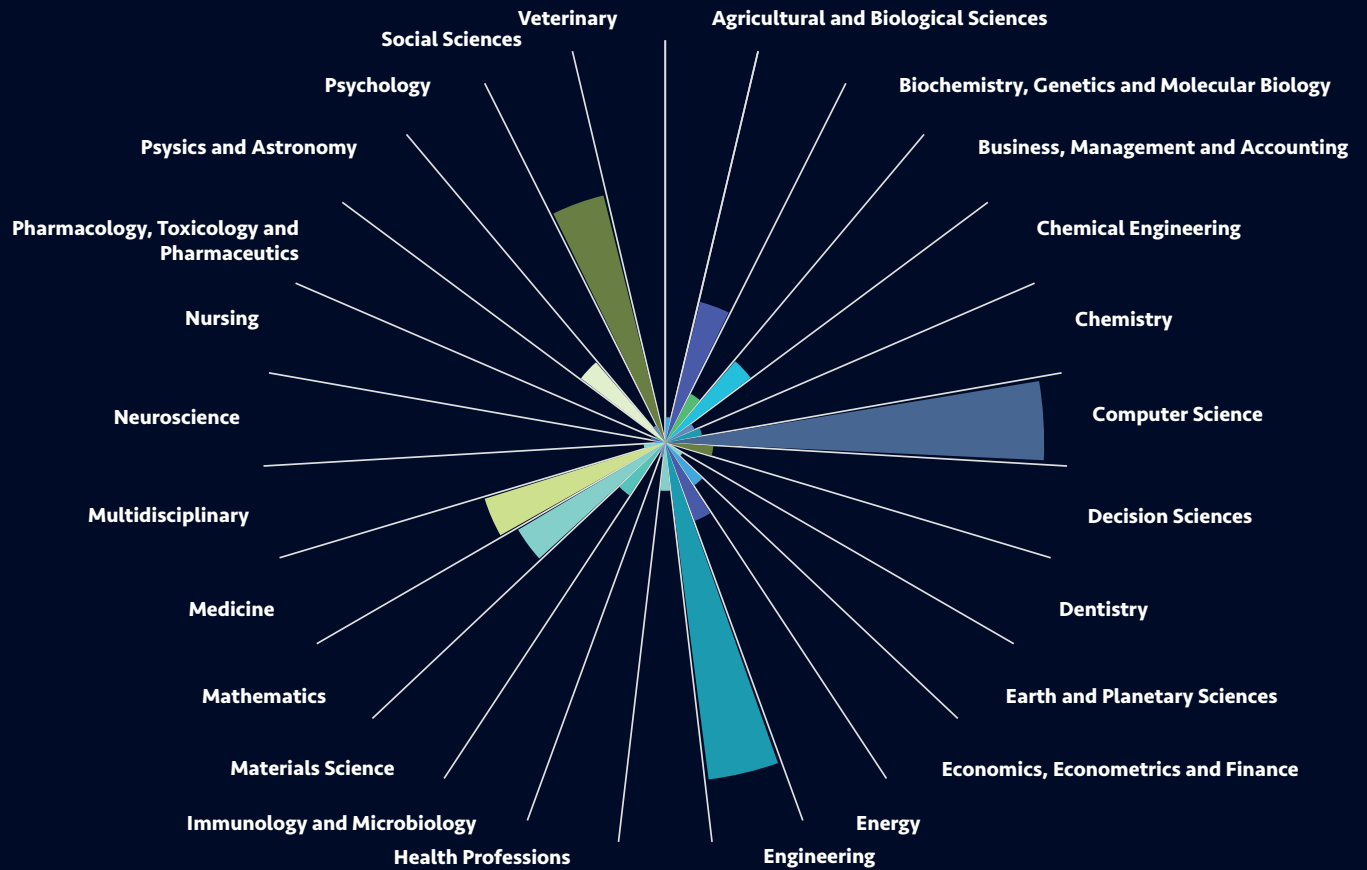
Source: Scopus private universities with less than 1000 publications per year

2016 2017 2018 2019 2020 2021 2022 2023 2024



SUBJECT PROFILE

Visualization of the institution production disaggregated by thematic areas from Scopus



DOCUMENTS BY COUNTRY

Distribution by country affiliation of co-authors, international collaboration documents

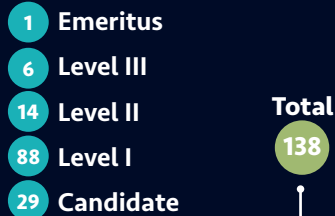
Top 10 collaboration countries



MEMBERS OF THE NATIONAL SYSTEM OF RESEARCHERS

Source: own preparation

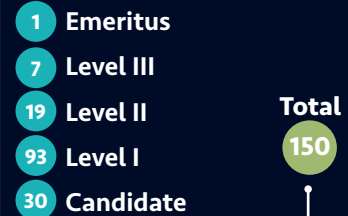
2022



2023



2024



INTERNATIONAL RECOGNITION IN RANKINGS

Between January 1st - December 31st, 2024.



Published: June 4th

2025 Edition

3rd in Mexico (overall)
2nd Private mexican university
Top 30 in LATAM



Published: October 3rd

2025 Edition

66th Regional
5th Private mexican university



Published: December 10th

2025 Edition

2nd Private mexican university



Published: March 12th

Private MX Univesities 2025

1th Philosophy, best in LATAM
3rd Hospitality
3rd Law
3rd Business & Management
2nd Computer Science
3rd Economics & Econometrics



2024 Edition

1th Private University in Mexico



2024 Edition

Top 168 worldwide



Published: October 9th

2025 Edition

2nd Private mexican university
1st Private mexican university in teaching



Published: January 22nd

2025 Edition

2nd Engineering
2nd Business & Economics
2nd Social Sciences



Published: June 12th

Among private univesities in Mexico

2nd No Poverty
5th Good Healt and Well-Being
2nd Quality Education
2nd Industry, Innovation and Infranstructure
3rd Partnerships for the Goals



Published: November 12th

2025 Edition

3rd Private mexican university



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Patents



External Fund Partner

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¹⁵ Co-authorship of an article affiliated with the School of Engineering.



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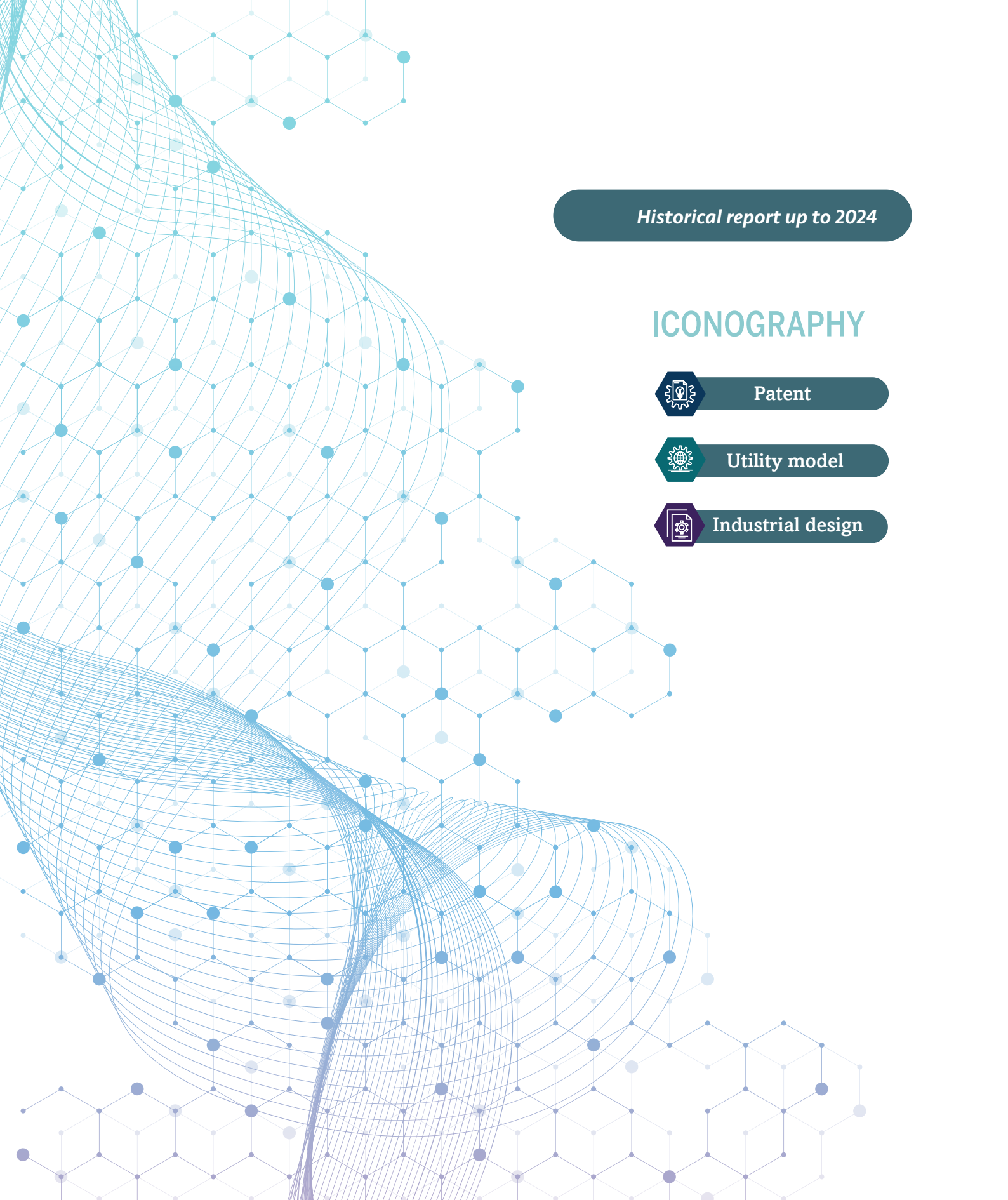
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PATENTS





Historical report up to 2024

ICONOGRAPHY



Patent



Utility model



Industrial design

INTELLECTUAL PROPERTY, TECHNOLOGY TRANSFER AND INNOVATION

Universidad Panamericana reiterates its commitment to entrepreneurship and innovation as instrumental drivers of its endeavors. Our strategy is to invigorate the connection between the industrial and social sectors, taking advantage of the creativity of our students and the research results of our professors. This allows us to strengthen the management of intellectual property, entrepreneurship and innovation as pillars of our institution.

Through our strategic areas of research and invention development, we evaluate market and industry opportunities, promoting the relevance of our scientific research and academic training with international trends.

In the last four years, our technological portfolio has focused on high and medium-high technology sectors, comprising 30 invention applications. This strategic focus on innovation and development in areas of high added value is evidenced by the fact that more than 90% of our patents are focused on key sectors such as Industry 4.0, food industry, medical devices and machinery, positioning the university as a relevant key player in advanced research.

The relevance of our technological portfolio aligned with the national and international market is validated with the granting of 12 invention registrations that concur with the priorities of more than 27 leading companies (including BASF, Bayer, 3M, Abbott, Philips, Ford, Baxter, Avent, Roche, Sony, Google, Grupo Bimbo, John Deere, Softbank, Pfizer, Procter & Gamble, Unilever, Nissan, Los García, NTT DATA, Stendhal Pharma, Ford, Natura Extracta).



Fidencio Tapia Rodríguez
Senior Researcher C, SNII Candidate Level

a/2019/000720

AERONAUTICAL SAFETY DEVICE WITH HEATING SYSTEM (PITOT TUBE)

DESCRIPTION: Device used by aircraft to calculate pressure, speed, altitude, which includes a delayed heating system and prevents icing on the tip of the tube to avoid blockage and thus provide erroneous information to the pilot in command.

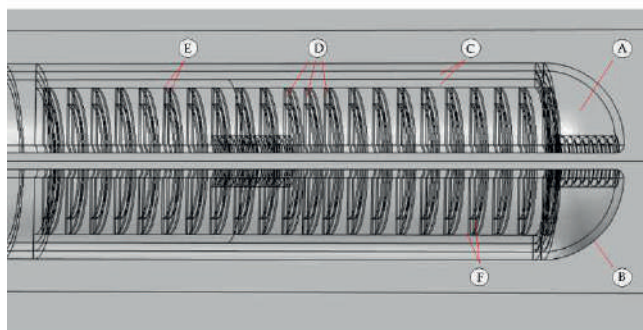
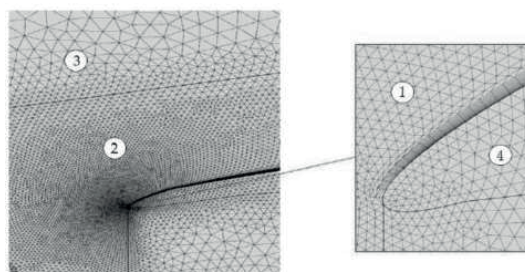
FIELD OF APPLICATION: Materials engineering.

INVENTORS:

Geydy Luz Gutiérrez

Robert Jáckel

Fidencio Tapia Rodríguez





Omar Eduardo Jiménez López
Research Professor

a/2019/013988

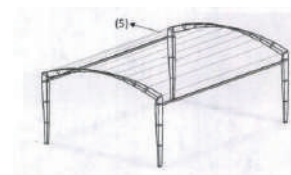
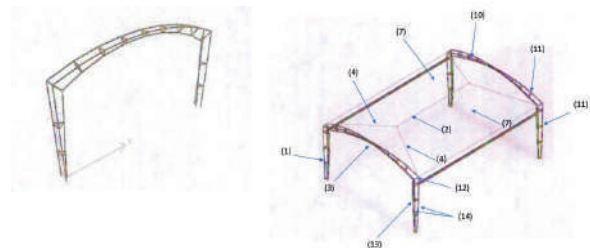
SEMIRIGID STRUCTURE FOR MICROCLIMATE CONTROL FOR BERRY CULTIVATION WITH MANUALLY ROLL-UP VENTILATION

DESCRIPTION: Composition used to maintain adequate environmental conditions to favor plant growing, which is based on a solid structure and resistant to strong winds, that can be mechanically put up and taken down. The structure is adapted to allow tractor-trailers to pass through its interior, thus making the structure large and high, using plastic tarpaulins to cover the upper part of the structure and create the microclimate. Such tarpaulins are rolled up at the front and back of the structure to facilitate their placement and tensioning.

FIELD OF APPLICATION: Agriculture, Greenhouses.

INVENTORS:

Luis Angel Amezcua Eccius
Gerardo Cárdenas Ornelas
Omar Eduardo Jiménez López
Josué Miguel Torres Ascención





Fidencio Tapia Rodríguez
Senior Researcher C, SNII Candidate Level

f/2020/000540

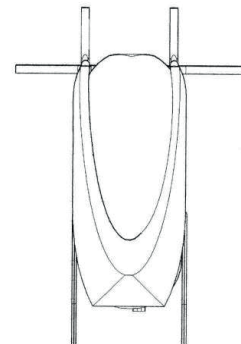
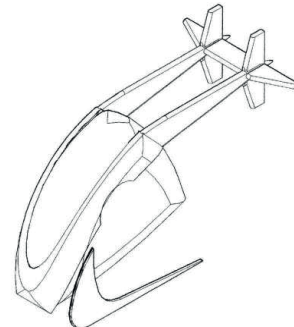
ELECTRIC PERSONAL AIRCRAFT CABIN INDUSTRIAL MODEL

DESCRIPTION: This invention presents an innovative industrial model for electric personal aircraft cabins, designed to optimize efficiency, ergonomics and sustainability. It combines lightweight materials and electric power systems to reduce weight and emissions, while prioritizing safety and rider comfort. Its modular approach allows adaptability to different prototypes, accelerating manufacturing and reducing costs. Ideal for the emerging urban air mobility (eVTOL) market, this model sets a new standard in customized, eco-friendly aircraft design.

FIELD OF APPLICATION: Aeronautics, aeronautical safety.

INVENTORS:

Eduardo Arreguin Velasco
Luis Alberto Barroso Moreno
Leticia Gaytan Hernández Magro
Elias Gonzalez Horn
Ulises Montiel Pichardo
Brenda Sarahí Rodríguez Rubio
Fidencio Tapia Rodríguez
Alejandra Berenice Topete Gandara
Ignacio Turrubiartes Alvarado





Óscar Sánchez Barba Acevedo

Research Professor

u/2020/000086

INDUSTRIAL MODEL OF SOLAR ORGANIC FOOD WASTE DEHYDRATER

DESCRIPTION: Solar dehydrator design, built with PVC pipes and connectors, in which multiple trays are placed, on which organic food waste will be placed and dehydrated through the transmission of heat generated by the absorption and storage of heat from the sun. Through the use of a canvas the heat will be stored and a translucent plastic tarpaulin is placed over the trays. The plastic screen allows direct sunlight to enter the dehydration chamber. It has one mesh underneath and another one at the back, so that a continuous flow of air is generated, which is heated as it passes into the chamber, extracting the moisture from the waste. Additionally, the grills are used for air flow between the waste so that there is as much sunlight and airflow contact as possible.

FIELD OF APPLICATION: Food.

INVENTORS:

Óscar Sánchez Barba Acevedo

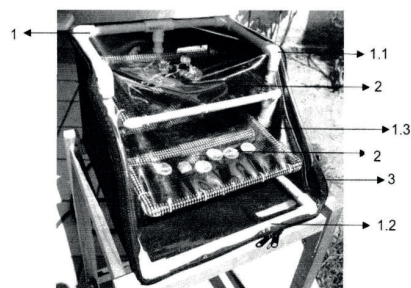
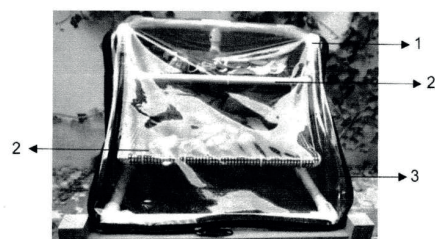


FIGURA 1





Fidencio Tapia Rodríguez
Senior Researcher C, SNII Candidate Level

a/2020/002887

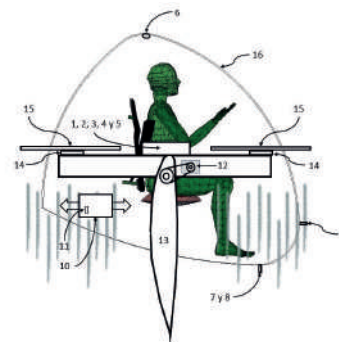
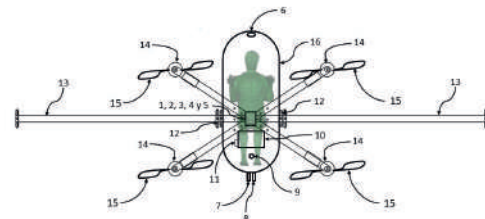
FLIGHT STABILIZATION SYSTEM FOR ONE-PERSON COCKPIT IN AUTONOMOUS AERIAL VEHICLES

DESCRIPTION: This invention refers to a mechatronic system employed in autonomous flight aircraft with vertical takeoff and landing and horizontal flight, the purpose of which is to keep the cabin of the aircraft stable without any movements throughout any of the flight stages, so that the crew member and/or the cargo that, if any, will crew or be loaded on the aircraft are completely safe and, in the case of persons, comfortable during the entire flight. Such stabilization will be achieved by varying the speed of the engines and the position of the wings through the movement of its servomotors.

FIELD OF APPLICATION: Aeronautics, aviation safety.

INVENTORS:

Eduardo Arreguin Velasco
Moisés Arturo Barajas Maraveles
Luis Alberto Barroso Moreno
Leticia Gaytán Hernández Magro
Elías González Horn
Ulises Montiel Pichardo
Fidencio Tapia Rodríguez
Ignacio Turrubiartes Alvarado





Friné Velázquez Contreras
SNII Candidate Level

a/2020/003002

THYMOL AND CARVACOL ENCAPSULATION IN B-CYCLODEXTRINS FOR ACTIVE PACKAGING OF POLYMERIC MATRIX OF POLYLACTIC ACID

DESCRIPTION: Chemical formulation that inhibits fungal and microbial activity based on an aqueous dilution for subsequent drying and encapsulation in sugars to promote the preservation of foods such as berries, lettuce, fresh spices, edible leaves, sprouts, among others, in both bulk and wholesale product.

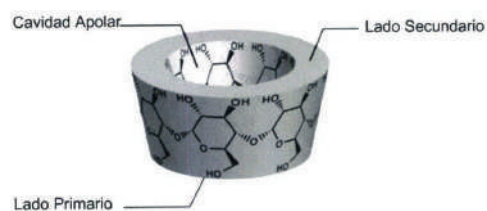
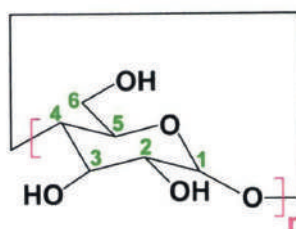
FIELD OF APPLICATION: Food.

INVENTORS:

José Antonio Gabaldón Hernández

Estrella Núñez Delicado

Friné Velázquez Contreras





Fidencio Tapia Rodríguez
Senior Researcher C, SNII Candidate Level

u/2020/000116

PERSONAL CABIN UTILITY MODEL FOR AUTONOMOUS AERODYNAMIC FLIGHT

DESCRIPTION: Personal cabin for autonomous flight that guarantees the safety and comfort of the crew members. It is versatile and aerodynamic, allowing its implementation in tilt-wing flight systems. It addresses the problem of obtaining a stable and protected cabin in current developments.

FIELD OF APPLICATION: Aeronautics, aviation safety.

INVENTORS:

Luis Alberto Barroso Moreno

Fidencio Tapia Rodríguez

Ignacio Turrubiarres Alvarado

Leticia Gaytán Hernández Magro

Brenda Saraí Rodríguez Rubio

Ulises Montiel Pichardo

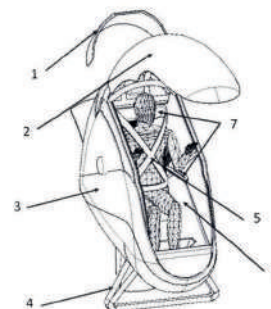
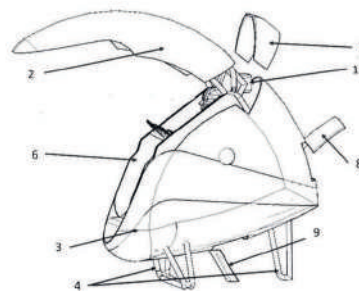


FIGURA 1



**Friné Velázquez Contreras***SNII Candidate Level***Héctor Rubén Acevedo Parra***Research Professor*

a/2020/007302

POLYLACTIC ACID MATRIX INJECTION PROCESS WITH THYMOL AND CARVACROL ENCAPSULATION IN β -CYCLODEXTRINS

DESCRIPTION: This invention consists of an injection process for active packaging for antimicrobial and antifungal release, by means of plastic extrusion and injection processes, using a PLA (lactic polyacid) polymeric matrix with the addition of β -cyclodextrin-Timol and β -cyclodextrin-Carvacrol at different weight concentrations (0, 1.5, 2.5 and 5 weight percent).

FIELD OF APPLICATION: Biotechnology, application in active food packaging.

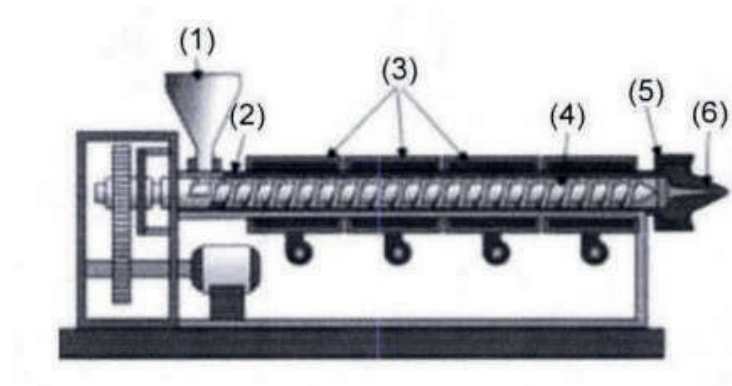
INVENTORS:

Héctor Rubén Acevedo Parra

José Antonio Gabaldón Hernández

Sergio Manuel Nuño Donlucas

Estrella Núñez Delicado

Friné Velázquez Contreras



Fidencio Tapia Rodríguez
Senior Researcher C, SNII Candidate Level

u/2021/000263

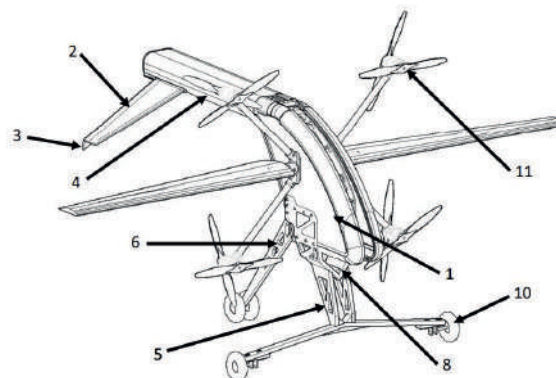
TRANSPORT AIRCRAFT SYSTEM WITH EMPENNAGE AND LANDING GEAR

DESCRIPTION: Transport aircraft system with empennage and landing gear, consisting of the integration of an empennage system built with a central tube, a support plate, a curved covering that forms an empennage boom, a pair of stabilizers and a pair of rudders that in turn are controlled by a series of servomotors to give greater control to the aircraft and a landing gear system consisting of a landing gear and a steering control bar. This will allow VTOL type aircraft flights, preferably single-person and/or autonomous flight, to have more efficient and safer short flights, guaranteeing the integrity of the aircraft and its crew or cargo.

FIELD OF APPLICATION: Aeronautics, aviation safety.

INVENTORS:

Moisés Arturo Barajas Maraveles
Luis Alberto Barroso Moreno
Leticia Gaytán Hernández Magro
Ulises Montiel Pichardo
Fidencio Tapia Rodríguez
Ignacio Turrubiartes Alvarado



Óscar Sánchez Barba Acevedo
Research Professor

f/2021/001531

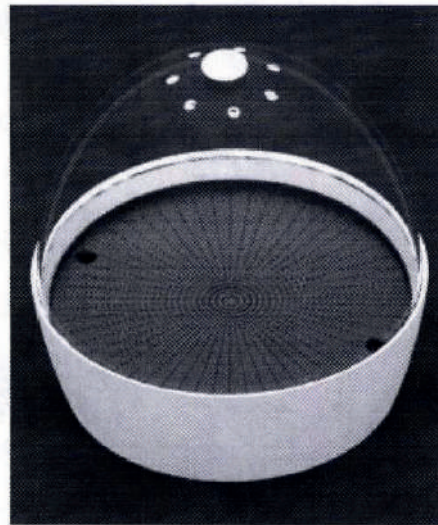
INDUSTRIAL MODEL OF SOLAR DEHYDRATOR FOR ORGANIC FOOD WASTE

DESCRIPTION: This invention consists of a solar dehydrator for organic food waste with its own peculiar shape and ornamentation, providing an innovative solution for waste processing.

FIELD OF APPLICATION: : Food industry, Restaurant industry, Household goods industry.

INVENTORS:

Oscar Sánchez Barba Acevedo
Salvador Aztlán Tercero Martínez





Utility model

Claudia Nallely Sánchez Gómez

Senior Researcher B, SNII Candidate Level

Julieta Domínguez Soberanes

Senior Researcher A, SNII Level I

María Teresa Orvañanos Guerrero

Senior Research B, SNII Candidate Level

u/2021/000562

LIGHT CABIN FOR CONTROL OF PHOTOGRAPHIC VARIABLES OF BEEF SAMPLES

DESCRIPTION: The quality of beef is mainly based on several quality characteristics; among these, the color stands out. However, color has variables that have to do with illumination, the angle of diffraction of light, among other characteristics. Thus, controlling the way in which color is measured should be an established parameter in the meat industry in order to guarantee the repeatability of this measurement. Thus, the following invention shows a light booth for controlling photographic variables which is composed of a booth for controlling the illumination when taking photographs of meat samples.

FIELD OF APPLICATION: Food.

INVENTORS:

Juan Pablo Antonio Cisneros Barba

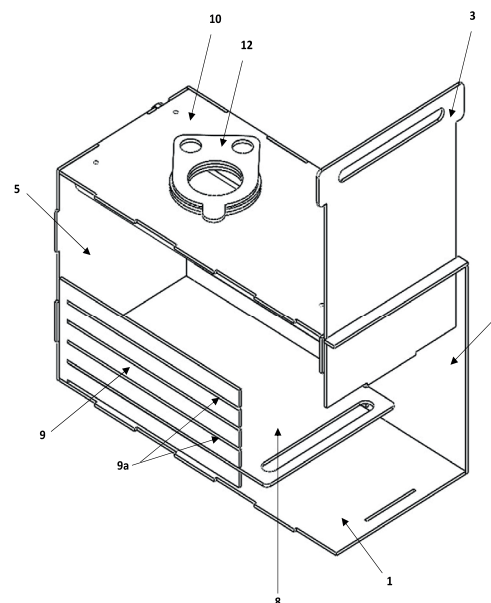
Julieta Domínguez Soberanes

Claudia Nallely Sánchez Gómez

Luis Enrique Orozco Robles

María Teresa Orvañanos Guerrero

Hugo Germán Ramírez Vences





Héctor Rubén Acevedo Parra
Research Professor

u/2023/000172

URINAL WASTE RECEIVING MAT

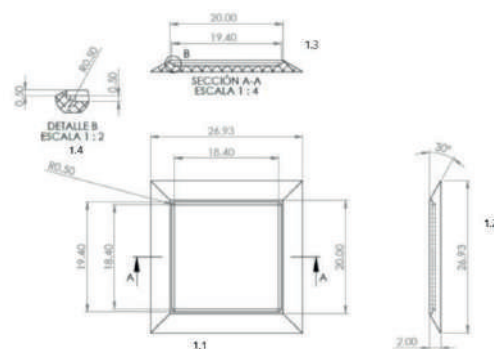
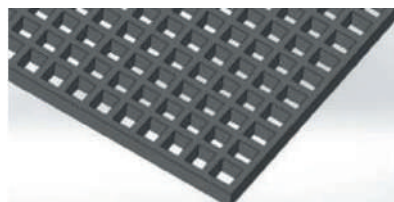
DESCRIPTION: A mat for public or private restrooms that captures residual urine that falls to the floor of the wall urinal. It consists of a catcher of small amounts of urine that do not fall into the urinal and a core that absorbs them and prevents the release of bad odors; made up of replaceable and interchangeable cartridges, it is easier and faster to clean.

FIELD OF APPLICATION: : Tools and cleaning articles for hygiene.

INVENTORS:

José Luis Villa López

Héctor Rubén Acevedo Parra





FUNDED PROJECTS





Historical report up to 2024

SCHOOL OF
ECONOMIC AND
BUSINESS SCIENCES

Salvador Rivas Aceves
Senior Researcher B, SNII Level I
Leader

INDIGENOUS FOOD SYSTEMS FOR
CLIMATE JUSTICE PROJECT

DESCRIPTION: This project, promoted by the 100K Strong in the Americas Innovation Fund, is a tripartite collaboration among Universidad Panamericana (Mexico City), Kent State University (United States) and the University of Alberta (Canada), led by Salvador Rivas Aceves of the School of Business, Mexico Campus. The initiative aims to analyze and compare indigenous food systems, building on lessons learned from the community experience in Xochimilco Lake, where an Aztec agricultural technique has been preserved. Additionally, the project integrates the study of traditional farming techniques of indigenous communities in Saskatchewan, Manitoba and Alberta, which will allow undergraduate students to make meaningful comparisons between different food systems. In order to strengthen international mobility and promote climate justice through sustainable agricultural practices, the mobility of students to Canada will be financed to actively participate in this project, whose objective is to generate a high impact scientific publication (Q1 or Q2). The initiative will run until 2025, consolidating the commitment of our institutions to research excellence and internationalization.

COLLABORATORS:
Mary Beckie
Salvador Rivas Aceves
Sarah Schmidt

FUNDER: 100k Strong in the Americas.

Marisol Velázquez-Salazar
SNII Level I
Partner

PROYECTO ERASMUS+ CON MOVILIDAD
PARA INVESTIGADORES Y ESTUDIANTES
DE DOCTORADO

DESCRIPTION: This project, funded with the support of the European Commission through the Erasmus+ program, is intended to promote international mobility and strengthen the internationalization of research and advanced training in the area of business. Within this framework, an agreement has been established that will finance the mobility of both researchers and PhD students. Dr. Marisol Velázquez-Salazar, with the School of Business Administration at the Mexico Campus, leads this project, which includes internships at the University of Florence (UNIFI). During these stays, academic exchange activities, workshops and collaborative meetings will be held to enhance the development of international competencies, enrich the research experience and strengthen collaborative networks. Not only will this initiative increase the quality and impact of our research, but will also promote the creation of future leaders in the business world, consolidating our institution's commitment to internationalization and academic excellence.

COLLABORATORS:
Giovanni Belletti
Marisol Velázquez-Salazar

FUNDER: Erasmus+.

SCHOOL OF ENGINEERING

Mario Acevedo Alvarado

Senior Researcher D, SNII Level I
Partner

PROYECTO ERASMUS+KA171 CON LA UNIVERSIDAD LIBRE DE BRUSELAS (VUB)

DESCRIPTION: This project, funded with the support of the European Commission through the Erasmus+ program in action KA171, seeks to promote international mobility and strengthen the internationalization of research in the area of engineering. Within this framework, a joint agreement with the Université Libre de Bruxelles (VUB) has been applied for, which will finance the mobility of two researchers: Dr. Mario Acevedo, from the Guadalajara campus, and Dr. Ramiro Velázquez, from the Aguascalientes campus. Each of the researchers will spend 5 days at VUB, participating in academic and collaborative exchange activities that will enhance the quality and impact of our research at the international level.

Université Libre de Bruxelles (VUB)

FUNDER: Erasmus+.

Julieta Domínguez Soberanes

Senior Researcher A, SNII Level I
Partner

NETWORK ON WATER-ENERGY-FOOD NEXUS FOR A LOW-CARBON ECONOMY IN EUROPE AND BEYOND – NEXUSNET

DESCRIPTION: The project aims to understand how the water-energy-food nexus (WEF) can foster policy coherence and biophysical interactions, supporting the transition to a circular and low-carbon economy in Europe. It focuses on job creation, welfare, broad synergies and environmental care. The Nexus concept is tested at different scales (local, regional, national, European), and the network seeks to translate academic knowledge into practical and applicable knowledge through transdisciplinary approaches and interaction with related projects. Its activities to foster scientific collaboration

and development include short-term scientific missions (STSMs), training schools, and participation in meetings, workshops and conferences. It also enables easier communication and dissemination and the use of virtual networking tools. The involvement of Dr. Julieta Domínguez, from the School of Engineering at the Aguascalientes Campus, strengthens the international expansion of research in this field, allowing the exchange of knowledge and the definition of a strategic roadmap for future collaborations.

COLLABORATORS:

Dimitris Kofinas
Cevza Melek Kazezyilmaz-Alhan
Giannis Adamos
Serena Caucci
Tamara Radjenovic
Dejana Đorđević
Tina Dasic
Cristina Calheiros
Nina Nikolova
Dejan Vasovic
Dijana Likar
Messaoud Lazreg
Edyta Hewelke
Jairo Guzman
Michael Nones
Sarah Milliken
Milena Rajic
Alexandra Spyropoulou
Müge Akın
Kemal Koca
Mirela Sertić Perić
Kaan Ilker Demirezen
Georgios Alexandros Chatzistefano
Marco Falda
Hai-Ying Liu
Carlos Felipe Marin Rivera
Argyrios Balatsoukas
Monika Suskevics
Julieta Domínguez-Soberanes
Bamgboye Taiwo
Violeta Vasilčić
Rocío Pineda-Martos
Ivar Zekker
Stefania Munaretto
Floor Brouwer
Chrysi Laspidou

FUNDER: Cost Action.

Julieta Domínguez Soberanes

Senior Researcher A, SNII Level I
Partner

PROMOTING INNOVATION OF FERMENTED FOODS

DESCRIPTION: COST Action project, called PIMENTO, aims to federate the scientific community and other key players working in the field of fermented foods, promoting their research to enhance health, innovation and sustainability. Thanks to COST Action funding, collaborators receive support for short mobility, training and payment for open access publications. The involvement of Dr. Julieta Domínguez, from the School of Engineering at the Aguascalientes Campus, strengthens the international expansion of research in this field, allowing the exchange of knowledge and the definition of a strategic roadmap for future collaborations.

FUNDER: COST Action.

Julieta Domínguez Soberanes

Senior Researcher A, SNII Level I
Leader

SUSTAINABILITY IN THE DAIRY PROCESSING: A TRI-NATIONAL STUDENT FACULTY ABROAD PROGRAM

DESCRIPTION: This project, led by Dr. Julieta Domínguez-Soberanes from the School of Engineering at the Aguascalientes Campus, is developed in collaboration with CalPoly SLO (USA) and Université Laval (Canada). The initiative is intended to promote sustainability in the processing of dairy products, with emphasis on artisanal cheese production and the strengthening of value chains. The program provides for the mobility of both students and professors, facilitating an academic and practical exchange that will enrich training in innovation, circular economy and energy efficiency in the dairy sector. Likewise, this international collaboration will foster the generation of joint research projects, with the potential for high impact publications, consolidating the international promotion of research in this field.

COLLABORATORS:

Aslı Akpınar
Hayriye Şebnem Harsa
Lidia Hanna Markiewicz
Diana Paveljšek
Julieta Domínguez-Soberanes
Zeynep Agirbasli

Eleni Naziri
Mounaim Halim El Jalil
Gregory Bouchaud
Seppo Salminen
Isabelle Savary-Auzeloux
Christèle Humblot
Christophe Chassard10, Smilja Pracer
Guy Vergères
Barçın Karakaş-Budak

FUNDER: 100K Strong in the America.

**Antonieta Teodora
Martínez Velasco**

*SNII Level I
Partner*

**POSTDOCTORAL FELLOWSHIP AT THE
CENTRE DE RECERCA EN ENGINYERIA
BIOMÈDICA (CREB), UNIVERSIDAD
POLITÉCNICA DE CATALUNYA**

DESCRIPTION: Dr. Antonieta Teodora Martínez Velasco, from the Faculty of Engineering at the MX Campus at Universidad Panamericana, was selected for the Postdoctoral Fellowship 2024 of the Carolina Foundation. Through this grant, she spent some time at the Centre de Recerca en Enginyeria Biomèdica of the Universitat Politècnica de Catalunya, where she joined the Bioinformatics and Biomedical Signals group, developing activities in computational biology and machine learning in medical technologies. This initiative boosted international mobility and strengthened research cooperation between the two universities.

COLLABORATORS:

Alexandre Perera Lluna

Antonieta Teodora Martínez Velasco

FUNDER: Carolina Foundation.

**María Teresa
Orvañanos Guerrero**

*Senior Research B, SNII Candidate Level
Partner*

**ERASMUS+ PROJECT WITH RZESZOW
UNIVERSITY OF TECHNOLOGY (POLAND)**

DESCRIPTION: This project, funded with the support of the European Commission through the Erasmus+ program, aims to promote international mobility and strengthen the internationalization of engineering research. Within this framework, an agreement has been established with the Rzeszow University of Technology in Poland, which will finance the mobility of Universidad Panamericana researchers. Led by Dr. María Teresa Orvañanos Guerrero, from the Faculty of Engineering of the Aguascalientes Campus, the project includes a 5-day stay for each researcher at the Polish university, participating in academic and collaborative exchange activities that will enhance the quality and impact of our research at the international level.

COLLABORATORS:

Mariusz Węglarski

Antonieta Teodora Martínez Velasco

FUNDER: Erasmus+.

**María Teresa
Orvañanos Guerrero**

*Senior Research B, SNII Candidate Level
Partner*

**INTERNATIONAL PROJECT WITH NITTE
MEENAKSHI INSTITUTE OF TECHNOLOGY
(INDIA)**

DESCRIPTION: This project, funded with international support, aims to promote mobility and strengthen the international growth of engineering research. Within this framework, an agreement has been established with the Nitte Meenakshi Institute of Technology in India, which will finance the mobility of Dr. María Teresa Orvañanos Guerrero, from the School of Engineering of the Aguascalientes Campus, for an 18-day period. During her stay, Dr. Orvañanos will participate in academic and collaborative exchange activities, enhancing the quality and impact of our research at the international level.

COLLABORATORS:

Kiran MC

Antonieta Teodora Martínez Velasco

FUNDER: Nitte Meenakshi Institute of Technology.

Pedro Manuel Rodrigo Cruz

Senior Researcher C
Partner

INTERNATIONAL NETWORK FOR HARMONIZATION OF ATMOSPHERIC AEROSOL RETRIEVALS FROM GROUND BASED PHOTOMETERS (HARMONIA)

DESCRIPTION: The objective of the HARMONIA project is to establish an international network for the standardization and improvement of aerosol optical parameter retrieval techniques using multispectral photometry. Bringing together scientists, operators, users and developers, the initiative seeks to homogenize products derived from atmospheric measurements and foster innovation in this field. With the support of COST Action, collaborators receive funding for short mobility, training and payment for open access publications. The participation of Dr. Pedro Manuel Rodrigo Cruz, from the Faculty of Engineering of the Aguascalientes Campus, promotes the internationalization of research and the development of common solutions for the measurement of aerosols.

COLLABORATORS:

Pedro Manuel Rodrigo Cruz
Stavros Solomos

FUNDER: COST Action.

Pedro Manuel Rodrigo Cruz

Senior Researcher C
Partner

WITCPV: MICRO-CONCENTRADOR FOTOVOLTAICO CON SEGUIMIENTO INTEGRADO DE GRAN ACEPTANCIA ANGULAR PARA AGRIVOLTAICA

DESCRIPTION: This project, funded by the Ministry of Science and Innovation of Spain under the State Program to Develop, Attract and Retain Talent of the State Plan for Scientific and Technical Research and Innovation 2021-2023, aims to promote the international expansion of research through strategic alliances between Universidad Panamericana and the University of Jaén, Spain. Dr. Pedro Manuel Rodrigo Cruz, from the Faculty of Engineering at the Aguascalientes Campus, participates as a partner and will actively contribute to the academic exchange, co-creation of innovative projects and knowledge transfer. This initiative will strengthen the research capacity of our institution and expand our international networks, consolidating the development of talent and excellence in research.

COLLABORATORS:

Pedro Manuel Rodrigo Cruz
Eduardo F. Fernández

FUNDER: Spanish Ministry of Science and Innovation.

Leonardo Jesús Valdivia Parga

SNII Level I
Partner

SISTEMA INTEGRAL PARA LA MEDICIÓN DE VARIABLES EN LA INDUSTRIA DE LA MANUFACTURA

DESCRIPTION: This project seeks to promote the digital transformation of small and medium-sized manufacturing companies in Jalisco through the development of a comprehensive industrial monitoring system. The solution covers from data acquisition with sensors to visualization of key metrics in an adaptable and easy-to-access platform. With a modular, wireless and autonomous approach, the system enables companies to gain real-time visibility into their production, improve decision making and move towards Industry 4.0 without the need for large upfront investments.

COLLABORATORS:

Leonardo Jesús Valdivia Parga
Mario Acevedo Alvarado

FUNDER: COECyTJAL.

Ramiro Velázquez Guerrero

SNII Level I
Partner

PROYECTO ERASMUS+KA171 CON LA UNIVERSIDAD LIBRE DE BRUSELAS (VUB)

DESCRIPTION: This project, funded with the support of the European Commission through the Erasmus+ program in the KA171 action, aims to promote international mobility and strengthen the internationalization of research in the area of engineering. Within this framework, a joint agreement with the Université Libre de Bruxelles (VUB) has been applied for, which will finance the mobility of two researchers: Dr. Mario Acevedo, from the Guadalajara campus, and Dr. Ramiro Velázquez, from the Aguascalientes campus. Each of the researchers will spend 5 days at VUB, participating in academic and collaborative exchange activities that will enhance the quality and impact of our research at the international level.

COLLABORATORS:

Ramiro Velázquez Guerrero
Université Libre de Bruxelles

FUNDER: Erasmus+.

SCHOOL OF LAW

Clara-Luz Álvarez González de Castilla

Senior Researcher D, SNII Level III
Partner

FUTURES-ORIENTED GOVERNANCE OF OUTER SPACE: TOWARDS PEACE, EQUITY, AND ENVIRONMENTAL INTEGRITY (FOGOS)

DESCRIPTION: The FOGOS (Futures-Oriented Governance of Outer Space: Towards Peace, Equity, and Environmental Integrity) project focuses on analyzing and improving outer space governance mechanisms, addressing challenges related to peace, equity, and environmental integrity. The initiative brings together researchers from Europe and other regions to assess and propose policies to ensure a sustainable future in space. Through COST Action funding, collaborators receive support for short mobility, training and payment for open access publications, strengthening the bridge between academia, industry and policy makers. The participation of Dr. Clara-Luz Alvarez, from the Mexico Campus School of Law, provides a legal and strategic perspective essential for providing recommendations on spatial governance.

COLLABORATORS:

Clara-Luz Álvarez González de Castilla

Johannes Schmied

Rakhyun Kim

FUNDER: COST Actions.

Guillermo Tejada Becerra

Research Professor
Partner

DOCTORAL PROGRAM IN GLOBAL SOCIETY LAW WITH UNIVERSITY OF NAVARRA

DESCRIPTION: Researcher Guillermo Tejada Becerra, from the MX Campus School of Law, was admitted to the PhD Program in Global Society Law at the University of Navarra for the 2024-2025 academic year. He completed his thesis under the supervision of Dr. Mercedes Galán Lorda, in the area of History of Law, with exclusive dedication. This scholarship boosted his doctoral training and strengthened international cooperation in the legal field.

COLLABORATORS:

Guillermo Tejada Becerra

University of Navarra

FUNDER: Carolina Foundation.

SCHOOL OF PHILOSOPHY

Luis Xavier López Farjeat

Senior Researcher D, SNII Level III

Partner

NOTRE DAME / PANAMERICANA TEXT WORKSHOP: "ARISTOTLE'S DE MEMORIA AND ITS RECEPTION"

DESCRIPTION: EThis project, funded through the Mexico Faculty Grant Program of University of Notre Dame, aims to foster academic collaboration and strengthen research relationships between the universities of Notre Dame and Universidad Panamericana. In this context, workshops will bring together professors and graduate students from the philosophy departments of both institutions to carry out an in-depth analysis of Aristotle's "De memoria et reminiscencia" and its reception in the Greek, Muslim and Latin scholastic traditions. The initiative seeks to promote interdisciplinary dialogue and knowledge sharing, with the aim of generating publications and new lines of research in the field of philosophy. The participation of Dr. Luis Xavier López, from Universidad Panamericana, as a research associate, reinforces the commitment of our institution to academic excellence and the internationalization of research. Additionally, the funding covers logistical aspects, mobility and open access publications, ensuring the success and visibility of this important project.

COLLABORATORS:

Luis Xavier López Farjeat

Therese Scarpelli Cory

FUNDER: Notre Dame University - Mexico Faculty Grant Program.

SCHOOL OF PEDAGOGY

Donovan Barba Reynoso

Research Professor

Partner

**CRITICAL PERSPECTIVES ON CAREER AND
CAREER GUIDANCE (COCAG)**

DESCRIPTION: The COCAG (Critical Perspectives on Career and Career Guidance) project brings together researchers from Europe and other regions to critically explore changes in careers and career guidance in the contemporary world. The initiative promotes debate, the generation of publications and the creation of collaborative networks that favor the development of young researchers and professionals in this field. With COST Action funding, collaborators access funds for short mobility, training and payment for open access publications, facilitating the international exchange of knowledge. The participation of Dr. Donovan Barba Reynoso, from the School of Pedagogy and Psychology at the Guadalajara Campus, enriches this network and contributes to the formulation of new perspectives in professional orientation.

COLLABORATORS:

Donovan Barba Reynoso

Tristram Hooley

Mariana Lucas Casanova

Kristina Mariager-Anderson

FUNDER: COST Actions.

INSTITUTE OF HUMANITIES

José María Llovet Abascal

Senior Researcher C, SNII Level I

PLEASURE AND GOOD IN ANCIENT PHILOSOPHY

DESCRIPTION: This research project brings together an international group of experts to deepen the understanding of the early doctrines of pleasure in ancient philosophy, and how these are related to fundamental concepts such as the good, nature, virtue and happiness. The different traditions that have dealt with pleasure will be explored, from those that condemn it to those that consider it essential for happiness. The objective is to create an international network of researchers in ancient practical philosophy, publish a book in English with Brill publishing house that collects the contributions of each member, and generate a specialized research article for a journal indexed in Scopus. It is hoped that this project will make a significant contribution to the field of ancient philosophy, offering new perspectives on a subject of great ethical and cultural relevance.

COLLABORATORS:

José María Llovet Abascal

Ethel Junco

Roberto Rivadeneyra Quiñones

Héctor Zagal Arreguín

Laura Pérez

Leonardo Ramos Umaña

Diego Rosales Meana

UP-CI-2024-MX-25-HUM

Laura Trujillo Liñán

Senior Researcher B, SNII Level I

THE MEDIA ECOLOGY ASSOCIATION 2025 INTERNATIONAL CONGRESS: FROM NATURAL SELECTION TO ARTIFICIAL INTELLIGENCE: BALANCING OPPORTUNITIES, ETHICS AND CHALLENGES

DESCRIPTION: This project consists of the organization of the International Congress of the Media Ecology Association 2025, an event to be held at Universidad Panamericana. The congress will bring together scholars and experts from various disciplines to analyze and discuss the influence of media and technology on society and human culture, with a particular focus on the transition to artificial intelligence. Topics such as ethics in AI, educational innovation, and the impact of the media on the transfer and evolution of social values will be explored. The event seeks to foster international collaboration, academic networking, and enrich the student experience by allowing interaction with world-renowned experts. This project is expected to contribute to the university's academic reputation and international visibility, in addition to generating scientific publications and opportunities for faculty and student exchange.

COLLABORATORS:

Laura Trujillo Liñán

Mariano Emmanuel Navarro Arroyo

Íñigo Fernández Fernández

Andrée Marie López Fernández

María Teresa Nicolás Gavilán

Óscar Colorado Nates

UP-CI-2024-MX-23-HUM

SCHOOL OF COMMUNICATION

José Luis López Aguirre

Research Professor

**THE CONFIGURATION OF ELECTORAL
POLITICAL COMMUNICATION IN SOCIO-
DIGITAL NETWORKS DURING THE 2024
PRESIDENTIAL CAMPAIGN IN MEXICO
FROM A DIGITAL RHETORIC PERSPECTIVE**

DESCRIPTION: This project consists of the organization of the Media Ecology Association International Congress 2025, an event to be held at Universidad Panamericana. The congress will bring together scholars and experts from various disciplines to analyze and discuss the influence of media and technology on society and human culture, with a particular focus on the transition to artificial intelligence. Topics such as ethics in AI, educational innovation, and the impact of the media on the transmission and evolution of social values will be explored. The event seeks to foster international collaboration, academic networking, and enrich the student experience by allowing interaction with world-renowned experts. This project is expected to contribute to the university's academic reputation and international visibility, in addition to generating scientific publications and opportunities for faculty and student exchange.

COLLABORATORS:

José Luis López Aguirre

Nahayeli Gómez Aguilera

Eduardo Fernández y Fernández

José Israel Rivera Terrazas

Thelma Pérez Álvarez

Cyntia Cerón Hernández

María Concepción Estrada García

Miguel Acosta Valverde

Ana Teresa López García

Luis Ángel Gómez Gordillo,

UP-CI-2024-MX-24-COM

SCHOOL OF GOVERNMENT AND ECONOMICS

Esteban Colla De Robertis

Senior Researcher C

MEDIATING THE IMPACT OF FREE TRADE AGREEMENTS ON ECONOMIC DEVELOPMENT: INSTITUTIONAL QUALITY AND TREATY SCOPE

DESCRIPTION: This research project focuses on analyzing the factors that determine the success of free trade agreements (FTAs) as economic development policy tools. The impact of FTAs on Gross Domestic Product (GDP) per capita in developing countries that sign agreements with developed countries will be examined. Special emphasis will be placed on the moderating role of institutional quality and the specific characteristics of each treaty, such as clauses that encourage or impede technology transfer. This methodology will employ advanced econometric techniques, including the synthetic control method and regression models with regularization, to analyze a large database of FTAs signed by developing countries. This project is expected to generate a working paper and a scientific article in an indexed journal, in order contribute to the debate on the effectiveness of FTAs and providing valuable information for the formulation of trade policies that foster economic development.

UP-CI-2024-MX-26-GOB

SCHOOL OF
ENGINEERING

Mario Acevedo Alvarado

Senior Researcher D, SNII Level I

ANALYTICAL STUDY AND EXPERIMENTAL
VALIDATION OF THE STIFFNESS
CHARACTERISTICS OF A FLEXIBLE
PROTOTYPE OF THE 3-PRS PARALLEL
MANIPULATOR

DESCRIPTION: This project focuses on the research and evaluation of continuous parallel manipulators, particularly the 3-PRS robotic architecture. The main objective is to compare the kinematic and stiffness characteristics of this architecture in both its rigid link and flexible link versions. Through the development of analytical models, finite element simulations and experimental validation, the aim is to better understand the behavior of these robots, especially in applications where human-robot interaction and safety are crucial. The project is expected to generate scientific articles in indexed journals, presentations at international congresses and the training of human resources through the participation of scholarship students. This project represents a significant breakthrough in the field of robotics and contributes to knowledge in the design and application of flexible parallel manipulators.

COLLABORATORS:

Mario Acevedo Alvarado

Oscar Altuzarra

Víctor Petuya

UP-CI-2024-GDL-15-ING

David Escobar Castillejos

SNII Level I

DEVELOPMENT OF A MULTIMODAL
SIMULATION FRAMEWORK FOR THE
TEACHING OF SCIENCE, TECHNOLOGY,
ENGINEERING, ARTS AND MATHEMATICS.

DESCRIPTION: This project focuses on the creation of a multimodal simulation framework to upgrade the teaching of Science, Technology, Engineering, Arts, Arts and Mathematics (STEAM). The main objective is to develop a tool that integrates virtual reality technologies, augmented reality and haptic devices to provide students with more immersive and multisensory learning experiences. The aim is to transform education at Universidad Panamericana through this technological innovation, allowing students to interact with simulations that model reality with great fidelity. The project includes the design and implementation of the framework, the development of an educational application, and qualitative and quantitative studies to evaluate its impact on learning. This project is expected to generate scientific publications, presentations at congresses, and the training of human resources through the participation of students. It represents a significant breakthrough in the field of educational innovation and contributes to the adaptation of teaching methodologies to the digital era.

COLLABORATORS:

David Escobar Castillejos

Octavio Lozada Flores

UP-CI-2024-MX-22-ING

Carlos Alberto González Pérez

Research Professor

IDENTIFICATION OF THE LATERAL
STIFFNESSES AND MAGNITUDES OF
THE MASSES OF EACH LEVEL IN TWO-
DIMENSIONAL MODELS OF BUILDINGS
FROM THE DYNAMIC RESPONSE USING
METAHEURISTIC TECHNIQUES

DESCRIPTION: Identification of the lateral stiffnesses and magnitudes of the masses of each level in two-dimensional models of buildings from the dynamic response using metaheuristic techniques.

COLLABORATORS:

Carlos Alberto González Pérez

Jaime De-la-Colina Martínez

UP-CI-2024-GDL-13-ING

Juan Carlos López Pimentel

Senior Researcher B, Level I

ON THE FEASIBILITY OF USING
BLOCKCHAIN FOR PHYSICAL ASSET
TOKENIZATION

DESCRIPTION: This project seeks to apply advanced metaheuristic algorithms, such as genetic algorithms, differential evolution and particle swarms, to determine key structural parameters in buildings, such as stiffness, masses and damping levels, even under noisy measurement conditions. The project seeks to generate new knowledge in the identification of structural systems, improve the structural safety of buildings and contribute to the publication of high impact scientific articles.

COLLABORATORS:

Juan Carlos López Pimentel

Luis Alberto Morales Rosales

UP-CI-2024-GDL-14-ING

Ernesto Moya Albor*Senior Researcher D, SNII Level I***ANÁLISIS DE SEÑALES DE FONOCARDIOGRAFÍA FETAL MEDIANTE UN ENFOQUE BASADO EN PROCESAMIENTO DE SEÑALES Y APRENDIZAJE AUTOMÁTICO**

Description: This project focuses on developing a fetal phonocardiography signal analysis system to monitor fetal health. Using signal processing and machine learning techniques, the aim is to extract relevant information from the signals, classify the heart sounds and determine the fetal heart rate. The aim is to implement a low-cost, portable monitoring system that can be used in low-income or rural areas where access to advanced medical equipment is limited. The project is expected to generate a publication in a JCR indexed journal, a book chapter and a proposal for a utility model or patent registration, in addition to the training of human resources through the participation of scholarship students. This project represents a significant advance in fetal health monitoring and could have a positive impact on prenatal medical care in underserved communities.

COLLABORATORS:**Ernesto Moya Albor****Jorge Eduardo Brieva Rico**

Sandra Luz Gómez Coronel

Diego Renza Torres

UP-CI-2024-MX-18-ING

Alfredo Segismundo Ramos Jiménez*Research Professor***DEVELOPMENT OF EXACT, METAHEURISTIC AND MATHEURISTIC METHODS FOR SOLVING OPERATIONS MANAGEMENT OPTIMIZATION PROBLEMS**

DESCRIPTION: This project focuses on creating novel mathematical models and solution methods for complex optimization problems in areas such as project scheduling, supply chain design and distribution systems. The objective is to improve efficiency and effectiveness in the resolution of these problems, generating high quality solutions in reasonable times, and contributing to scientific knowledge and the training of future researchers specialized in operations optimization.

COLLABORATORS:**Alfredo Segismundo Ramos Jiménez****Elías Olivares Benítez****Samuel Moisés Nucamendi Guillén****Abraham Mendoza Andrade**

Julie Drzymalski

Marcos Moreno Vega

UP-CI-2024-GDL-08-ING

Alejandro Esteban Rodríguez Sánchez*SNII Level I***MODELING THE DYNAMIC RESPONSE OF POLYMERIC FOAMS USING ADVANCED ARTIFICIAL INTELLIGENCE METHODS**

DESCRIPTION: This objective of this project is to investigate and model the behavior of polystyrene and expanded polypropylene foams under cyclic loading, using advanced artificial intelligence to predict their viscoplastic response. The results are expected to generate new models and applicable knowledge in the design of products such as packaging and impact protection devices, in addition to contributing to high-impact scientific publications and the training of human resources.

COLLABORATORS:**Alejandro Esteban Rodríguez Sánchez****Luis Alberto Rosa Sierra**

Héctor Plascencia Mora

UP-CI-2024-GDL-07-ING

Omar Fernando Ruíz Martínez*Senior Researcher C, SNII Level I***DESARROLLO DE CONVERTIDORES DE ALTA GANANCIA ENFOCADOS AL PROCESAMIENTO DE ALIMENTOS MEDIANTE CAMPO ELÉCTRICO PULSANTE**

DESCRIPTION: This project focuses on designing and implementing a system that uses pulsed electric fields (PEF) to enhance the preservation and quality of food, particularly dairy products. The objective is to develop a working prototype, investigate the efficacy of the PEF in microbial inactivation, train students in applied research, and explore the possibility of filing a patent.

COLLABORATORS:**Omar Fernando Ruíz Martínez****Julieta Domínguez Soberanes****Fernando Dávalos Hernández**

UP-CI-2024-AGS-02-ING

Fidencio Tapia Rodríguez

Senior Researcher C, SNII Candidate Level

OPTIMIZACIÓN DE COMPONENTES IMPRESOS EN 3D CON BASE EN BIOMATERIALES PARA SU POTENCIAL APLICACIÓN EN IMPLANTES

DESCRIPTION: This project seeks to generate a design and optimization methodology to improve the mechanical performance of implants made with 3D printed biomaterials, specifically using polyether-ether-ketone (PEEK), combining Factorial Design of Experiments and Topological Optimization. Maximizing tensile strength and fatigue resistance is sought, as well as minimizing the amount of material, processing times and weight, and improving the quality of 3D printed parts. The project is carried out in collaboration with other institutions and companies, and is expected to generate high impact scientific publications, a patent, and the training of specialized human resources.

COLLABORATORS:

Fidencio Tapia Rodríguez
Sandra Luz Rodríguez Reyna
Héctor Rubén Acevedo Parra
Jorge Humberto Díaz Aguilera

UP-CI-2024-GDL-09-ING

Antonio Valderrábano González

SNII Level I

SISTEMA DE ACCIONAMIENTO DE MOTORES ELÉCTRICOS BASADO EN UNIDAD CONVERTIDORA DE VOLTAJE DE 84 PULSOS

DESCRIPTION: This project seeks to design and build a prototype of a system to manage the speed of three-phase induction motors in programmed trajectories, maintaining an adequate torque and minimizing harmonic distortion in the power grid. The project involves motor modeling, simulations, circuit design and manufacturing, experimental data acquisition, and the writing of scientific papers for peer-reviewed journals. It is expected to generate applicable knowledge in the integration of distributed energy systems and improve the quality of energy in electrical systems.⁴

COLLABORATORS:

Antonio Valderrábano González
Carlos Eduardo Castañeda Hernández
Omar Aguilar Mejía
Francisco Beltrán Carbajal
Rubén Tapia Olvera
Hossam A. Gabbar

UP-CI-2024-GDL-10-ING

Ramiro Velázquez Guerrero

SNII Level I

APLICACIÓN DE TÉCNICAS MULTIESPECTRALES EN EL DIAGNÓSTICO DEL PIE DIABÉTICO

DESCRIPTION: This project seeks to use multispectral imaging technology to improve the detection and classification of diabetic foot ulcers by analyzing components such as melanin and hemoglobin to assist in early diagnosis and treatment. The project aims to generate reports, scientific articles and evaluate the feasibility of technology transfer for use in the clinical setting.

COLLABORATORS:

Ramiro Velázquez Guerrero
Eduardo Sanchez Pérez
Daniel Ulises Campos Delgado
Edwige Pissaloux

UP-CI-2024-AGS-01-ING

SCHOOL OF PHILOSOPHY

André Laks

Senior Researcher D

EPISTEMOLOGICAL MODESTY

DESCRIPTION: This project focuses on the interdisciplinary research of “epistemological modesty”, exploring the nature of knowledge and its relationship to beliefs from diverse philosophical, sociological and anthropological perspectives. The team of researchers will examine how epistemic modesty has been understood historically, from ancient philosophy to contemporary debates about epistemic authority and post-truth. Special attention will be paid to methodological problems related with understanding concepts such as belief and science in different historical contexts. The project seeks to foster the collaboration between researchers at Universidad Panamericana and other international institutions, as well as to consolidate a research network on the philosophy of belief in Greco-Roman antiquity. The project is expected to generate academic publications, international seminars and symposia, and the training of human resources through the participation of scholarship students.

COLLABORATORS:

André Laks

Cecilia Coronado

Leopoldo Iribarren

David LévyStone

Luis Xavier López Farjeat

Stéphane Marchand

José Alberto Ross

María José Urteaga

UP-CI-2024-MX-21-FIL

SCIENTIFIC PRODUCTION



INSTITUTE OF HUMANITIES

Luz Imelda Acedo Moreno

Research Professor

HARMONY OR DISCORDANCE BETWEEN SACRAMENTAL AND LITURGICAL THEOLOGY?

ABSTRACT. This paper aims to show a way of approximating between liturgical studies and sacramental theology, trying to undo a too formal separation between the two sciences. The paramount cause is to be found at the request of Sacrosanctum Concilium, starting from the link between the two to achieve a greater and more fruitful participation of those faithful to the sacraments. In the words of Card. Ratzinger, this request has not been fully met. The dichotomy and relationship between the notions of *theoria* and *praxis* in both sciences are presented as the need for a solid foundation or philosophical frame of reference with a metaphysical or realistic background, attending to the problems raised by the International Theological Commission in the document on "The Reciprocity between Faith and Sacraments in the Sacramental Economy" (1999). The pathway is open, some solutions are proposed, and an attempt is made to show the importance of this subject for the understanding of man himself and his Christian life. © 2024 by the author.

Acedo Moreno, L. I. (2024). Harmony or Discordance between Sacramental and Liturgical Theology?. *Religions*, 15(3), 334. doi: 10.3390/rel15030334. Article.

Federico Nassim Bravo Jordán

Senior Researcher B, SNII Level I

ADLER AND THE DEBATE ON REVELATION IN GOLDEN AGE DENMARK

ABSTRACT. In 1843, Adolph Peter Adler, a pastor of the Danish Church, claimed that he had received a supernatural revelation in which Christ spoke to him. The event triggered a religious controversy. In this article, I would like to offer an analysis of the episode of Adler's alleged revelation by taking as a frame of reference the philosophical and theological debates of the time, the reaction of the ecclesiastical authorities to the incident, and Søren Kierkegaard's own proposed diagnosis of the case. Such an analysis will allow us to reach a conclusion regarding the discussion of the time surrounding Adler's episode, namely, that a contemporary revelation seems to present insurmountable difficulties within the margin of the orthodoxy defended by the Danish Church in the first half of the nineteenth century. A rationalist view, such as that adopted by the Danish Church in this period, holds that any discussion of Christian doctrine and its sources must be rationally explicable. The Scriptures, from this point of view, can and should be interpreted from the free, rational, and scientific perspective of the professional theologian. That said, if by "revelation" is meant a supernatural and subjective phenomenon, it follows that there can be no rational reflection on such a revelation. Therefore, it seems that a revelation – especially a contemporary revelation – cannot coexist with a rationalist theology.

Bravo, N. (2023). Adler and the Debate on Revelation in Golden Age Denmark. *Filozofia*, 78(10), 821-833. doi: 10.31577/filozofia.2023.78.10.2. Article.

Federico Nassim Bravo Jordán

Senior Researcher B, SNII Level I

KIERKEGAARD Y ADLER: LA EXPERIENCIA MODERNA DE LA REVELACIÓN

ABSTRACT. In this article I would like to offer an analysis of Adler's revelation, taking as reference the theological debates of the time, the reaction of the ecclesiastical authorities to the incident and the diagnosis that Kierkegaard himself proposed in this regard. Such an analysis will allow us to observe the difficulties involved in the appearance of a contemporary revelation in the religious context of modernity, especially after the Enlightenment, and, more specifically, in the face of a rationalist orthodoxy such as that championed by the Danish Church in the 19th century. © 2024 Universidade de Santiago de Compostela. All rights reserved.

Bravo, N. (2024). Kierkegaard y Adler: la experiencia moderna de la revelación. *Agora - Papeles de Filosofía*, 43(1). doi: 10.15304/ag.43.1.8722. Article.

Federico Nassim Bravo Jordán

Senior Researcher B, SNII Level I

HANS LASSEN MARTENSEN'S "NEW POEMS BY J.L. HEIBERG"

ABSTRACT. In this article I offer an English translation of the first two installments of Hans Lassen Martensen's review of the New Poems by Johan Ludvig Heiberg. The review was published in three installments in the periodical *Fædrelandet* in January 10 – 12, 1841. This is the first translation of Martensen's review into English. I provide an introduction to the text in the foregoing article in this volume of the Yearbook, titled "Martensen's Review of Heiberg's New Poems and the Discussion on Speculative Poetry and the Crisis of the Age". © 2024 Walter de Gruyter GmbH. All rights reserved.

Bravo, N. (2024). Hans Lassen Martensen's "New Poems by J.L. Heiberg". *Kierkegaard Studies*, 29(1), 333-349. doi: 10.1515/kierke-2024-0016. Article.

HUMAN FIRST AND THEN CHRISTIAN: GRUNDTVIG'S ANTHROPOLOGY AS A PLURALIST ALTERNATIVE

ABSTRACT. In this article, I would like to suggest that the anthropological proposal of Nicolai Frederik Severin Grundtvig, the famous nineteenth-century Danish author, offers a model that maintains and affirms religious diversity, recognizing its place in the life of the community, but without having to resort to the separation of the religious and the public, the typical response of liberalism that has been generally adopted in the modern world. Grundtvig's proposal - an ordained pastor of the Danish Church, but deeply influenced by English liberal ideas - represents an intriguing middle ground between secularization and pluralism. He understood that, in the new modern world, it was necessary to recognize not only the members of the official Church, but also the practitioners of other religions and even non-believers. The voice of the Church was just one among many. However, he also resisted excluding religion from public life, as is the case in traditional secularism. © 2024 Slovak Academy of Sciences. All rights reserved.

Bravo, N. (2024). Human First and then Christian: Grundtvig's Anthropology as a Pluralist Alternative. *Filozofia*, 79(8), 878-891. doi: 10.31577/filozofia.2024.79.8.3. Article.

MARTENSEN'S REVIEW OF HEIBERG'S NEW POEMS AND THE DISCUSSION ON SPECULATIVE POETRY AND THE CRISIS OF THE AGE

ABSTRACT. In this article I offer an introduction to Hans Lassen Martensen's review of Heiberg's New Poems, published in 1841. In his treatise On the Significance of Philosophy of 1833, the poet and philosopher Johan Ludvig Heiberg presented a diagnosis of what he perceived as the cultural crisis of the time. In his view, Danish society was afflicted by a frivolous and nihilistic worldview. A Hegel enthusiast, Heiberg thought that the cure for the crisis lay in a new philosophical perspective, capable of finding the universal and infinite within the particular and finite. But this was only possible to communicate through literature and, more specifically, through what he called speculative poetry. In the following years, Heiberg and his friend and colleague Martensen developed the notion of this new genre. This didactic campaign culminated with the publication of Heiberg's New Poems, especially the piece "A Soul after Death," accompanied by the review composed by Martensen. © 2024 Walter de Gruyter GmbH. All rights reserved.

Bravo, N. (2024). Martensen's Review of Heiberg's New Poems and the Discussion on Speculative Poetry and the Crisis of the Age. *Kierkegaard Studies*, 29(1), 317-332. doi: 10.1515/kierke-2024-0015. Article.

RESEÑA DE COMUNIDAD Y PEDAGOGÍA. LA FILOSOFÍA PLATÓNICA DE LA EDUCACIÓN, DE CLAUDIO CÉSAR CALABRESE. ZACATECAS:TEXERE. 2018. 222 PP

ABSTRACT. Platón, nadie lo pone en duda, ocupa un puesto principal en el olimpo filosófico; sus comentaristas, en consecuencia, son multitud. Por generaciones, el intento usual de los exégetas y estudiosos del platonismo ha consistido en desentrañar en la medida de lo posible los elementos del pensamiento del filósofo ateniense. Se ha tratado, pues, de exprimir afirmaciones y sentencias, de manera que al final les sea posible exclamar: «Esto lo dijo y lo pensó Platón». La teoría es su componente principal.

El libro más reciente del Dr. Claudio César Calabrese, Comunidad y pedagogía. La filosofía platónica de la educación, ofrece un enfoque distinto. El autor destaca el carácter práctico, a menudo relegado al olvido, tan decisivo en la filosofía platónica. Insiste en el hecho de que, más que un teórico, Platón era un educador, y que su vocación, contrario a lo que insinúa el lugar común, no era la especulación por sí misma, sino la formación de ciudadanos, una tarea que resultaba tanto más urgente cuanto que la Atenas de su época se encontraba en un penoso estado de bancarrota cultural. Calabrese señala con razón que la crisis ateniense no nos resulta ajena. La filosofía educativa de Platón, subraya el autor, constituye un apoyo indispensable para nuestra época.

Bravo, N. (2019). Reseña de Comunidad y pedagogía. La filosofía platónica de la educación, de Claudio César Calabrese. Zacatecas:Texere. 2018. 222 pp. *Open Insight*, 10(19), 167-171. doi: 10.23924/oi.v10i19.364. Review.

Claudio César Calabrese Ruíz

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ALLEGORY AND DESIRE FOR GOD IN SAINT AUGUSTINE

ABSTRACT. If allegory is fundamentally a way of reading and writing (in short, of thinking), which, in a Christian key, is linked to personal salvation, this activity, in fact, cannot be obviously separated from the act of faith, nor in the fundamental desire of God, that is, that impulse that returns the human being to his perfection. The always renewed harmony between man (world) God sets in motion two aspects: one ascending or delectatio Dei and another descending or cupiditas mundi. There is no reading without desire, nor desire that is not consumed as a search for God. © 2024 Centro de Investigación Social Avanzada. All rights reserved.

Calabrese, C. C., & Junco, E. (2024). Allegory and Desire for God in Saint Augustine. *Open Insight*, 15(34), 145-167. doi: 10.23924/oi.v15i34.648. Article.

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MEXICO IN FEMININE: VIOLENCE AND CULTURE ACCORDING TO ELENA GARRO

ABSTRACT. In *Los Recuerdos del Porvenir*, Elena Garro addresses the problematic Mexican sociocultural situation through the female type of the cuscas, or young prostitutes, victims of violence naturalized as an ideological format. This article presents a reading of the novel's models of literal and symbolic violence through the work of Philippe Bourgois, Pierre Bourdieu, Johan Galtung and Nancy Scheper-Hughes. The representation of these fictional characters in Garro's novel shows how structural violence permeates social relations through a network of prejudices and systems of oppression that prevent the cuscas' liberation. The characteristics given to the prostitutes in the novel articulate an argument about national identity, which for the author present a potential to define the future. The article concludes by confirming Garro's literature as a committed political activity, due to its critical position in the face of any social discrimination and the revaluation of the sectors neglected by power. © 2023 Instituto de Investigaciones Literarias y Discursivas. All Rights Reserved.

Junco, E., & Calabrese, C. C. (2024). Mexico in feminine: violence and culture according to Elena Garro. *Anclajes*, 28(2), 173-184. doi: 10.19137/anclajes-2024-28212. Article.

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PLOTINUS' FOUNDATIONS OF THE SOUL AND ITS RECEPTION IN AUGUSTINE OF HIPPO EN. IV, 8 [7] IN GN. ADU. MAN. 2, 12

ABSTRACT. In this study, we present the following hypothesis: the passage from Plotinus' *Enneads* IV, 8 [7] is present in Gn. adu. Man. 2, 12 by Augustine of Hippo. As this is not a direct citation, and there is ongoing controversy regarding the content of the *Libri platoniorum*, a collection of texts translated into Latin that allowed Plotinus to frame an argument about the credibility of faith (cf. 7, 13), we approach this proposal through a three-part convergence. First, we present the state of the question regarding the authors in the aforementioned collection; then, the clarifications regarding the soul in Plotinus and the difficulties encountered along the path to understanding; and finally, how this conception influenced Augustine of Hippo's notion of the soul during the aforementioned exegesis. In this context, we find the term *medietas animae* to explain the soul's state in paradise, suggesting the use of a Latin text translating the Plotinian expression μέση τάξις. We conclude, through this analytical perspective, that Augustine of Hippo explains the fall of the soul using En. IV, 8 [7] in a way that aligns with Scripture. Our research method is philological as a science of comprehension, based on a careful reading of Plotinus' and Augustine's texts. © 2025, Universidad Pontificia Bolivariana. All rights reserved.

Calabrese, C., & Junco, E. B. (2025). Plotinus' Foundations of the Soul and Its Reception in Augustine of Hippo En. IV, 8 [7] in Gn. adu. Man. 2, 12. *Cuestiones Teológicas*, 52(117). doi: 10.18566/cueteo.v52n117.a03. Article.

Claudio César Calabrese Ruíz

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Ethel Beatriz
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SAINT AUGUSTINE AND THE ASCENT
FROM THE REGIO DISSIMILITUDINIS. THE
DISENCHANTMENT OF MANICHAISM
AND THE ENCOUNTER WITH
NEOPLATONISM

ABSTRACT. La metáfora neoplatónica “regio dissimilitudinis” invoca, negativamente, el concepto de semejanza, y ésta, según el modo en que san Agustín leyó a Plotino, implica a la vez un imperativo del regreso al Creador o “imitatio Christi”. Este fundamento doctrinal tiene también raíces biográficas, durante el tiempo en que san Agustín fue parte de la gnosis maniquea; luego, la lectura de los “Libri Platoniorum” le dio los elementos para un acercamiento metafísico a las Escrituras; nos ocupamos, en definitiva, de los supuestos teóricos y existenciales de la conversión de san Agustín, comprendidos como un modo de participar en la vida divina. Nuestro método es filológico en un doble sentido, pues nos ocupamos de la letra en sí (Confessiones) y de las lecturas comprendidas en aquellas confesiones, recorriendo esa tierra de semejanza que es el lenguaje.

Calabrese, C., & Junco, E. B. (2024). Saint Augustine and the ascent from the regio dissimilitudinis. The disenchantment of Manichaeism and the encounter with Neoplatonism. *Diacovensia*, 32(1), 13-31. doi: 10.31823/d.32.1.1. Article.

Claudio César Calabrese Ruíz

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Ethel Beatriz
Junco de Calabrese

Senior Researcher D, SNII Level I

THE MEDIATING EROS: MARÍA
ZAMBRANO

ABSTRACT. The paper refers to the relationship between the meaning of the figures of Diotima in the Platonic Banquet and Zambrano’s essay “Diotima de Mantinea”. Through the figure of the inspired woman who teaches the philosopher, emphasis is placed on the notion of Eros, dáimon of mediation between the human and the divine. The analysis seeks to connect what is properly rational in philosophical discourse with its pre-rational source; by Zambrano’s position, about the classical and especially archaic sources of the Greek world, the axes of each text are described, highlighting Zambrano’s interest in constituting the bases of his original method recognized as “poetic reason”. In the process, it is intended to highlight the author’s proposal to integrate and not the division of knowledge and her denunciation of scientific rationality. © 2023 Universidad de Chile. All rights reserved.

Junco, E., & Calabrese, C. C. (2023). The Mediating Eros: María Zambrano. *Byzantion Nea Hellas*, 42, 355-375. Article.

Claudio César Calabrese Ruíz

Senior Researcher D, SNII Level III

Ethel Beatriz
Junco de Calabrese

Senior Researcher D, SNII Level I

THE NATURE OF THE LINGUISTIC
SIGN. AUGUSTINIAN OUTLINES IN DE
DIALECTICA AND DE MAGISTRO

ABSTRACT. In his youth texts, Saint Augustine objects to skepticism, which denies the possibility of knowledge and teaching; this negation, which has a linguistic origin, declares the impossibility of relating the word to reality. Saint Augustine deepens the analysis on the sign and concludes with his famous “under no circumstances then learn” (nusquam igitur discere), creating one of the most original aspects of his thought: listening makes sense if it puts the receiver in contact with the inner truth. This theory does not deny the reality of the human intellect, but rather supposes it, in the same terms that the created is distinguished from the uncreated. © 2021 Centro de Investigación Social Avanzada. All rights reserved.

Calabrese, C. C., & Junco, E. B. (2021). The Nature of the Linguistic Sign. Augustinian Outlines in De dialectica and De magistro. *Open Insight*, 12(24), 83-107. doi: 10.23924/oi.v12i24.448. Article.

Claudio César Calabrese Ruíz*Senior Researcher D, SNII Level III***Ethel Beatriz
Junco de Calabrese***Senior Researcher D, SNII Level I***THE RELEVANCE OF PYTHAGOREANISM
IN THE POETRY OF ZAMBRANO**

ABSTRACT. In this paper, we are interested in pointing out the importance of Pythagoreanism as a possible philosophical path to sustain Western thought, according to María Zambrano's criteria. In her *El hombre y lo divino*, Zambrano questions the decisions that philosophy has adopted in its origin and proposes an integrative reason that is capable of including the feeling and the becoming of life in consideration of thought. From this perspective, we will point out the original contribution of Pythagoreanism, its dependence on the "sacred core," and its expression through alternative forms of language that reflect perceived but not generated harmonies. We will highlight the Orphic basis of thought since its fundamental notions serve the meanings Zambrano prioritizes. We will also point out the consonances between Pythagoreanism and poetic reason, on which the author proposes a different way of thinking from current European systems. © 2024 Slovak Academy of Sciences. All rights reserved.

Junco, E., & Calabrese, C. C. (2024). The Relevance of Pythagoreanism in the Poetry of Zambrano. *Filozofia*, 79(6), 608-620. doi: 10.31577/filozofia.2024.79.6.3. Article.

Gustavo Adolfo Esparza Urzúa*Senior Researcher C, SNII Level I***BODY, ILLNESS AND SYMBOL IN ERNST
CASSIRER**

ABSTRACT. The aim of this paper is to study Cassirer's philosophy of the body, and some of its foundations developed in the report entitled "Pathology of Symbolic Consciousness." It details how patients with cerebral aphasia and apraxia are characterized by a loss of symbolization abilities in the performance of operational tasks, as well as in their linguistic performance, which translates into a decrease in the ability to create cultural meaning. These cases allow one to evaluate the definition of the human being as a "symbolic animal" that is presented in *An Essay on Man*. An interpretative reading of both works is proposed to underline the role of the body in the development of (a) the symbolic formation process and (b) cultural development. © 2024 Slovak Academy of Sciences. All rights reserved.

Esparza, G. (2024). Body, Illness and Symbol in Ernst Cassirer. *Filozofia*, 79(4), 365-379. doi: 10.31577/filozofia.2024.79.4.2. Article.

Gustavo Adolfo Esparza Urzúa*Senior Researcher C, SNII Level I***DESCARTES AND CASSIRER: UNITY AND
METHODOLOGICAL DISCONTINUITY OF
SUBSTANCE**

ABSTRACT. This article studies the methodological foundations of Cartesian work as a philosophical antecedent in the structuring of 'function' and 'symbolic form' in Cassirer's work. This incorporation would have been developed through two moments: first, it is recognized the value of the scientific and mathematical studies proposed by the Frenchman as an indispensable way for the study of the natural substances of the world; second, it is criticized the lack of methodological continuity used in the study of the human substance. To this end, a comparative analysis is made between the works of Descartes and those of Cassirer. © 2023 The author(s).

Esparza, G. (2023). Descartes and Cassirer: Unity and Methodological Discontinuity Of Substance. *Principia*, 27(3), 497-517. doi: 10.5007/1808-1711.2023.e91313. Article.

Gustavo Adolfo Esparza Urzúa*Senior Researcher C, SNII Level I***Ethel Beatriz
Junco de Calabrese***Senior Researcher D, SNII Level I***MISTERY, DESTINY AND DIVINITY IN
CASSIRER AND SOPHOCLES]**

ABSTRACT. The aim of this paper is to deepen in the perception of divinity and its consequent complexities. Theoretically, we consider the Cassirer's Philosophy of Religion in *Language and Myth* and in *Mythical Thought* to apply them to the *Ajax* by Sophocles. In the methodological framework, we identify a phenomenological order of perceiving deity, composed by four phases: spiritual force, perception of the part, of the part, and of the personality. In the hermeneutic of the work, we achieved three results: (1) the revelation of destiny and self-revelation of deity express, at the same time, an intentionality of the god; (2) the natural order of the events is structured following divine intention; (3) the tragedy, as community text, reveals a religious experience and a cosmological order that needs to be considered. © 2024 Universidad Nacional de Colombia. All rights reserved.

Esparza, G., & Junco, E. (2024). Mystery, destiny and divinity in Cassirer and Sophocles. *Ideas y Valores*, 73(186), 219-242. doi: 10.15446/ideasy-valores.v73n186.94577. Article.

PHILOSOPHICAL FOUNDATIONS FOR A
PEDAGOGY OF CULTURE

ABSTRACT. The general objective of this paper is to elaborate a pedagogical reading of Ernst Cassirer's Philosophy of Symbolic Forms, focusing on the Phenomenology of Knowledge where the author details that the foundations adduced by Paul Natorp, in Introduction to Psychology constitute a critical view of psychology as the foundation of intellectual operations. In general, there are three results to be shown: first, it will be shown that this recovery of the Natorpian vision allows Cassirer to maintain that all cultural activity (language, mythology, art, science, etc.) has as its foundation the psychological activities of the subject, which implies that all symbolic formation is both an intellectual product of the individual and a cultural activity. Second, it will be shown that part of the development of a critical psychology, in accordance with Natorp's general plan, is the need for a theory of formation that explains how the cultural environment shapes the intellectual activities of the subject, a general thesis assumed by Cassirer for the development of his theory of the symbol. Finally, it will be noted that the cultural formative agents considered by Natorp for the formation of the individual (state, art and religion, mainly) constitute the theoretical bases of culture on which the student will later develop his theory of language, myth/religion, art and science as cultural formations. © Universidad Politécnica Salesiana del Ecuador.

Esparza, G. (2024). Philosophical foundations for a pedagogy of culture. *Sophia* (Ecuador), 2024(37). doi: 10.17163/soph.n37.2024.06. Article.

THE PERCEPTION OF THE DIVINE: MYTH,
ART, AND RELIGION IN ERNST CASSIRER

ABSTRACT. According to the philosophy of religion proposed by Ernst Cassirer, myth and religion are two symbolic forms whose goal of representation is the idea of the sacred; to achieve this, both use different aesthetic representations such as totem, ritual, or art to configure their own idea of the divine. Through a critical examination of the author's work, both the structure and the form of mythical and religious thought are analyzed to describe the aesthetic function fulfilled in each form. To illustrate the contribution that art offers in the contemplation of the divine in both modalities, we will use Ratzinger's sermon "The Feeling of Things, the Contemplation of Beauty". © 2024 Slovak Academy of Sciences. All rights reserved.

Esparza, G. (2024). The Perception of the Divine: Myth, Art, and Religion in Ernst Cassirer. *Filozofia*, 79(8), 921-934. doi: 10.31577/filozofia.2024.79.8.6. Article.

DEFINING A CANON TO ACHIEVE
LEARNING OUTCOMES: LAS CASAS
APOLOGY AS A CASE EXAMPLE

ABSTRACT. The Humanities Institute of Universidad Panamericana, Guadalajara (Mexico), has carefully crafted its own reading canon by incorporating in to its course design a learning outcomes framework that mirrors its Christian institutional mission. The paper presents an overview of this framework and of its implementation within the University's Gen Ed reading canon selection. It uses an excerpt of Bartolomé de las Casas' Apology as a case example of the practice. This text is used within a course of introductory Ethics delivered to 30 different student groups per year. The criteria used in its selection and suggested practices are detailed. Overall, the text shows the value of a learning outcomes approach to text selection in a core-text-based course. © The Author(s) 2023.

Gómez-Ruiz, M. J., Orejel-Orejuel, L. G., Salomón-Ferrer, M. (2023). Defining a canon to achieve learning outcomes: Las Casas Apology as a case example. *International Journal of Christianity and Education*, 28(3), 274-286. doi: 10.1177/20569971231189727. Article.

Vicente de Haro Romo

Senior Researcher D, SNII Level I

VIGO, A. G. (2023). KANT Y LA CONCIENCIA MORAL. UN COMENTARIO DE LOS TEXTOS PRINCIPALES. COLECCIÓN SAPIENTIA. EDITORIAL NUN. 167 PP.

ABSTRACT. Alejandro G. Vigo, catedrático del Instituto de Filosofía de la Universidad de los Andes en Chile, es, para muchos -entre ellos, para el que esto escribe-, el mejor filósofo latinoamericano de la actualidad. Este volumen suyo abona en el sustento de dicha opinión. En esta publicación se presenta de modo revisado un trabajo que ya había visto la luz en el libro Conciencia, ética y derecho. Estudios sobre Kant, Fichte y Hegel (2020). Es un aporte relevante, sin embargo, en cuanto la edición de NUN es más accesible en México y en Latinoamérica y se presenta el contenido sobre Kant de modo independiente. El resultado es el mejor libro en castellano sobre la conciencia moral (Gewissen) en Kant. Antecedentes, como el texto de Norbert Bilbeny (1994), se quedan lejos del mérito académico del trabajo de Vigo en cuanto no se ocupan de la evolución del pensamiento de Kant respecto al tema o no se acercan a la precisión exegética o a la conciencia metódica del volumen publicado ahora. También, comparado con la bibliografía en otras lenguas, este libro de Alejandro Vigo destaca por su profundidad y por su acierto hermenéutico: por ejemplo, el trabajo de Willem Heubült (1980), que es bastante citado y una referencia reconocida en el tema, aunque sí atiende a la evolución del pensamiento kantiano, tampoco tiene la concisión o la utilidad hermenéutica que sí ofrece el libro de Vigo en tanto Heubült construye su discurso con otros intereses en mente (sobre metafísica, antropología y religión) que le distraen del enfoque y del lugar sistemático de la conciencia en el pensamiento del filósofo de Königsberg.

De Haro Romo, V. (2024). Vigo, A. G. (2023). Kant y la conciencia moral. Un comentario de los textos principales. Colección Sapientia. Editorial NUN. 167 pp. *Tópicos* (México), (68), 521-527. Review.

Rafael Hurtado Domínguez

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Elba Díaz Cerveró

SNII Level II

Gabriel Domínguez Partida

SNII Level I

AUDIOVISUAL ANALYSIS OF THE DAHMER SERIES: GENEALOGY OF A MONSTER AND FAMILY MODELS

ABSTRACT. This article undertakes an examination of the familial representations within the series Dahmer (2022), which draws from the life and crimes of the eponymous serial killer. Employing a methodology rooted in textual analysis, the study elucidates a discernible bias in the portrayal of the perpetrator's familial unit vis-à-vis those of his victims. The principal inference drawn pertains to the thematic privileging of ostensibly "disadvantaged" familial constructs as the ones most adept at societal integration, juxtaposed against the portrayal of the ostensibly normative liberal American familial paradigm, which becomes the locus for the emergence and proliferation of dysfunctions culminating in the figure of the serial killer under scrutiny within this scholarly endeavour. © 2024, VisualCOM Scientific Publications. All rights reserved.

Hurtado-Domínguez, R., Domínguez-Partida, G., & Díaz-Cerveró, E. (2024). AUDIOVISUAL ANALYSIS OF THE DAHMER SERIES: Genealogy of a Monster and Family Models. *VISUAL Review. International Visual Culture Review / Revista Internacional de Cultura*, 16(2), 153-169. doi: 10.62161/revvisual.v16.5194. Article.

Ethel Beatriz

Junco de Calabrese

Senior Researcher D, SNII Level I

Claudio César Calabrese Ruíz

Senior Researcher D, SNII Level III

NATURALIZACIÓN DE LA TRAGEDIA FEMENINA: UN HOGAR SÓLIDO DE ELENA GARRO

ABSTRACT. We offer a reading of Elena Garro's *Un hogar sólido* in relation to the postulates of the Greek tragedy, in particular the notions of destiny, guilt and knowledge, to highlight the feminine position presented by the author through which she questions the conventions of her epoch. First we present the idiosyncrasies of the characters to highlight the tragic matter that the protagonist of the piece contributes and to base her heroine character. In the existential circumstance of the women the opposition of destiny and freedom is raised, although the search for autonomy will be the path of affirmation of identity. The author confronts the protagonist with the determination of fate, exposes her decision and verifies her fall; in the proposed differences between Greek tragedy and Mexican tragedy, criticism is made of sociocultural structures and gender stereotypes. Elena Garro confirms the political role of the theater and the hero's mission to the community. © 2023 The Author(s).

Junco, E., & Calabrese, C. (2023). Naturalización de la tragedia femenina: Un hogar sólido de Elena Garro. *Logos: Revista de Linguística, Filosofía y Literatura*, 33(2), 451-470. doi: 10.15443/RL3324. Article.

Ethel Beatriz
Junco de Calabrese

Senior Researcher D, SNII Level I

POETIC REASON: IDENTITY IN THE MIDST OF MYSTICISM AND PHILOSOPHY

ABSTRACT. The irrationalist and vitalist options in the philosophy of the early twentieth century find in María Zambrano a liminal proposal. The author proposes a double movement: archaizing in order to renew the model of a philosophy saturated with formulas and without experiential content. To do so, she reads Plato, the father of Greek rationalism, through her acute hermeneutics to demonstrate that the birth of philosophy is methodologically congruent with mystical experience. Both philosophy and mysticism are models of liberation of the soul in search of truth, understood as transcendent reality. Both start from the multiplicity of being to coincide in the unity of the permanent. Both are also sources of knowledge for the common man who can approach the divine by means of his decision and will. Thus, in her main texts we find the arguments to recover the lost spirituality and to move into the experience of the sacred through the articulation of poetic reason. © 2024 Slovak Academy of Sciences. All rights reserved.

Junco, E. (2024). Poetic Reason: Identity in the Midst of Mysticism and Philosophy. *Filozofia*, 79(8), 907-920. doi: 10.31577/filozofia.2024.79.8.5. Article.

José María Llovet Abascal

Senior Researcher C, SNII Level I

ARISTOTLE AND THE METEORITE OF AEGOSPOTAMI

ABSTRACT. The meteorite that fell in the mid-5th century B.C. in Aegospotami could have changed the course of ancient science, as it provided solid evidence that the sky is not perfect nor immutable. However, Aristotle claimed that it was a stone lifted by strong winds. This paper explains why Aristotle refused to consider the possibility that the meteorite had fallen from the sky. © 2023, Sociedad Española de Historia de las Ciencias y de las Técnicas. All rights reserved.

Llovet-Abascal, J. M. (2023). Aristotle and the Meteorite of Aegospotami. *Llull*, 46(93), 203-209. doi: 10.47101/llull.2023.46.93.llovet. Article.

José María Llovet Abascal

Senior Researcher C, SNII Level I

ARISTOTLE ON THE EFFICIENCY OF ACCIDENTAL CAUSES

ABSTRACT. In this chapter, the author reviews Aristotle's assertions throughout the Corpus about accidental causes to show that accidental causes are generally ineffective and therefore also epistemologically irrelevant. He shows that chance and luck constitute an exception to this rule, since Aristotle conceives of them as effective, although indeterminate, accidental causes. Before talking about accidental causes, it makes sense to clarify the notion of the accidental in general. Although someone unfamiliar with the art of gastronomy could produce a mouthwatering dish with beginner's luck, if the people really want a mouthwatering dish, it is better to ask someone who has cultivated the art of producing mouthwatering dishes to make it. This is an aspect of the doctrine of chance to which attention is not always paid and that also contains the key to understanding the topic of the efficacy of this type of accidental cause. © 2024 selection and editorial matter, Alberto Ross and Daniel Vázquez; individual chapters, the contributors.

Llovet-Abascal, J. M. (2023). Aristotle on the Efficiency of Accidental Causes. In A. Ross, & D. Vázquez (Eds.), *Cause and Explanation in Ancient Philosophy* (pp. 129-146). Routledge. doi: 10.4324/9781003306450-8. Book Chapter.

José María Llovet Abascal

Senior Researcher C, SNII Level I

TIME, MOTION AND SOUL IN ARISTOTLE: IS MOTION A SUFFICIENT CONDITION FOR THE EXISTENCE OF TIME?

ABSTRACT. In this paper, I discuss the conditions for the possibility of the existence of time according to Aristotle's Physics IV, 10-14. For this purpose, I present three thought experiments that help to clarify the nature of time. According to my reading, motion is not a sufficient condition for the existence of time; such condition is, instead, that motion could be measured—even if it is not actually measured. There is time when a movement can be put in a relation of proportion with another movement. © 2024 Universidad Panamericana. All rights reserved.

Llovet-Abascal, J. M. (2024). Time, Motion and Soul in Aristotle: Is Motion a Sufficient Condition for the Existence of Time?. *Tópicos (México)*, (70), 371-405. doi: 10.21555/top.v700.2669. Article.

Manuel Ocampo Ponce

SNII Level I

SOME FOUNDATIONS OF THE REALISTIC PHILOSOPHY OF SAINT THOMAS AQUINAS FOR AN ASSESSMENT OF ARTIFICIAL INTELLIGENCE (AI)

ABSTRACT. In 1956, the term artificial intelligence (AI) was introduced to refer to a technology that is capable of emulating the cognitive operations of the human being through the use of computer systems and computer programs in order to help decision-making in different areas of knowledge. However, it has been questioned whether the adjective intelligence should be used for these uses of digital technology. Concern has also been raised about its ethical implications because artificial intelligence consists of non-autonomous systems that are not capable of free and responsible acts, which requires that they be guided by people. The purpose of this paper is to present some foundations of the realistic philosophy of Saint Thomas Aquinas that allow us to make an assessment of artificial intelligence. © 2024 Universidad Católica Luis Amigo. All rights reserved.

Ponce, M. O. (2024). Some Foundations of the Realistic Philosophy of Saint Thomas Aquinas for an Assessment of Artificial Intelligence (AI). *Perseitas*, 12, 72-92. doi: 10.21501/23461780.4724. Article.

NEW TECHNIQUES FOR OLD ARGUMENTS. MAPPING AND EVALUATION OF ARGUMENTS IN ARISTOTLE, REGARDING FRIENDSHIP

ABSTRACT. The complexity of the philosophical arguments in general, and of the Aristotelian ones in particular, make possible new attempts at interpretation that can shed some light on the classical methodologies. The present investigation will allow future attempts to be focused towards a greater understanding of the Stagirite's thought, based on the reasons given by the techniques of identification and diagramming of arguments. This is intended to bring the reader closer to this wisdom of Antiquity. These methodological resources, in turn, allow a more detailed visualization of the argumentative evidence, and a closer study of the propositional connections within the structure of the reasoning. In this research, four passages from Aristotle's Nicomachean Ethics are rehearsed in order to sufficiently show the identification, analysis and diagramming of such arguments, regarding the theme of friendship, thereby illuminating the dialectical and rhetorical nature of practical philosophy. © Rómulo Ramírez Daza y García.

Daza y García, R. R. (2024). New techniques for old arguments. Mapping and evaluation of arguments in Aristotle, regarding friendship. *Revista Iberoamericana de Argumentación*, 2024(28), 1-26. doi: 10.15366/ria2024.28.001. Article.

STUDY AND DIAGRAMMING OF THE SEPULVEDA-LAS CASAS DIALECTIC IN THE LIGHT OF SOME OBJECTIONS AND REPLIES IN THE VALLADOLID DEBATE

ABSTRACT. The primary purpose of this study is to clarify the argument, including the philosophical discourse of the Sepúlveda- Las Casas debate. The aim is to show the dialectical nature of the Valladolid struggle, to analyze in detail some theological-philosophical arguments of both sides of the dispute, clarifying their assumptions, connections and doctrinal bases; and clarifying the rationality, partly dialectical and partly rhetorical, that is behind the reasons for and against this great historical debate, which took place in 1552, between the Aristotelian philosopher Juan Ginés de Sepúlveda and the theologian-humanist brother Bartolomé de Las Casas. Based on this exposition, the nature of the arguments presented can be evaluated, and their conceptual relationships and connections can be elucidated through diagramming. © Rómulo Ramírez Daza y García.

Daza y García, R. R. (2024). Study and diagramming of the Sepúlveda-Las Casas dialectic in the light of some objections and replies in the Valladolid debate. *Revista Iberoamericana de Argumentación*, 2024(3), 43-54. doi: 10.15366/ria2024.m3.003. Article.

INEFFABLE TONGUES: AN ANALYSIS OF THE NOTION OF INEFFABILITY IN PENTECOSTAL GLOSSOLALIA

ABSTRACT. In this text I will analyze the notion of ineffability present in one of the most common practices of Pentecostalism, which is known as glossolalia: speaking in strange or non-existent languages. I will begin by outlining several of the main conceptions of ineffability that have emerged in studies in philosophy of religion, which explain why this concept is essential in the consideration of various religious experiences and beliefs. Finally, I will show how in one of the most important religious movements of the last centuries a particular notion of ineffability gains strength. I will try to explain what this notion consists of and analyze the causes and implications it has in the understanding of Pentecostalism. © 2024 Slovak Academy of Sciences. All rights reserved.

Rojas, F. (2024). Ineffable Tongues: An Analysis of the Notion of Ineffability in Pentecostal Glossolalia. *Filozofia*, 79(8), 863-877. doi: 10.31577/filozofia.2024.79.8.2. Article

CAUSE AND EXPLANATION IN ANCIENT PHILOSOPHY

ABSTRACT. This volume offers an updated analysis of the use, meaning, and scope of the classical notion of *aitia*. It clarifies philosophical and philological questions about *aitia* and offers bold and innovative interpretations of this key concept of ancient philosophy. The numerous meanings and nuances of *aitia* remain difficult to grasp. Ancient philosophers use *aitia* to explain the existence and activity of substances, bodies, souls, or gods. Paradoxically, its own definition remains difficult to establish. This book reconstructs some of the most important uses, variants, and scopes of the term *aitia* within different philosophical perspectives in antiquity, including early Greek philosophy, Plato, Aristotle, Stoicism, and Islamic philosophy. The chapters analyze metaphysical aspects, epistemological issues, and logical implications of *aitia*. They engage with the most relevant critical literature generated in several modern languages. In doing so, they offer an inclusive and overarching re-evaluation of our assumptions about causation and explanation in ancient philosophy. Cause and Explanation in Ancient Philosophy will be of interest to scholars and advanced students working on Pre-Socratic philosophy, Plato, Aristotle, Hellenistic philosophy, late antiquity, and medieval philosophy. © 2024 selection and editorial matter, Alberto Ross and Daniel Vázquez; individual chapters, the contributors.

Ross, A., & Vázquez, D. (2023). *Cause and Explanation in Ancient Philosophy*. Routledge. doi: 10.4324/9781003306450. Book.

CAUSE AND EXPLANATION IN ARISTOTLE: LOGOS, EIDOS, AND TROPOS

ABSTRACT. The aim of this chapter is to propose a reconstruction of the Aristotelian notion of *aitia*. I will attempt to justify that, through this notion, Aristotle proposes a doctrine regarding the different ways to explain something, which is not necessarily linked to a specific cosmology. If we read closely his exposition about what is an *aitia* and the classifications according to their *eidos* and their *tropos*, we find a fruitful theory both from a historical and from a thematic point of view. This can be justified by identifying the methodological moment in which its exposition is found and in the kind of examples used. To prove this thesis, I will comment some passages of Ph. II 3 and Metaph. V 1-3 in order to show what is common between species and modes of *aitiai*. After that, I will analyze these classifications and attempt to show that they provide us with a wide variety of options to answer the question about why something is the case. I will also try to prove that they are not necessarily linked to a specific physics or cosmology. © 2024 selection and editorial matter, Alberto Ross and Daniel Vázquez; individual chapters, the contributors.

Ross, A. (2023). Cause and Explanation in Aristotle: Logos, Eidos, and Tropos. In A. Ross, & D. Vázquez (Eds.), *Cause and Explanation in Ancient Philosophy* (pp. 94-110). Routledge. doi: 10.4324/9781003306450-6. Book Chapter.

TEACHING AND CATHOLIC IDENTITY: WISDOM AND SOUND CRITICAL THINKING

ABSTRACT. This article aims to reflect on the teaching practices in universities of Catholic inspiration. Our study argues that the university should be a place for cultivating wisdom, not merely for transmitting specialized knowledge. This thesis is grounded in the idea that universities are engaged in a systematic pursuit of truth in its various forms. While primarily theoretical, our research is also informed by recent studies on the development of critical thinking within the academic environment. The connection between truth and wisdom suggests that ongoing engagement with reality deepens our understanding of the relationships among things, enabling us to distinguish between means and ends, and what is appropriate from what is not. Wisdom involves understanding the meaning of things and placing them in their proper context—an outlook that universities should foster in students. Although *phronesis*, the practical dimension of wisdom, cannot be directly taught, a high-quality university education can bridge the gap between theory and daily life. This connection is reflected in the promotion of a sound critical mindset, where the professor's primary goal is to stimulate active learning. This can be achieved through diverse methods and creative teaching approaches. In a Catholic university, the search for truth is intrinsically linked to intellectual development and community service, guiding individuals closer to God, the source of all wisdom. © 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Mercado, J. A., Romera, L., & Ross, A. (2024). Teaching and catholic identity: Wisdom and sound critical thinking. *Church, Communication and Culture*, 9(2), 225-243. doi: 10.1080/23753234.2024.2405054. Article.

ALBERT CAMUS: THE MEANING OF LIFE

ABSTRACT. This text explores the philosophical similarities between Albert Camus and Joseph Ratzinger (Pope Benedict XVI) in their understanding of existentialist themes, particularly the meaning of life. While Camus is known for his atheistic existentialism, Ratzinger offers an indirect dialogue with Camus by addressing the question of God and the rationality of the world. Camus presents the world as absurd and devoid of meaning, rooted in a universe where God does not exist. Ratzinger, on the other hand, argues for the primacy of the Logos, emphasizing that reality is rational and good, with the existence of God providing purpose and love. The text examines their respective positions on the nature of reality and the human condition, revealing contrasting perspectives on the rationality and meaning of existence. While Camus finds despair and meaninglessness in a godless universe, Ratzinger suggests the possibility of reconciliation and joy through the love of the Logos that radically affirms human existence, as signified by the cross of Jesus Christ..

Sada, A. (2024). Albert Camus: The Meaning of Life. In T. Rowland, A. Sada, & R. Albino de Assunção (Eds.), *Joseph Ratzinger in Dialogue with Philosophical Traditions: From Plato to Vattimo* (pp. 315-324). Bloomsbury Publishing. Book Chapter.

JEAN-PAUL SARTRE: TRUTH, FREEDOM, AND RESPONSIBILITY

ABSTRACT. The Chapter discusses the philosophical perspectives of Jean-Paul Sartre and Joseph Ratzinger (Pope Benedict XVI) regarding atheism, rebellion against truth, freedom, and the relationship between freedom and truth. Sartre's existentialist philosophy emphasizes the non-existence of God and the importance of individual freedom in defining human existence. He rejects the notion of human nature and argues that existence precedes essence. In contrast, Ratzinger criticizes Sartre's rejection of God and sees it as a rebellion against human nature and the limitations that come with it. Ratzinger asserts that truth is the foundation of freedom, and human freedom should be understood as a coexistence of freedoms in a web of mutual dependence. The texts explore the implications of these philosophical perspectives for morality, the understanding of human existence, and the relationship between freedom and responsibility.

Sada, A. (2024). Jean-Paul Sartre: Truth, Freedom, and Responsibility. In T. Rowland, A. Sada, & R. Albino de Assunção (Eds.), *Joseph Ratzinger in Dialogue with Philosophical Traditions: From Plato to Vattimo* (pp. 299-314). Bloomsbury Publishing. Book Chapter.

JOSEPH RATZINGER FRENTE AL RECHAZO DE LA FILOSOFÍA POR PARTE DE BUENAVENTURA

ABSTRACT. This article examines the way in which Joseph Ratzinger, in his doctoral thesis, dealt with Bonaventure's rejection of philosophy. Ratzinger's effort to reconcile the Seraphic Doctor— one of his favorite theologians—with philosophical thought sheds valuable light on the problem of the relationship between faith and reason in general, and theology and philosophy in particular. In the final analysis, Bonaventure's enemy is not philosophy itself but a disordered, autonomous way of understanding it, disconnected from the sources of revelation. © (2024), (Pontificia Universidad Catolica de Chile). All rights reserved.

Sada, A. (2024). Joseph Ratzinger frente al rechazo de la filosofía por parte de Buenaventura. *Teología y Vida*, 65(1), 39-69. doi: 10.7764/TyV.651.E2. Article.

**JOSEPH RATZINGER IN DIALOGUE WITH
PHILOSOPHICAL TRADITIONS: FROM
PLATO TO VATTIMO**

ABSTRACT. This book extensively explores the various influences and connections between Joseph Ratzinger and a number of leading philosophers; engaging with his work by means of Spanish, Portuguese, German, and English schools of thought through the contributions of a global body of scholars. Each chapter in this volume examines precisely how Ratzinger has dealt with the ideas of a particular philosopher, and how he has appropriated their ideas and thoughts. Moving from philosophers he has modified or critiqued – such as Kant, Comte or Wittgenstein – to those who have contributed to his philosophical theology, such as Guardini and Pieper, this truly international endeavour is an extraordinary journey into Ratzinger’s engagement with his competing and congenial schools of thought. © Alejandro Sada, Tracey Rowland, and Rudy Albino de Assunção, 2024.

Sada, A., Rowland, T., & De Assunção, R. A. (2024). *Joseph Ratzinger in Dialogue with Philosophical Traditions: From Plato to Vattimo*. Bloomsbury Publishing. Book.

**COULD FORGIVENESS BE CONSIDERED A
SOCIAL ACT? ARGUMENTS IN FAVOR AND
ITS EXPLAIN ADVANTAGES**

ABSTRACT. This paper supports the idea of forgiveness as social act and exhibits its explain advantages. In the first section, the definition of social act by Adolf Reinach is reviewed, and the critics against forgiveness as social act are considered and replied. In the second section, three main advantages of this approach are examined, one of them regarding Nussbaum’s critique on forgiveness, in which it arises mostly as a perverted value, another regarding Serrano & Cázares’ critique on certain moralizing attitudes, and the last one in consideration to the polysemy of the word. Copyright: © 2023 CSIC.

Sánchez-Barajas, M. P. (2023). Could Forgiveness Be Considered a Social Act? Arguments in Favor and its Explain Advantages. *Isegoria*, (69). doi: 10.3989/isegoria.2023.69.03. Review.

SCHOOL OF COMMUNICATION

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SYSTEMATIZED REVIEW OF THE ACADEMIC PRODUCTION ON LATIN AMERICAN PUBLIC DIPLOMACY

ABSTRACT. Public diplomacy is an international political communication activity used by countries to achieve political objectives abroad and establish positive relationships with foreign publics. There are four types of public diplomacy: cultural, media, branding, and niche. Methodology: Following the SALSA framework and the PRISMA statement's four-phase flow diagram, this paper seeks to answer the following research questions: How has the production of academic literature about Latin American public diplomacy evolved? What are the characteristics of the production country by country? What characterizes such production according to the type of public diplomacy it is focused on? The systematic review of the academic literature on Latin American public diplomacy resulted in a sample of 95 items published in databases such as Scopus, Science Direct, SpringerLink, ProQuest One Academic, Jstor, and DOAJ. Results: Academic publications on Latin American public diplomacy emerged in 2007 and have grown consistently since 2016. The primary focus has been on Brazil, Mexico, and Colombia, with Brazil and Colombia being the primary editors of journals publishing articles on the topic. Studies on Brazil and branding constitute a significant portion of the research, representing 28 % and 60 % of the sample, respectively. Conclusions: Academic production about Latin American public diplomacy begins later than that focused on other parts of the world, consistent with its later practice in the region. The dominant powers have the leading role. Branding focused on promoting tourism, investment, and exports, is the type of public diplomacy generating the most interest, to the detriment of strategies

with more political weight such as media diplomacy. Keywords. © 2024, El Profesional de la Informacion. All rights reserved.

Azpíroz. M. L., & Rodríguez-Espínola. A. (2024). Systematized Review of the Academic Production on Latin American Public Diplomacy. *Profesional de la Informacion*, 33(1), Article e330013. doi: 10.3145/epi.2024.0013. Article.

Mindaugas Briedis
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EMBODIED COGNITION AND THE IMAGING OF BIO-PATHOLOGIES: THE QUESTION OF EXPERIENTIAL PRIMACY IN DETECTING DIAGNOSTIC PHENOMENA

ABSTRACT. This article investigates the origins of the experiences involved in the diagnostics (detection and normative evaluation) of biological entities in image-based medical praxis. Our specific research aim presupposes a vast discussion regarding the origins of knowledge in general, but is narrowed down to the alternatives of anthropomorphism and biomorphism. Accordingly, in the subsequent chapters we will make an attempt to investigate and illustrate what holds the diagnostic experiential situation together—biological regularities, manifestation via movement, conscious synthesis, causal categories, or something else. We argue that as long as knowledge originates out of practices, a promising way forward is to oscillate between the prominent although controversial ideas of the history of philosophy and observations of concrete human practices, such as, in our chosen example, image-based medical diagnostics of biological pathologies. Although a number of thinkers are involved in the discussion, Aristotle and Husserl are most important here as the representatives of historical paradigms on the matter. The body in this research was not taken solely as the physical entity (Körper) but rather as a transcendental, constitutive structure where diagnostic and biological processes synchronize in teleological movement (Leib). However, philosophical speculations are illustrated by actual radiograms, the interpretation of which brings us back to the aforementioned question of primacy regarding cognition. © Springer Nature Switzerland AG 2024.

Briedis, M. (2024). Embodied Cognition and the Imaging of Bio-Pathologies: the Question of

Experiential Primacy in Detecting Diagnostic Phenomena. *History and Philosophy of the Life Sciences*, 46(1), Article 13. doi: 10.1007/s40656-024-00609-7. Article.

Mindaugas Briedis

SNII Level I

**Mariano Emmanuel
Navarro Arroyo**

Senior Researcher A, SNII Candidate Level

ENACTIVE APPROACH TO COMMUNICATION OF NORMATIVITY IN ONCORADIOLOGY DIAGNOSTICS

ABSTRACT. This article examines the enactive approach to oncoradiology imaging and the diagnostic process involved. It investigates how diagnostically relevant knowledge is related to the radiologist's (embodied) subjectivity and (professional) intersubjectivity. Besides identifying a number of correlations between the analysis of embodied cognition and image-based diagnostic praxis, the question of normativity in diagnostic praxis is thematized, which presupposes a social appropriation of biological processes and an urge to achieve optimality in the process of engaging with imaging technology and communication with professionally significant others. The theoretical claims of this research are supported and illustrated by the analysis of actual radiograms. © 2023 Vanderbilt Law Review. All rights reserved.

Briedis, M., & Navarro, M. (2023). Enactive Approach to Communication of Normativity in Oncoradiology Diagnostics. *Medicina e Morale*, 72(4), 417-431. doi: 10.4081/mem.2023.1249. Article.

KANT'S TRANSCENDENTALISM AND
TILlich'S ONTOLOGICAL THEOLOGY

ABSTRACT. The article discusses Paul Tillich's ontology against the background of Kant's transcendental philosophy, and attempts to show that Tillich criticizes Kant's critical demarcation of knowledge, on the one hand, and incorporates the categorial forms of Kant's transcendental philosophy into his ontology, on the other. When constructing the concept of ontology, Tillich uses Kant's categorial analysis and critique of metaphysics. Thus, Tillich's approach to Kant's epistemology is polemical and requires a deeper analysis. Like Kant, Tillich raises the question of what it means to exist and how this existence relates to God. Although Kant's transcendental dialectic justifies the impossibility of proving God through intellectual operations, the mind can contemplate ultimate reality. For both thinkers, the main problem becomes the application of reason beyond its theoretical competence. © 2024, Zalozba Nova Revija. All rights reserved.

Briedis, M. (2024). Kant's Transcendentalism and Tillich's Ontological Theology. *Phainomena*, 33(128-129), 5-26. doi: 10.32022/PHI33.2024.128-129.1. Article.

MEMORY IN THE PHILOSOPHY OF
RELIGION: TEMPTATIONS OF THE
CARTESIAN DEMON IN EPISTEMOLOGY
AND THEODICY

ABSTRACT. This article analyzes the notion of memory in the philosophy of religion. The area of this problematic is defined by Descartes, who, in a thought experiment, postulates an all-powerful, evil demon capable of falsifying human perception. The problem of solipsism raised here also implies doubt about claims based on memory. Descartes' assumptions are taken up constructively by Alvin Plantinga in his attempt to solve problems in the epistemology of religion by raising the following new question: is belief in God rational, and, if so, is it justified? Peter van Inwagen, for his part, uses memory analysis to construct arguments in support of theodicy. In considering these issues, other key topics within the philosophy of religion, such as the afterlife and the existence of the soul, which are closely related to the analysis of personal identity, inevitably arise. © 2024, Akademia Ignatianum w Krakowie. All rights reserved.

Briedis, M. (2024). Memory in the Philosophy of Religion: Temptations of the Cartesian Demon in Epistemology and Theodicy. *Forum Philosophicum*, 29(1), 139-152. doi: 10.35765/forumphil.2024.2901.07. Article.

A JOURNEY THROUGH THE RECENT
HISTORY OF OUR SOCIOPOLITICAL
EVENTS AND THEIR REFLECTION ON
SOCIAL NETWORKS [REVIEW]

ABSTRACT. The book *Interacciones en redes sociales y sus efectos en el mundo real: reflexiones sobre una década de profundos cambios sociales y tecnológicos* offers to its readers a journey through the recent history of all continents, especially America and Europe. The objective of its author, the academic Daniel de la Garza, is to tell us about the evolution of new technologies applied to communication from the end of the 20th century to 2023, emphasizing what happened between 2010 and 2018. With an absolutely thorough speech, the researcher - who holds a doctorate in Communication and also in Philosophy with an orientation in Political Science - does not skimp on offering all possible nuances to reality, and, although in many fragments of his book he relates social networks with their ability to polarize political discourses, it also emphasizes that the incendiary potential of these is less in those parts of the world where there is an independent press. In line with this idea of polarization, the inevitable phenomenon of hoaxes appears in the book. To counteract them, its author highlights the need for increasingly scarce investigative journalism, which in these current times is in crisis. © 2024 Universidad de Alicante. All rights reserved.

Díaz-Cerveró, E. (2024). A Journey Through the Recent History of Our Sociopolitical Events and their Reflection on Social Networks [Review]. *Revista Mediterránea de Comunicación*, 15(2), Article e27387. doi: 10.14198/MEDCOM.27387. Article.

EMERGENCY COMMUNICATION THROUGH TWITTER: LEVEL OF ACTIVITY, COMMUNICATION FUNCTIONS AND INTERACTIONS OF THE INSTITUTIONS AND SPOKESPERSONS INVOLVED IN THE WILDFIRES IN SIERRA BERMEJA, MÁLAGA

ABSTRACT. This article analyzes the communication management carried out by institutions and spokespersons on Twitter about the intentionally set fires in Sierra Bermeja, Málaga, in September 2021. The goals are to analyze the number of messages, their communicative purpose, and the level of interaction achieved. To this end, a content analysis of 582 tweets has been carried out. The main conclusion is that the institutions took advantage of their messages for self-propaganda purposes. © 2023 Departamento de Periodismo I de la Universidad de Sevilla. All rights reserved.

Díaz-Cerveró, E., Reina, M. A. C., & Calero, M. L. S. (2023). Emergency Communication Through Twitter: Level of Activity, Communication Functions and Interactions of the Institutions and Spokespersons Involved in The Wildfires in Sierra Bermeja, Málaga. *IC Revista Científica de Informacion y Comunicacion*, 20, 381-404. doi: 10.12795/IC.2023.120.16. Article.

HARNESSING INTERACTIVITY FOR ONLINE MEDIA OUTLETS: INSIGHTS FROM MEXICO'S DIGITAL LANDSCAPE

ABSTRACT. This study examines interactions between full-time members and web traffic across 137 Mexican online media platforms, as cataloged by Sembramedia in May 2023, focusing on the number of technological platforms and the type of interactivity involved. We used descriptive analyses and a structural equation model to test our hypotheses. Findings highlight the crucial role of human-to-content interactivity in shaping online media design and significantly influencing user content consumption patterns. © 2024 NOND of AEJMC.

Barredo Ibáñez, D., Díaz-Cerveró E., Pinto Garzón, K. (2024). Harnessing Interactivity for Online Media Outlets: Insights from Mexico's Digital Landscape. *Newspaper Research Journal*, 45(4), 532-550. doi: 10.1177/07395329241270458. Article.

INTERACTIVITY IN THE PRINCIPAL INDEPENDENT ONLINE MEDIA IN MEXICO (2023)

ABSTRACT. Based on the hypothesis that independent Mexican digital media outlets are more connected to their audiences than traditional newspapers, the primary objective of this study is to examine the interactivity proposed and provided to users by these independent online media outlets. As secondary objectives, we seek to identify trends in the interface design of the selected media outlets. Lastly, this research aims to compare the levels of interaction present in the sample. To accomplish this, we analyzed 137 Mexican newspapers from the Sembramedia database (2023), applying an interactivity model according to the Rodríguez et al. (2012) model, with a previous adaptation done by the authors and validated through the Kuder-Richardson coefficient (KR20). The main findings reveal that, while there are high levels of interactivity in terms of information accessibility and media presence on Web 2.0 platforms, interactivity remains limited when it comes to user-generated content reproduction, information personalization, and utilization of Web 2.0 tools. Consequently, this study concludes that the analyzed independent digital media outlets still hesitate to relinquish greater control to users. However, their business model continues to prioritize audience loyalty, increasingly relying on subscriptions and, to a lesser extent, government advertising. Furthermore, the findings suggest three crucial factors influencing the evolution of interactivity. Firstly, improving transparency in media-user communication and facilitating user content publication. Secondly, simplifying access and using intuitive tools may enhance user experience, although it could lead to a potential reduction in multimedia content. Lastly, restricting media connections with Web 2.0 platforms suggests centralizing web traffic within the outlet, departing from external platforms that monopolize advertising investment. © (2024), (Universitat Autònoma de Barcelona). All rights reserved.

Díaz-Cerveró, E., Barredo-Ibáñez, D., & Garzón, K.T.P. (2024). Interactivity in the Principal Independent Online Media in Mexico (2023). *Analisi*, 70, 59-77. doi: 10.5565/rev/analisi.3711. Article.

DIGITAL NEWS AUDIENCES IN MEXICO: AGE SEGMENT ANALYSIS

ABSTRACT. This study aims to determine whether news consumption, media trust, interest in news, and political affinity are correlated with the generational segment of the market, measured by the age of the digital audience. Furthermore, this study seeks to verify whether age is associated with digital audiences' paying attention to journalists or news brands. This research is based on a survey of 2,005 people in Mexico by YouGov in 2022, commissioned by the Reuters Institute for the Study of Journalism at the University of Oxford as part of its annual Digital News Report. The statistical method used was the chi-square test of independence between qualitative variables. The results showed that age correlates with consumption habits, media trust, interest in news, and citizens' political affinity for digital audiences in Mexico. Moreover, age relates to whether digital audiences focus on journalists or news brands in Latin America. This study delves into the characteristics of digital audiences in Mexico and contributes from a media economics, media management, and media marketing perspective. It also helps media organizations assess their market strategy, market segmentation, and target markets based on the characteristics of digital news audiences in Mexico. © 2024 Universidad de La Sabana. All rights reserved.

Gutiérrez-Rentería, M.E., Ruiz-Sanchez, E. A., & Vara-Miguel A. (2024). Digital News Audiences in Mexico: Age Segment Analysis. *Palabra Clave*, 27(3), Article e2737. doi: 10.5294/pac-la.2024.27.3.7. Article.

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INFLUENCE OF NEWS INTEREST, PAYMENT OF DIGITAL NEWS, AND PRIMARY NEWS SOURCES IN MEDIA TRUST. A MODERATED MEDIATION MODEL

ABSTRACT. This study investigated the mediating effect of the primary type of news source used by audiences on the relationship between interest in news and media trust. In addition, this study explored the moderating role of payments for digital news. Based on 12,252 respondents from six countries (the United Kingdom, the United States, France, Spain, Germany, and Finland), the study confirms that the type of news source chosen by audiences significantly mediates the relationship between interest and media trust. This mediation is not moderated by the payments for digital news. Furthermore, there is no direct association between payment and media trust, although data shows that direct effect of interest in media trust is slightly moderated by payment for digital news. © 2023 Media Management and Transformation Centre.

Vara-Miguel, A., Medina, M., & Gutiérrez-Rentería, M. E. (2023). Influence of News Interest, Payment of Digital News, and Primary News Sources in Media Trust. A Moderated Mediation Model. *Journal of Media Business Studies*, 21(4), 315-339. doi: 10.1080/16522354.2023.2214447. Article.

José Luis López Aguirre
Research Professor

MEXICAN ELECTIONS TRAVEL TO SOCIAL MEDIA: HOW CITIZENS PARTICIPATED THROUGH YOUTUBE, FACEBOOK, AND TWITTER

ABSTRACT. Mexican Elections Travel to Social Media: How Citizens Participated through YouTube, Facebook, and Twitter.

López Aguirre, J. L., & González, S. B. (2016). Mexican Elections Travel to Social Media: How Citizens Participated through YouTube, Facebook, and Twitter. In G. W. Richardson Jr. (Ed.), *Social Media and Politics: A New Way to Participate in the Political Process*: (2 vols, pp. V1-167-V1-187). Praeger. Book Chapter.

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Mindaugas Briedis
SNII Level I

CONCEPTUAL PROBLEMS WITH DISEMBODIED COGNITION IN LEARNING ENVIRONMENT(S) AND THE ALTERNATIVE OF EMBODIED CREATIVITY

ABSTRACT. The article is motivated by today's practical realities and theoretical transformations that have affected education on a major scale. The shift from in-person to online classrooms at the beginning of the pandemic brought forward a series of issues related to embodied conditioning for creative strategies in the learning process. After presenting the shortcomings of the disembodied approach to education, we emphasize the role of the embodied (somatic, motoric, affective) aspects of education and discuss the embodied skills of creativity in a variety of learning environments. While so called embodied creativity became a fast-developing field due to mostly quantitative experiments in teaching-learning environments, it still lacks some conceptual clarification, especially in relation to its genesis in the paradigm of embodied cognition. Hence the main goal of this conceptual article is to extend, through the method of theory adaptation, the existing body of research on embodied cognition in academic environments to show how the embodied teaching and learning paradigm presents embodied creativity methods as an alternative to the disembodied approach to education and how technological environments provide an opportunity for such purposes. © 2024 The Author(s). Published by Vilnius Gediminas Technical University.

Briedis, M., & Navarro, M. (2024). Conceptual Problems with Disembodied Cognition in Learning Environment(S) and the Alternative of Embodied Creativity. *Creativity Studies*, 17(1), 244-253. doi: 10.3846/cs.2024.20755. Article.

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SNII Level I

EMBODIED COGNITION AND EMPATHIC EXPERIENCES IN WAR COMMUNICATION

ABSTRACT. Using the perspective of phenomenological-enactive embodied cognition, this paper examines the role of the body in constituting specific social interactions via specific media ecologies (war imagery) during the times of (refugee) crisis. Such media ecologies give affordances that can amplify social beliefs and turn subjective judgments into an intersubjective action. We consider the human body in relation to war media as playing an important role in sustaining social experiences and relations. To that end, the article explores the fundamental experience of empathy, combining the theoretical perspectives of phenomenology and enactivism with the examples from war imagery and refugee embodiment. It is shown that the classical phenomenological tradition offers different yet useful conceptualisations of empathy. We also argue that war images and/or messages should be viewed as means/tools for, rather than representations of, the enaction of certain important experiences. Hence, the article connects the analysis of the affection by war imagery with the subsequent social interactions in the context of refugee crisis. © 2024, Lithuanian Academy of Sciences Publishers. All rights reserved.

Briedis, M., & Navarro, M. (2024). Embodied Cognition and Empathic Experiences in War Communication. *Filosofija, Sociologija*, 35(1), 98-107. doi: 10.6001/fil-soc.2024.35.1.13. Article.

JOURNALISM AND CINEMA: CONTENT, AUDIENCES, TEACHING, NEW FORMATS AND EXHIBITION SPACES [MONOGRAPH PRESENTATION]

ABSTRACT. This special issue addresses the relationship between journalism and cinema. It includes ten investigations, nine of them on journalistic cinema, that is, on films and television series that focus on the media and the work of journalists. These studies have been approached from different perspectives, such as film noir, humor, feminism or ethics, and geographical frameworks, such as Colombia, Spain or the United States. In light of its main conclusions, it can be seen how this type of cinema, which has been developing since the beginning of the 20th century, perpetuates negative stereotypes about the profession of journalist. In addition, this issue publishes a study on film journalism, a specialty that, despite its social impact, consolidation and evolution, has barely been addressed by academia in recent years. We hope that this special issue will help to awaken scientific interest in this type of cultural journalism and also to broaden the scope of study of journalistic cinema. © 2024, CEU Ediciones. All rights reserved.

Chaparro-Domínguez, M. Á., Deltell-Escolar, L., & Nicolás-Gavilán, M. T. (2024). Journalism and Cinema: Content, Audiences, Teaching, New Formats and Exhibition Spaces [Monograph Presentation]. *Doxa Comunicacion*, 2024(39), 229-237. doi: 10.31921/doxacom.n39a2209. Article.

FROM RISK PERCEPTION TO THE USE OF TECHNICAL RESTRICTIONS OF SVOD SERVICES IN MEXICO, THE MEDIATING ROLE OF PARENT INVOLVEMENT AND KNOWLEDGE

ABSTRACT. Using parental mediation and protection motivation theory, a serial moderated mediation model was developed to study what drives parents to employ technical restriction tools offered by Subscription Video on Demand (SVoD) services. Based on a survey of 1,022 parents of elementary school children (generally between the ages of 5–12) in Mexico, it was found that for Netflix and Amazon Prime Video, the use of technical restrictions appears to be triggered by parents' perception of risk and that parental involvement in children's media use and perceived knowledge of the available technical restrictions mediates the usage of the parental control tools. © 2023 Broadcast Education Association.

Sada Garibay, C., & Lapierre, M. A. (2023). From Risk Perception to the Use of Technical Restrictions of SVoD Services in Mexico, the Mediating Role of Parent Involvement and Knowledge. *Journal of Broadcasting and Electronic Media*, 68(1), 21-42. doi: 10.1080/08838151.2023.2278616. Article.

SCHOOL OF ECONOMIC AND BUSINESS SCIENCES

Norman Aguilar Gallegos

SNII Level I

ALTERNATIVE MODEL TO MEASURE THE ADOPTION OF INNOVATIONS: APPLICATION IN THE PUEBLA BEEKEEPING SYSTEM

ABSTRACT. This work aimed to adapt a methodological tool capable of improving the way to obtain the Innovation Adoption Index in the Puebla beekeeping system. A questionnaire was designed and applied to a sample of 62 beekeepers, from which information was obtained on the use of management, genetics, food, and health innovations, from which 32 original variables and seven innovation categories were defined. The Innovation Adoption Index (InAI) was redesigned and adapted using the analytic hierarchy process (AHP), which made it easier to identify social aspects of beekeepers and innovations that contribute to improving honey productivity. The results show that the innovations that contribute the most to production are those contained in the categories of apiary location and health. On the other hand, the InAIalt evaluation proved to be a pertinent alternative for the explanation of the behavior of the yield per hive in addition to showing the specific contribution percentages on the innovations assessed, which can be used to calculate estimates that are more precise and consistent with the expected yields of the region. © 2024 INIFAP-CENID Parasitología Veterinaria. All rights reserved.

Farrera-Vázquez, I. C., Martínez-González, E. G., Santoyo-Cortés, V. H., Aguilar-Gallegos, N., Luna-Olea, R.A., & Omaña-Silvestre, J. M. (2024). Alternative Model to Measure the Adoption of Innovations: Application in the Puebla Beekeeping System. *Revista Mexicana de Ciencias Pecuarias*, 15(3), 515-533. doi: 10.22319/rmcp.v15i3.6661. Article.

Norman Aguilar Gallegos

SNII Level I

TRANSITION TO SUSTAINABLE INTENSIFICATION IN SHRIMP FARMING: CHALLENGES AND OPPORTUNITIES

ABSTRACT. The main practices of Sustainable Intensification (SI) carried out by small and medium producers in shrimp farming in Sinaloa, Mexico, were analyzed. The sustainability approach was used, from establishment to commercialization. The study shows a limited incorporation of SI practices and the main limiting factors are: poor institutional and regulatory framework, lack of electricity, low adoption of technologies, inefficient food management and supply, and excessive use of antibiotics. This work contributes to the recognition of limitations in the adoption of SI in shrimp farming, and to progress in the sustainability of this activity. © (2023), (Universidad Politécnica de Valencia.). All Rights Reserved.

Maldonado-Hernández, I., Leos-Rodríguez, J. A., Aguilar-Gallegos, N., Sagarnaga-Villegas, L. M., & Astorga-Ceja, J. (2023). Transition to Sustainable Intensification in Shrimp Farming: Challenges and Opportunities. *Economía Agraria y Recursos Naturales*, 23(2), 143-165. doi: 10.7201/earn.2023.02.06. Article.

Norman Aguilar Gallegos

SNII Level I

SUSTAINABLE AGRI-FOOD SYSTEMS: THE CASE OF THE AVOCADO VALUE CHAIN IN MEXICO

ABSTRACT. Achieving sustainable agri-food systems (SAS) requires the collaborative work of multiple participants. Using a systemic analytical approach, the limiting factors for the sustainable transition of the agri-food system (AS) of the Mexican avocado value chain (VC) were studied. International, national and government data sources were consulted and complemented by three case studies. Short-term policies, current VC and AS governance structures, inadequate infrastructure for the sustainable use of natural resources and insecurity limit the achievement of the SAS. Acceptable economic indicators for the sector should allow for social and environmental improvements by introducing more efficient irrigation systems and improving current working conditions. © 2024 Universidad Nacional Autónoma de Mexico. All rights reserved.

Reyes-Gómez, H., Martínez-González, E. G., Aguilar-Ávila, J., & Aguilar-Gallegos, N. (2024). Sustainable Agri-Food Systems: the Case of the Avocado Value Chain in Mexico. *Problemas del Desarrollo*, 55(217), 29-60. doi: 10.22201/iiec.20078951e.2024.217.70098. Article.

Paloma Aguilar Ham

Research Professor

FINANCIAL SELF-EFFICACY, FINANCIAL WELL-BEING AND JOB SATISFACTION OF EMPLOYEES IN THE METAL-MECHANICAL SECTOR IN CHIHUAHUA, MEXICO

ABSTRACT. Job Satisfaction is a key element in organizational strategies, as it significantly impacts various aspects such as talent attraction, retention, performance, and organizational commitment. The aim of this study is to analyze the effect of Financial Self-Efficacy (FSE) and Financial Well-being (FWB) on the Job Satisfaction (JS) of workers in a metal-mechanical company in the maquiladora industry located in the state of Chihuahua, Mexico. The research is quantitative, non-experimental, and cross-sectional. A survey was administered to 236 workers, and the collected data were analyzed using a Structural Equation Model (SEM). The results confirm that Financial Well-being and Financial Self-Efficacy positively influence the Job Satisfaction of workers. These findings are relevant for the human resources departments of organizations, aiming to implement strategies that assist their employees in managing adequate financial well-being and self-efficacy, thereby fostering Job Satisfaction. © 2024, Universidad del Zulia. All rights reserved.

Aguilar Ham, P., Beltrán Godoy, J. H., & Gaxiola Laso, S. R. (2024). Financial Self-Efficacy, Financial Well-being and Job Satisfaction of Employees in the Metal-Mechanical sector in Chihuahua, Mexico. *Revista Venezolana de Gerencia*, 29(106), 491-510. doi: 10.52080/rv-gluz.29.106.3. Article.

Anuschka Isabel
Álvarez Von Gustedt

Research Professor

AUTONOMIST DEBATES IN LATIN AMERICA AND THE EUROPEAN UNION: DIVERGENCES AND CONVERGENCES

ABSTRACT. In a world of growing international competition and rivalry between China and the United States, Latin America and the European Union (EU) are caught in the same thorny dilemma. Positioned between these global giants, both regions are facing a return to a Westphalian system of nation-states, which undermines their roles as emerging regional players. In view of these new global challenges in Latin America and the EU, this paper uses a qualitative and comparative approach to explore foreign policy discourses on autonomy in both regions. It examines their goals and priorities and assesses the potential regional and interregional consequences. © (2024), CIDOB (Barcelona centre for international affairs). All Rights Reserved.

Álvarez, A. I., & Gratiús, S. (2024). Autonomist Debates in Latin America and the European Union: Divergences and Convergences. *Revista CIDOB d'Afers Internacionals*, (136), 63-88. doi: 10.24241/RCAI.2024.136.1.63. Article.

María Concepción
Atristain Suárez

Research Professor

Susana Castaños Cervantes

Research Professor

ASSERTIVENESS IN EDUCATIONAL AND PEDAGOGICAL STRATEGIES FOR INSTITUTIONAL COMPETITIVENESS

ABSTRACT. This book delves into the crucial role of assertiveness in shaping effective educational and pedagogical strategies. It presents innovative research and practical techniques to empower educators, students, administrators, and institutions to enhance competitiveness in the ever-evolving educational landscape. Using in-depth research, evidence-based analysis and synthesis, and examples for use in the classroom, this book offers tools to navigate the complex landscape of assertiveness in educational contexts. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Atristain-Suárez, C., & Castaños-Cervantes, S. (2024). *Assertiveness in Educational and Pedagogical Strategies for Institutional Competitiveness*. Springer Nature. doi: 10.1007/978-3-031-58885-3. Book.

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Research Professor

Susana Castaños Cervantes

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ASSERTIVENESS IN EDUCATIONAL AND PEDAGOGICAL STRATEGIES FOR INSTITUTIONAL COMPETITIVENESS

ABSTRACT. This chapter highlights the crucial importance of assertiveness in the contemporary educational field, underlining its determining role in the success of institutions in a highly competitive environment. Assertiveness, the ability to express ideas clearly and respectfully, emerges as an essential component for teachers and students, promoting relationships based on respect and trust. It details how assertiveness benefits students and teachers, facilitating effective communication, establishing clear limits and constructively addressing conflicts. It is emphasised that assertiveness strengthens educational institutions' competitiveness and guarantees comprehensive and meaningful training for students in a constantly changing world. Its impact on the active participation of students and the creation of environments conducive to learning is highlighted. The relationship between institutional competitiveness and educational assertiveness is explored in detail, highlighting how assertive educational institutions can attract the best teachers and students, constantly improving and establishing solid ties with society. Finally, the book's objectives, research questions, and structure are presented, organised into three parts that address various aspects of assertiveness in education. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Atristain-Suárez, C., & Castaños-Cervantes, S. (2024). Assertiveness in Educational and Pedagogical Strategies for Institutional Competitiveness. In C. Atristain-Suárez & Castaños-Cervantes (Eds.), *Assertiveness in Educational and Pedagogical Strategies for Institutional Competitiveness*. (pp. 1-20). Springer Nature. doi: 10.1007/978-3-031-58885-3_1. Book Chapter.

Hugo Briseño Ramírez

Senior Researcher A, SNII Level I

Rodrigo Navarro Guerrero

Research Professor

DETERMINANTS OF FINANCIAL SELF- SUFFICIENCY OF MEXICAN WATER UTILITIES

ABSTRACT. This article aims to explore the variables that impact the financial self-sufficiency of water utilities in Mexico. A panel database is built with the public information available from 31 agencies in big cities, which serve a third of the country's urban population during the years 2017 to 2019, referring to financial self-sufficiency, domestic, commercial and industrial tariffs, cross-subsidy level, physical efficiency, commercial efficiency, collection efficiency, global efficiency and a dichotomous variable that is activated when the utility is from a state in southeastern Mexico. It is found that there is a significant positive relationship between self-sufficiency and the variables domestic tariff, physical efficiency, commercial efficiency and global efficiency. Likewise, a strong significant negative relationship is found between self-sufficiency and that the organization belongs to a state in the Mexican southeast. It is concluded that the public financial information of the organizations is very limited, that an adequate tariff, as well as efficiency in management, increases financial self-sufficiency; and that the southeastern states, where there is a lot of water, decrease incentives to improve the efficiency of water utilities. © 2024 Instituto Mexicano de Tecnología del Agua. All rights reserved.

Navarro, R., & Briseño, H. (2024). Determinants of Financial Self-Sufficiency of Mexican Water Utilities. *Tecnología y Ciencias del Agua*, 15(1), 156-188. doi: 10.24850/j-tyca-15-01-04. Article.

Fernando Rey Castillo Villar

SNII Level I

EFFECTS OF FEMINIST SELF- IDENTIFICATION ON FEMVERTISING STRATEGY IN MEXICO

ABSTRACT. In recent years, advertising that communicates women's empowerment and aims to eliminate gender stereotypes (femvertising) has become more important for several companies to target and appeal to female audiences. This purpose of study is twofold: first, to analyze the impact of feminist self-identification on the trust and congruence of the femvertising brand. Second, to examine the impact of trust and congruence in femvertising on attitudes toward femvertising and its subsequent impact on brand purchase intent. A quantitative, explanatory, cross-sectional study was conducted among 401 female Millennial consumers of a bottled water brand that engages in femvertising as part of its promotional communication. Structural equation analysis results show that feminist self-identification negatively affects brand trust and perceived congruence of femvertising advertising. However, brand trust and perceived congruence have a positive impact on attitude towards femvertising, which in turn has a positive impact on purchase intention. More research still needed in the field of femvertising to develop more effective communication strategies for this target group. © 2024 Pontificia Universidad Católica de Chile. All rights reserved.

Martínez-Aguirre, A., Cavazos-Arroyo, J., Carrillo-Durán, M. V., & Castillo-Villar, F. R. (2024). Effects of Feminist Self-Identification on Femvertising Strategy in Mexico. *Cuadernos.info*, (57), 205-225. doi: 10.7764/cdi.57.64203. Article.

Fernando Rey Castillo Villar

SNII Level I

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

INDUSTRIAL BRAND EQUITY: A SYSTEMATIC LITERATURE REVIEW AND DIRECTIONS FOR FUTURE RESEARCH

ABSTRACT. The importance of industrial brand equity in the business-to-business (B2B) marketplace has seen a considerable surge in the last decade, emphasizing its crucial role in shaping competitive advantages and fostering long-term relationships within industries. However, while research has thoroughly explored the concept of brand equity in the business-to-consumer (B2C) context and its various dimensions and implications for consumer behavior, research on industrial brand equity is still recent, with many aspects remaining under-explored and lacking comprehensive theoretical grounding. To advance this emerging and important domain, bibliometric analyses and the 'Theory-Context-Characteristics-Methodology' (TCCM) framework were applied as part of the systematic literature review. Overall, 64 articles from the Web of Science database, published between 2010 and 2023, were thoroughly reviewed and analyzed. The study offers a unifying overview of existing findings on industrial brand equity, systematically highlighting the most prominent theoretical perspectives, variables such as antecedents, mediators, moderators, and outcomes, as well as various contexts and research methods that have been employed in this area. Furthermore, it provides a future roadmap aimed at stimulating further studies on industrial brand equity, addressing gaps, and proposing new directions for research. Also provided are managerial implications suggested by the findings of this research. © 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Castillo-Villar, F. R., & Murillo E. (2025). Industrial brand equity: a systematic literature review and directions for future research. *Cogent Business and Management*, 12(1), Review 2440623. doi: 10.1080/23311975.2024.2440623. Review.

Fernando Rey Castillo Villar

SNII Level I

PROSUMER CAPITALISM IN THE SHARING ECONOMY: A GENDER APPROACH TO SERVICE PROVIDERS' EXPERIENCES IN RIDESHARING PLATFORMS

ABSTRACT. Introduction: The study draws on the theory of "prosumer capitalism" to explore the experiences of female drivers in ridesharing platforms. Methods: Twenty-five phenomenological in-depth interviews were carried out with Mexican female drivers in ridesharing platforms. Results: The results yielded insights regarding the motives of women to become rideshare drivers, their prosumption experiences, and gender issues related to the job. Discussion: The study offers a novel gender-based approach to comprehend the status of female service providers as prosumer-as-producers and the diverse risks and challenges they face while working in the sharing economy. In a practical sense, platform designers and marketers can improve the application functions to attend to the specific needs of female drivers and implement inclusive measures to safeguard their integrity and well-being. Copyright © 2024 Castillo-Villar, Castillo-Villar and Castillo-Villar.

Castillo-Villar, F. R., Castillo-Villar, R. G., & Castillo-Villar, K. K. (2023). Prosumer Capitalism in the Sharing Economy: A Gender Approach to Service Providers' Experiences in Ridesharing Platforms. *Frontiers in Sociology*, 8, Article 1274969. doi: 10.3389/fsoc.2023.1274969. Article.

Alba Violeta Corona Cabrera

Assistant Researcher

A COMPARATIVE ANALYSIS OF COLOUR-EMOTION ASSOCIATIONS IN 16-88-YEAR-OLD ADULTS FROM 31 COUNTRIES

ABSTRACT. As people age, they tend to spend more time indoors, and the colours in their surroundings may significantly impact their mood and overall well-being. However, there is a lack of empirical evidence to provide informed guidance on colour choices, irrespective of age group. To work towards informed choices, we investigated whether the associations between colours and emotions observed in younger individuals also apply to older adults. We recruited 7393 participants, aged between 16 and 88 years and coming from 31 countries. Each participant associated 12 colour terms with 20 emotion concepts and rated the intensity of each associated emotion. Different age groups exhibited highly similar patterns of colour-emotion associations (average similarity coefficient of .97), with subtle yet meaningful age-related differences. Adolescents associated the greatest number but the least positively biased emotions with colours. Older participants associated a smaller number but more intense and more positive emotions with all colour terms, displaying a positivity effect. Age also predicted arousal and power biases, varying by colour. Findings suggest parallels in colour-emotion associations between younger and older adults, with subtle but significant age-related variations. Future studies should next assess whether colour-emotion associations reflect what people actually feel when exposed to colour. © 2023 The British Psychological Society.

Jonauskaite, D., Epicoco, D., Al-rasheed, A. S., Aruta, J. J. B. R., Bogushevskaya, V., Brederoo, S. G., Corona, V., Fomins, S., Gizdic, A., Griber, Y. A., Havelka, J., Hirnstein, M., John, G., Jopp, D. S., Karlsson, B., Konstantinou, N., Laurent, É., Marquardt, L., Mefoh, P. C., Oberfeld, D., Papadatou-Pastou, M., Perchtold-Stefan, C. M., Spagnulo, G. F. M., Sultanova, A., Tanaka, T., Tengco-Pacquing, M. C., Uusküla, M., Wąsowicz, G., & Mohr, C. (2023). A Comparative Analysis of Colour-Emotion Associations in 16-88-year-old Adults from 31 Countries. *British Journal of Psychology*, 115(2), 275-305. doi: 10.1111/bjop.12687. Article.

Alba Violeta Corona Cabrera

Assistant Researcher

Alejandro Rodríguez Magaña

Senior Researcher A, SNII Level I

COMPARISON OF CONSUMER PERCEPTION OF COLOMBIAN AND MEXICAN BLUEBERRIES (VACCINIUM CORYMBOSUM L. CV. BILOXI)

ABSTRACT. Consumers often associate their flavor preferences with the origin of foods and beverages; however, these distinctions are not always considered when such products are exported. This research presents the findings of a study designed to evaluate cross-cultural differences in the perceptions of Mexican and Colombian consumers regarding the organoleptic characteristics of the biloxi blueberry variety, grown in both Mexico and Colombia. For this purpose, an experimental study was conducted based on a questionnaire in which 397 consumers from both countries assessed different sensory attributes of two samples: one grown in Mexico and the other in Colombia, both belonging to the biloxi variety. In addition, a biometric test was performed to detect facial microexpressions to complement the results of the experiment with indicators of emotional valence. The study demonstrated that certain correspondences between organoleptic properties are consistent in both cultures. Specifically, in both nationalities a significant effect is evident in acidity, bitterness, and sweetness. The Colombian blueberry was perceived as sweeter, while the Mexican blueberry was evaluated as more bitter and sour. Similarly, it was found that when the blueberry evaluated was rated as more acidic, the overall flavor rating was lower. These results are relevant for blueberry producers, traders, and exporters, knowing that the sweeter varieties will be the most accepted by Colombian and Mexican consumers. © 2024 Universidad de Ciencias Aplicadas y Ambientales U.D.C.A. All rights reserved.

Rubiano-Moreno, J., Corona, V., Rodríguez-Magaña, A., & García-Segovia, P. (2024). Comparison of Consumer Perception of Colombian and Mexican blueberries (*Vaccinium corymbosum* L. cv. Biloxi). *Revista U.D.C.A Actualidad & Divulgación Científica*, 27(2), Article e2199. doi: 10.31910/rudca.v27.n2.2024.2199. Article.

Clara Cristina Catarina

Eccius Wellmann

SNII Level I

María Elena Gutiérrez Rentería

Senior Researcher B, Research Professor

CLASSIFICATION OF MEXICAN AUDIENCES BY THEIR INTEREST IN DIGITAL NEWS CONTENT AND SOCIOECONOMIC CHARACTERISTICS

ABSTRACT. The news industry faces challenges due to the global macro and micro-economic environment. The current digital situation leads to the study of the characteristics of the audience interested in news content products. The central aim of this research is to classify the main attribute interest in digital news content in Mexico of the audience's market by the attributes of age group, education level, and income level. This research is based on a survey of 2,005 digital news consumers in Mexico, directed in 2022 by the Reuters Institute for the Study of Journalism at the University of Oxford for the annual Digital News Report Study. The statistical method used is data mining with decision trees that classify the audience by the attribute of interest in the news as the dependent variable and attributes of age groups, education level, and income level as independent variables. These findings confirm the segmentation of digital news consumers' audiences. The classification in which the attributes of age groups, level of education, and income level are considered simultaneously concerning audiences' interests indicates that some of the predictions made show that some attributes may not be significant in some subsets, except for age group. The lowest average interest in the news is between 18 and 24 years, and the highest average interest in the news, which is nearly very interested, has audiences over 35 years. © 2024 Communication & Society.

Gutiérrez-Rentería, M.-E., Eccius-Wellmann, C., & Vara-Miguel A. (2024). Classification of Mexican Audiences by Their Interest in Digital News Content and Socioeconomic Characteristics. *Communication and Society*, 37(1), 205-218. doi: 10.15581/003.37.1.205-218. Article.

Santiago García Álvarez

SNII Candidate Level

Andrée Marie López Fernández

SNII Level II

CO-CREATING VALUE THROUGH PEOPLE-CENTERED LEADERSHIP: LESSONS LEARNED FROM THE COVID-19 CRISIS

ABSTRACT. COVID-19 has represented a crisis and a turning point in business dynamics. The lockdown forced people to work from home in a more flexible and technologically intensive manner. Now, well into the post-COVID-19 lockdown phase, there are numerous challenges for organizations, particularly, a person-centered leadership that may drive the co-creation of value through greater flexibility, optimal technology use, efficiency, and collaborator well-being. In this framework, adhocracy is proposed and discussed as a model to build work communities that respond to the needs of the post-pandemic lockdown world. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

García-Álvarez, S.; & López-Fernández, A.M. (2023). Co-Creating Value Through People-Centered Leadership: Lessons Learned from the COVID-19 Crisis. In E. Murillo, P. R. Morganti, & J. Moreno (Eds.), *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy* (pp. 65-89). Springer Nature. doi: 10.1007/978-3-031-41386-5_4. Book Chapter.

WHEN SPACE AND TIME MATTER IN ENVIRONMENTAL INJUSTICE: A BAYESIAN ANALYSIS OF THE ASSOCIATION BETWEEN SOCIO-ECONOMIC DISADVANTAGE AND AIR POLLUTION IN GREATER MEXICO CITY

ABSTRACT. Environmental injustice refers to the unequal burden of pollutants on groups with lower socioeconomic status. An increasing number of studies have identified associations between high levels of pollution and socioeconomic disadvantage. However, few studies have controlled adequately for spatio-temporal variations in pollution. This study uses a Bayesian approach to explore the association between socioeconomic disadvantage and pollution in Mexico City Metropolitan Area. We quantify the association of socioeconomic disadvantage with PM10 and ozone and evaluate the impact of accounting for spatio-temporal structure of the pollution data. We find a significant positive association between socio-economic disadvantage and pollution for levels of PM10, but not ozone. The inclusion of the spatio-temporal element in the modeling results in improved weaker estimates of this association but this does not alter results substantially. These findings confirm the robustness of previous studies that found signs of environmental injustice where spatio-temporal variations have not been explicitly considered, confirming that targeted policies to reduce pollution in socio-economically disadvantaged areas are required. © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023.

Lome-Hurtado, A., Touza, J., White, P. C. L., & McClean, C. J. (2023). When Space and Time Matter in Environmental Injustice: A Bayesian Analysis of the Association between Socio-economic Disadvantage and Air Pollution in Greater Mexico City. *Environmental Management*, 73(3), 657-667. doi: 10.1007/s00267-023-01905-x. Article.

CORPORATE SOCIAL RESPONSIBILITY INFORMING CRISIS MANAGEMENT FOR STAKEHOLDER SATISFACTION: FROM SURVIVAL MODE TO SURVIVABILITY IN A PANDEMIC

ABSTRACT. The second quarter of 2020 is ending, and the covid-19 pandemic is ongoing. The intricacies of this crisis are unprecedented; yet, it would be challenging to find a time in history when the human race has not been confronted with crisis and catastrophic consequences. Most individuals and organizations, surviving a crisis, are infused with collateral effects of trauma, but survive. The question is why are organizations ceasing to exist, or unable to transition to survivability? It is plausible that a different approach to crisis management is needed to face the current challenges. The general objective of this study is to analyze the implications of engaging in corporate social responsibility to inform crisis management and maintain stakeholder satisfaction. A conceptual model is discussed to describe how effective socially responsible crisis management enables firms to transition from survival mode to survivability. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021.

López-Fernández, A. M. (2021). Corporate Social Responsibility Informing Crisis Management for Stakeholder Satisfaction: from Survival Mode to Survivability in a Pandemic. In G. Dávila-Aragón, & S. Rivas-Aceces (Eds.), *The Future of Companies in the Face of a New Reality: Impact and Development in Latin America*, (pp. 169-183). Springer Nature. doi: 10.1007/978-981-16-2613-5_9. Book Chapter.

RESEARCH INFRASTRUCTURE, RESEARCH OUTCOME, AND TEACHING-LEARNING PROCESS: A CROSS-CULTURAL STUDY OF INDIA AND MEXICO

ABSTRACT. This research identifies the association between Research Infrastructure and Teaching-Learning Process with a mediation of Research Outcome. It is a cross-nation study of India and Mexico. The data was collected from the academicians of both countries in the form of an online questionnaire. A total of 429 respondents from India and Mexico responded to the questionnaire which was further segregated to 228 from India and 201 from Mexico. PLS-SEM tool has been used for data analysis and to compare both countries. A significant difference in the results of both countries was found when Research Outcome (RO) was used as a mediator. A partial mediation effect of RO is seen for the association between Research Infrastructure and Teaching-Learning Process in Mexico but for India, no mediation impact of RO was identified. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Sharma, S., López-Fernández, A. M., & Sharma, M. (2024). Research Infrastructure, Research Outcome, and Teaching-Learning Process: A Cross-cultural Study of India and Mexico. In E. G. Carayannis (Eds.), *Palgrave Studies in Democracy, Innovation and Entrepreneurship for Growth* (Part F3719, pp. 387-403). Palgrave Macmillan. doi: 10.1007/978-3-031-71667-6_16. Book Chapter.

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Lourdes Patricia
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SNII Candidate Level

THE SCRATCH DILEMMA

ABSTRACT. Theoretical basis: Ethic code moral and ethic dilemma. Research methodology: The case study is based on a series of in-depth interviews carried out with the owners and directors. The data were complemented by documentary analysis, including descriptions of internal processes, and industry information. The teaching note opted for an exploratory study using the open-ended approach of grounded theory. It is important to mention to the students that although the names of the characters and the company were modified for confidentiality reasons, the case actually happened. Case overview/synopsis: Roberto Rodarte, an employee of Internet Architects Interactive, won a luxury car in a raffle from the hotel where he was staying in a business trip. Roberto decided to keep the car and did not inform the company of what had happened. The company did not have any established policies for these situations. Manuel de la Torre, a partner, thought that it would be fair if either Roberto give the car to the company. Roberto, thought that the car belonged to him. The company decided to fire him. What could be done to avoid similar situations arising in the future? Complexity academic level: The case can be used by administrative program students and Master of Business Administration students in courses such as management, good management practices, human resources, leadership and business ethics. © 2022, Emerald Publishing Limited.

López-Hernández, C., & Chávez, A. L. (2022). The Scratch Dilemma. *CASE Journal*, 18(6), 884-897. doi: 10.1108/TJ-05-2021-0074. Article.

MEASURING JOB QUALITY IN MEXICO FROM A GENDER PERSPECTIVE

ABSTRACT. This article measures and compares the quality of employment in Mexico from a gender perspective. Indices were constructed using principal components, including income, social security, job stability and work-life balance data from the ENOE for two periods (2012 and 2022). The results showed low and similar job quality in Mexico for both men and women, with significant heterogeneity between regions. The state with the highest job quality for women was Chihuahua, while Oaxaca had the lowest job quality across all indices. Income is the factor most affected over time for both genders, with a more significant disadvantage for women. © 2024 Universidad Nacional Autonoma de Mexico. All rights reserved.

Maisterrena, L. (2024). Measuring Job Quality in Mexico from a Gender Perspective. *Problemas del Desarrollo*, 55(218), 89-116. doi: 10.22201/iiec.20078951e.2024.218.70161. Article.

IT IS NOT ENOUGH: THE MODERATION EFFECT OF ENTREPRENEURSHIP EDUCATION IN MEXICAN UNIVERSITY STUDENTS

ABSTRACT. Understanding the impact of entrepreneurship education on the entrepreneurial cognition of university students is relevant to finding ways to foster entrepreneurship that boost the economy in developing countries. The objective of this study is to determine the influence of personal attitude, perceived behavioral control, and subjective norms on entrepreneurial intention, and to discover if there exists a moderation effect of entrepreneurship education on the abovementioned aspects. We collected 343 questionnaires of students of the Center for Administrative and Economic Sciences of a Mexican university. We used structural equations through the method of partial minimum squares, and, to test the hypothesis, we used the Smart-PLS 3.0 software. The results indicate that entrepreneurship education does not have a significant moderation effect on the relationship between personal attitude on entrepreneurial intention and perceived behavioral control on entrepreneurial intention. However, there exists a significant and positive influence of personal attitude on entrepreneurial intention and perceived behavioral control on entrepreneurial intention. We conclude that current entrepreneurship education has the opportunity to create impactful outcomes because the theory is easy, but entrepreneurship in reality is hard and requires more effort. We recommend including a wider view with external resources like lectures of experts from the entrepreneurial ecosystem and support from government and potential investors, among other approaches. © 2024 by the authors.

Melchor-Durán, I. L., Pinzón Castro, S. Y., Cheynergarcía, A., & Alvarado-Carrillo, A. (2024). It Is Not Enough: The Moderation Effect of Entrepreneurship Education in Mexican University Students. *Administrative Sciences*, 14(10), 235. doi: 10.3390/admsci14100235. Article.

Javier Moreno Espinosa

SNII Candidate Level

VAT ELASTICITIES ON IMPORTS AS A LEVER TO FORECAST COLLECTION: MEXICO 2010–2021

ABSTRACT. This chapter obtained the elasticities of VAT collection with respect to merchandise imports classified in the 99 chapters of the International Harmonized System 2010–2021. Evidence of an equilibrium relationship, in the long run, was found by cointegration in a VEC model. The results show that sixteen chapters explain 82% of the value of imports with different elasticities which allows identifying the sensitivity of VAT collection in generating income from imports. The chapters that stand out are machinery and electrical material; mechanical devices, boilers, and their parts; goods related to land transport and its parts, and mineral fuels and their products. The elasticities can be a lever that contributes to a better forecast of tax government revenues, specifically of the second source of income. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Moreno-Espinosa, J., Mata, L. M., & Beltrán-Godoy, J. H. (2023). VAT Elasticities on Imports as a Lever to Forecast Collection: Mexico 2010–2021. In E. Murillo, P. R. Morganti, & J. Moreno (Eds.), *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy* (pp. 115–139). doi: 10.1007/978-3-031-41386-5_6. Springer Nature. Book Chapter.

Paolo Riccardo Morganti

Senior Researcher A

THE EFFECTS OF FLEXIBLE WORKSPACE ON ORGANIZATIONAL STRUCTURE AND INEQUALITY: AN EQUILIBRIUM ANALYSIS

ABSTRACT. The need to implement home-office after the COVID-19 pandemic impacts the flow of knowledge transmitted within an organization. As companies restructure their hierarchies to ensure the best use of the time of their managers, impactful changes in the job markets will follow. Using a general equilibrium approach, we predict that an increase in internal communication costs generates a fall in the economy's wealth, a decline in the dispersion of wages and also of managers' compensations, but an increase in overall inequality. Moreover, we predict that the new configuration of the economy will feature more firms, but of smaller size. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Morganti, P. R., & García-Cano, G. (2023). The Effects of Flexible Workspace on Organizational Structure and Inequality: An Equilibrium Analysis. In E. Murillo, P. R. Morganti, & J. Moreno (Eds.), *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy* (pp. 23–42). Springer Nature. doi: 10.1007/978-3-031-41386-5_2. Book Chapter.

Paolo Riccardo Morganti

Senior Researcher A

María Concepción Atristain Suárez

Research Professor

THE ROLE OF DEVELOPMENT AND COMMERCIAL BANKING IN PROMOTING ECONOMIC GROWTH IN MEXICO: A SECTORAL ANALYSIS

ABSTRACT. This study examines the impact of credit extended by both commercial and development banks on exports, GDP, and FDI across different sectors in Mexico. The research lies within the broader context of financial sector development and its role in promoting regional development and economic growth. We use panel data techniques to compare traditional models that include only commercial bank credit with models incorporating development bank credit. Our results emphasize the different and complementary roles of commercial and development banks. The latter is crucial in addressing market failures and supporting long-term, socially and economically beneficial projects. The study concludes that development bank credit should be integrated into economic studies to better understand its contribution to sustainable growth. It suggests that policymakers should coordinate the roles of both banking sectors to foster a balanced and resilient economy. © 2024 by the authors.

Gil-Jardón, J. A., Morganti, P. R., & Atristain-Suárez, C. (2024). The Role of Development and Commercial Banking in Promoting Economic Growth in Mexico: A Sectoral Analysis. *Journal of Risk and Financial Management*, 17(11), 505. doi: 10.3390/jrfm17110505. Article.

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

Paolo Riccardo Morganti

Senior Researcher A

Javier Moreno Espinosa

SNII Candidate Level

CREATING ECONOMIC STABILITY AMID GLOBAL UNCERTAINTY: POST-PANDEMIC RECOVERY IN MEXICO'S EMERGING ECONOMY

ABSTRACT. COVID-19 impacted economic activity in a way that hurt households, businesses, industries, and governments. What followed immediately was a period of high uncertainty, and what's to come is still unknown. Economists have a lot to learn from this point in history, as different countries have handled this very differently from others. This book journeys through what one emerging economy has done to attempt recovery following immense disruption: Mexico's recovery following the pandemic. This volume offers empirical studies that trace the post-pandemic recovery period in Mexico, providing insight into what this emergent economy went through and did after 2021. The first part of the book examines macroeconomics, such as tax collection, and microeconomics, such as household income. These chapters draw on policy and the actions driving the economic recover in this emergent economy. The second half of the book focuses on what organizations can do to improve internal governance as well as market success. Full of new conceptual and empirical studies, the book explains what it looks like to rebuild an emerging economy. It will appeal to economists, economic scholars, and policymakers trying to make sense of the best ways to move forward following intense period of economic instability. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Murillo, E., Morganti, P. R., & Moreno-Espinosa, J. (2023). *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy*. Springer Nature. doi: 10.1007/978-3-031-41386-5. Book.

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

DELIVERING THE BRAND PROMISE THROUGH GIG WORKERS: INTERNAL BRAND MANAGEMENT IN RIDE-HAILING PLATFORMS

ABSTRACT. This paper explores the intersection of Internal Brand Management (IBM) and the Sharing Economy, specifically how platform organizations ensure brand-aligned service while relying on gig workers. Basic IBM relationships are examined for continued validity in two ride-hailing platforms. Potential moderators are explored, including electronic performance monitoring, qualitative job insecurity, and platform fairness. Findings reveal that IBM relationships persist, offering a scalable solution for consistent brand delivery. Moderating effects are identified, offering insights for platform managers and prompting avenues for future research. With growth of the gig economy, understanding the adaptability of IBM in platform contexts is crucial for brand success. © 2024 Taylor & Francis Group, LLC.

Murillo, E., & Terán-Bustamante, A. (2024). Delivering the Brand Promise Through Gig Workers: Internal Brand Management in Ride-Hailing Platforms. *Services Marketing Quarterly*, 45(4), 361-396. doi: 10.1080/15332969.2024.2396223. Article.

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

FINDING BRAND VALUES THAT MATTER TO EMPLOYEES

ABSTRACT. Employee-brand value congruence plays a significant role in transforming service employees into brand ambassadors. However, most studies examining this construct have utilized reflective measures that only render overall congruence levels. Considering the multi-facet nature of brand values, we advance a Multiple Indicators Multiple Causes model (MIMIC model) that assesses both the overall level of value congruence and the contribution of specific brand values that drive the congruence perception. Through two empirical studies, the findings strongly support the validity of this approach and demonstrate how to identify specific brand values that resonate with employees to design effective internal branding programs. © 2024 Taylor & Francis Group, LLC.

Xiong, L., King, C., Du, J., & Murillo, E. (2024). Finding Brand Values That Matter to Employees. *Services Marketing Quarterly*, 45(3), 342-360. doi: 10.1080/15332969.2024.2383048. Article.

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

INTERNAL BRANDING IN RETAIL ORGANIZATIONS: A STUDY IN A CHAIN OF PHARMACIES

ABSTRACT. The objective of this article is to introduce the concept of internal branding to the organizational literature published in Mexico, distinguishing it from related concepts such as internal marketing and employer branding. The method consisted of estimation of a structural equations model using Partial Least Squares, with a sample of 310 surveys of employees from a large chain of pharmacies. The results show a positive relationship between employees' brand values fit and their job satisfaction, intention to stay and brand-aligned behavior. The principal finding is that internal branding exceeds the exclusive scope of marketing and positively influences traditional human resource objectives, such as employee satisfaction and intention to stay. © 2020, Universidad de Guadalajara. All rights reserved.

Murillo, E. (2020). Internal branding in retail organizations: a study in a chain of pharmacies. *Mercados y Negocios*, 2020(42), 27-50. doi: 10.32870/myn.vli42.7506. Article.

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

INTERNAL BRANDING PROCESSES IN A FASHION ORGANIZATION: TURNING EMPLOYEES INTO BRAND AMBASSADORS

ABSTRACT. This research aims to empirically examine the internal branding processes implemented by a global sports fashion firm to turn all employees into competent brand ambassadors. Brand-oriented training was hypothesized as an antecedent of salesperson brand identification and brand commitment, which drive brand-aligned behavior, the critical trait of employee brand ambassadors. These hypotheses were tested by surveying 141 corporate and retail employees of a global sportswear fashion brand's regional operations in Mexico. The principal conclusion is that brand-oriented training proves a significant driver of salesperson brand identification. Furthermore, brand identification drives brand commitment and brand-aligned behavior among all company employees, not just salespersons. © 2024, Universidad de Guadalajara. All rights reserved.

Murillo, E., Sádaba, T., Mir-Bernal, P., Terán-Bustamante, A., & López-Sánchez, O. (2024). Internal Branding Processes in a Fashion Organization: Turning Employees into Brand Ambassadors. *Mercados y Negocios*, 2024(52), 3-30. doi: 10.32870/myn.vi52.7718. Article.

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

María Concepción

Atristain Suárez

Research Professor

LEVERAGING STRATEGIC PLANNING TO NAVIGATE VOLATILE ENVIRONMENTS

ABSTRACT. Periods of rapid change underscore the importance of Strategic Planning as a managerial lever for decision-making in the face of environmental volatility. This study examines the effect of two strategies implemented by a university as part of the strategic plan devised to respond to the COVID-19 pandemic. Student assessments of brand promise delivery and an updated corporate visual identity (CVI) are measured through an online survey (n=288). Brand promise delivery has a substantive effect on the university's reputation and brand advocacy, in both cases mediated by brand image and student satisfaction. The new CVI positively moderates the relationship between brand promise delivery and brand image. By focusing on the impact of two marketing strategies, the study illustrates the cyclical nature of the Strategic Planning process, and how successive cycles of planning can benefit from the knowledge gained through empirical research. Managerial applications are suggested. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Murillo, E., & Atristain-Suárez, C. (2023). Leveraging Strategic Planning to Navigate Volatile Environments. In E. Murillo, P. R. Morganti, & J. Moreno (Eds.), *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy* (pp. 189-217). Springer Nature. doi: 10.1007/978-3-031-41386-5_9. Book Chapter.

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Senior Researcher B, SNII Level I

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Senior Researcher B, SNII Level I

FACTORS AFFECTING RESEARCHERS' INCENTIVE PREFERENCES: A CROSS SECTIONAL STUDY OF PRIVATE UNIVERSITIES IN MEXICO

ABSTRACT. Incentives to scientific products have become an important tool to increase research productivity in universities around the world, usually through financial incentives policies aimed to foster publications or citations. In this paper, we study the preferences of researchers regarding research incentives in Mexican private universities. Through statistical methods, including z-tests for differences in proportions and correlation tests, we analyzed the results of a survey applied to researchers of business and engineering areas. Results suggest that demographic aspects like age, rather than salary range and years of experience, influence researcher's incentive preferences, and that non-financial incentives are significant to young researchers. We also find that timing for receiving incentives is a significant factor that might drive researchers' decisions. This study contributes to identifying the right incentives for researchers, considering that in Mexico these incentive programs are entirely financed by universities. The relevance of this research is that it allows policymakers to design comprehensive research policies including not only university research goals, but also researchers' preferences to ensure their commitment and motivation. © 2024 Ali Khorsandi Taskoh. All rights reserved.

Núñez-Acosta, A., Sánchez-García, J. Y., & Ramírez-Nafarrate, A. (2024). Factors Affecting Researchers' Incentive Preferences: A Cross Sectional Study of Private Universities in Mexico. *Journal of Higher Education Policy and Leadership Studies*, 5(3), 113-132. doi: 10.6186/johepal.5.3.113. Article.

DETERMINING THE FACTORS TO IMPROVE SUSTAINABLE PERFORMANCE IN A MEDIUM-SIZED ORGANIZATION

ABSTRACT. Small- and medium-sized organizations rely heavily on their internal configuration to achieve sustainable performance. However, their internal structure often represents an obstacle to achieving that goal. To help organizations achieve sustainable performance, we develop a research framework using the viable system model (VSM) to evaluate the relationship between organizational factors. We adopt a systems perspective: (1) The VSM serves as a theoretical foundation to define factors to be evaluated through a conceptual model; (2) social network analysis to obtain information for the conceptual model; (3) partial least squares path modeling to test the proposed model with 150 employees; and (4) VSM to suggest changes. The nine hypotheses are supported, suggesting that improving sustainable performance is related to adopting a network structure and focusing on relational factors to reduce inconsistencies between operations and coordination systems. This article differs from previous studies, as it proposes a methodological coupling to assist decision-makers in improving organizational balance and performance. Additionally, it can encourage academics to reconsider structural factors, enabling them to allocate resources more precisely and enhance effectiveness. © 2024 by the authors.

Núñez-Ríos, J. E., & Sánchez-García, J. Y. (2024). Determining the Factors to Improve Sustainable Performance in a Medium-Sized Organization. *Sustainability* (Switzerland), 16(16), Article 6937. doi: 10.3390/su16166937. Article.

PRIORITIZING FACTORS TO FOSTER IMPROVEMENT OF SALES OPERATIONS IN SMALL- AND MEDIUM-SIZED INDUSTRIAL ORGANIZATIONS

ABSTRACT. Small- and medium-sized companies depend heavily on their internal configuration to achieve their goals, generate profit, and remain competitive. The performance of the sales department is often crucial for this. Decision-makers need to understand how to coordinate the sales force's operations while considering team members' communication and commitment. This article presents an approach to prioritize factors that will improve the operations of the sales department in small- and medium-sized companies in the industrial sector. To achieve this, we adopted the soft modeling approach by (1) outlining a conceptual model that identifies the factors that can lead to improvements based on the literature and (2) using the analytical hierarchy process to validate a construct and prioritize the factors. This study is focused on the organizational domain and involves the participation of sixty employees from medium-sized Mexican companies with at least five years of experience. The results indicate that the factors that foster improvement in sales department operations are communication improvement, failure prevention, workload alignment, and adequate integration of human efforts with technology without neglecting coordination and management mechanisms. This article could encourage academics and practitioners to adopt the soft modeling approach to adopt new courses of action based on continuous learning and improve organizational cohesion. © 2024 by the authors.

Vásquez-Ruiz, L. A., Núñez-Ríos, J. E., & Sánchez-García, J. Y. (2024). Prioritizing Factors to Foster Improvement of Sales Operations in Small- and Medium-Sized Industrial Organizations. *Systems*, 12(9), Article 383. doi: 10.3390/systems12090383. Article.

HOW MUCH DO MEXICANS PAY FOR REGULATION IN THE TRANSPORTATION OF OIL PRODUCTS?

ABSTRACT. The new oil derivatives transportation scheme proposed by the 2013 Mexican Energy Reform allowed new participants to enter the sector. The new legal framework requires fulfilling many requirements and corresponding duties for the transportation of oil products. The Mexican government already has an institution dedicated to measuring the regulatory cost of each federal procedure. This work aims to quantify the regulatory costs associated with the procedures and their compliance to obtain permits for transporting oil products by truck. We use the standard cost method to measure these costs, considering all associated costs. The results showed that two government offices did not adequately measure these costs. They did not consider relevant information on frequency and opportunity costs, resulting in undervaluation and leading to wrong expectations. As a result of this research, we provide a more accurate way of estimating these costs, which brings greater certainty in the budgeting of these projects and, therefore, increases the probability of survival and success. © 2024 by author(s).

Jiménez-Pérez, A. I., & Ortiz-Arango, F. (2024). How Much do Mexicans Pay for Regulation in the Transportation of Oil Products? *Journal of Infrastructure, Policy and Development*, 8(5), Article 3695. doi: 10.24294/jipd.v8i5.3695. Article.

THE EFFECTS OF NATURAL GAS MARKET REFORMS IN MEXICO ON ITS PRICES, SALES AND FOREIGN TRADE

ABSTRACT. The objective of this article is to evaluate changes produced by regulatory reforms in the Mexican natural gas market between 2009 and 2018. For this purpose, various unit tests and structural breaks are carried out on the series of volumes and prices of natural gas that describe their behavior in national and international markets. The results of the statistical analysis support that all series are subject to structural changes in tendency and intercept between 2016 and 2017, so that they show a unit root. Consequences of such behaviors are relevant since shocks on series are permanent and due to the start of the reform. © 2019 Universidad Nacional Autónoma de México, Facultad de Contaduría y Administración. Este es un artículo Open Access bajo la licencia CC BY-NC-SA (<https://creativecommons.org/licenses/by-nc-sa/4.0/>).

Ortiz-Arango, F. O., Ramírez, J. C., & Rosellón, J. (2021). The Effects of Natural Gas Market Reforms in Mexico on its Prices, Sales and Foreign Trade. *Contaduría y Administración*, 66(3). doi: 10.22201/fca.24488410e.2021.2841. Article.

POSSIBLE PATHS FOR MEXICO'S ELECTRICITY SYSTEM IN THE CLEAN ENERGY TRANSITION

ABSTRACT. This paper analyzes possible paths for Mexico's Electricity System. It shows that under the current dispatch order and minimization of electricity production-cost guidelines, Mexico will not reach the 50% clean electricity goal in 2050; however, this goal could be achieved before 2030 if the government favors CO₂ minimization, with a low impact on energy costs. The effects of pollution are analyzed considering cost and CO₂ minimization guidelines, combining four energy demand growth scenarios and three investment growth scenarios. Finally, we show that if Mexico wants to take advantage of nearshoring, it is essential to consider the presented alternatives. © 2024 The Authors.

Cruz Ake, S., Ortiz Arango, F., & García Ruiz, R. S. (2024). Possible Paths for Mexico's Electricity System in the Clean Energy Transition. *Utilities Policy*, 87, Article 101716. doi: 10.1016/j.jup.2024.101716. Article.

Juan Pablo Patiño Karam

SNII Candidate Level

SELF-EFFICACY IN SOCIAL MEDIA ADVERTISING VALUE AGAINST CHRONIC AND PANDEMIC DISEASES

ABSTRACT. Purpose. The paper aims to explain a proposal framework composed of social media advertising value (SMAV) and self-efficacy (SEF) constructs with complementary factors such as risk and protection perception, sentiment, and motivations in users under chronic and pandemic disease environments. Methodology. SMAV-SEF literature review with additional factors in a theoretical questionnaire survey to 500 regular consumers (Sep-Nov, 2021). Results. Unexpected null relationship of SEF to people sentiment and positive contribution to risk perception. Originality' is based on the SMAV-SEF as the main constructs to be complemented with factors of a final framework explaining how to be used against chronic and pandemic diseases. ©2019 Universidad Nacional Autónoma de México, Facultad de Contaduría y Administración.

Mejía-Trejo, J., Patiño-Karam, J. P., & Vázquez-Elorza, A. (2024). Self-Efficacy in Social Media Advertising Value Against Chronic and Pandemic Diseases. *Contaduría y Administración*, 69(2), 281-315. doi: 10.22201/FCA.24488410E.2024.4535. Article.

Salvador Rivas Aceves

Senior Researcher B, SNII Level I

CRITICAL SOCIAL PARTICIPATORY ACTION RESEARCH FOR CONSCIENTIZATION: PEDAGOGIES AND FINDINGS FROM XOCHIMILCO

ABSTRACT. The Small Scale Food Production for Cultural Preservation and Economic Inclusion project is a critical social participatory action research project that utilizes critical pedagogies to facilitate spaces of learning and research where power differentials are both recognized and dismantled. The process of consciousness raising those results is an example of applied conscientization. The key pedagogical strategies explained in this article include co-constructed knowledge, critical praxis, a relational design rooted in dialogue and ongoing project partnership. © 2024 The Kerala State Higher Education Council.

Schmidt, S., & Rivas-Aceves, S. (2024). Critical Social Participatory Action Research for Conscientization: Pedagogies and Findings from Xochimilco. *Higher Education for the Future*, 11(2), 168-184. doi: 10.1177/23476311241249247. Article.

Salvador Rivas Aceves

Senior Researcher B, SNII Level I

Enrique Martín Murillo Othón

Senior Researcher C, SNII Level II

LOOKING BACK AT 2022: A RECOVERY OR A PROTRACTED CRISIS?

ABSTRACT. The year 2022 was a turbulent time for the global economy because of the cumulative impact of the war in Ukraine, rapid spread of COVID-19 Omicron, record-breaking heat waves, and other macroeconomic shocks. The adverse situation was reflected in many industries, as operations were hampered by employee absenteeism, supply chain disruptions, and inflation. Inflation is seen as the most severe long-lasting damage from the pandemic together with the recessionary interest rate hikes central banks have implemented to control it. Inflation is analyzed as mainly a supply-side problem, caused by supply chain disruptions and companies that went out of business during the lockdowns. As a consequence, high interest rates have so far failed to dampen inflation, but have negatively impacted investment, consumption, tax collection, and public debt payment issues for several countries. This Introduction also includes a commentary of all chapters in this volume. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Murillo, E., & Rivas-Aceves, S. (2023). Looking Back at 2022: A Recovery or a Protracted Crisis? In E. Murillo, P. R. Morganti, & J. Moreno (Eds.), *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy* (pp. 3-21). Springer Nature. doi: 10.1007/978-3-031-41386-5_1. Book Chapter.

Alejandro Rodríguez Magaña

Senior Researcher A, SNII Level I

Hugo Briseño Ramírez

Senior Researcher A, SNII Level I

A MONTE CARLO SIMULATION CASE STUDY ON BLUEBERRIES FROM MEXICO CASE STUDY

ABSTRACT. Global blueberry production more than doubled during the last decade. In Mexico, the production of this fruit has grown faster than globally, positioning this country among the top five international blueberry-producing regions. This case study focuses on a prospective investor planning to grow blueberries in Mexico and export most production to the U.S., the largest producer and consumer of fresh blueberries. A high-technology producer growing blueberries under high tunnels in western Mexico is featured in this article. The case study was researched using a combination of field visits to blueberry producers, collaborative work with an industry consultant, and academic research. The article provides industry statistics on blueberries in Mexico and globally over the last decade. In addition, it describes how the authors conceptualized and developed discounted cash flow models to evaluate this potential investment. Despite the importance of blueberries from Mexico, there is a need for financial models to assess the profitability and risk of growing blueberries in that country. Students solving this case are expected to identify risks and opportunities in the industry and conduct Porter's five forces competitive analysis. In addition, students will mainly evaluate the results of a stochastic capital budgeting model. © 2023 Trejo-Pech et al.

Trejo-Pech, C. O., Rodríguez-Magaña, A., Briseño-Ramírez, H., & Ahumada, R. (2024). A Monte Carlo Simulation Case Study on Blueberries from Mexico Case Study. *International Food and Agribusiness Management Review*, 27(2), 359-377. doi: 10.22434/IFAMR2023.0052. Article.

Alejandro Rodríguez Magaña

Senior Researcher A, SNII Level I

BASELINE MICROBIOTA OF BLUEBERRIES, SOIL, AND IRRIGATION WATER FROM BLUEBERRY FARMS LOCATED IN THREE GEOGRAPHICAL REGIONS

ABSTRACT. Bacterial microbiota was determined in fruit, soil, and irrigation water from blueberry (*Vaccinium* spp.) farms located in Cundinamarca, Colombia; Mississippi, United States; and Jalisco, Mexico. Bacterial communities were studied using 16S ribosomal ribonucleic acid (rRNA) gene amplification by targeting the V3-V4 hyper-variable region. The most abundant phylum in fruit was Proteobacteria in Colombia and the United States and Firmicutes in Mexico. The most abundant phylum in soil and water was Proteobacteria for all regions. The top three genera found in fruit were *Heliorestis* (9.2 %), *Rhodanobacter* (3.3 %), and *Sphingomonas* (2.8 %) for Colombia, *Heliorestis* (23.1 %), *Thiomonas* (8.5 %), and *Methylobacterium* (3.3 %) for the United States, and *Heliorestis* (47.4 %), *Thiomonas* (9.1 %), and *Bacillus* (4.6 %) for Mexico. Colombia reported the highest (Padj < 0.05) alpha diversity for blueberries, and United States and Mexico had similar (Padj > 0.05) results. Beta diversity revealed bacterial communities in fruit differed (P < 0.05) by region. Bacterial differences existed between Colombia, United States, and Mexico for soil and fruit (P = 0.021, 0.003, and 0.006, respectively) and water and fruit (P = 0.003, 0.003, and 0.033, respectively). Blueberries grown in the three different regions have unique microbiota. Fruit and fruit-environment microbial composition also differed by region. These results provide a more complete profile of the bacterial communities on blueberries and their agricultural environments and could contribute to better management and decision-making practices in terms of plant health, food quality, and food safety. © 2024.

Abdallah-Ruiz, A., Esteban-Pérez, C., White, S. B., Schilling, W., Zhang, X., Stafne, E. T., Rodríguez-Magaña, A., Peña-Baracaldo, F., Moreno-Ortiz, C. A., & Silva, J. L. (2024). Baseline Microbiota of Blueberries, Soil, and Irrigation Water from Blueberry Farms Located in Three Geographical Regions. *Heliyon*, 10(23), Article e40762. doi: 10.1016/j.heliyon.2024.e40762. Article.

Román Rodríguez Aguilar

Senior Researcher C, SNII Level II

A MACHINE LEARNING-BASED ANALYTICAL INTELLIGENCE SYSTEM FOR FORECASTING DEMAND OF NEW PRODUCTS BASED ON CHLOROPHYLL: A HYBRID APPROACH

ABSTRACT. This manuscript addresses the problem of forecasting the demand for innovative products with limited and inhomogeneous sales data over time. The main objective of the study is to use the information available from a group of innovative chlorophyll-based food products to build a coherent demand forecasting system. From a transactional database, time series were constructed for each group of products, analyzing the stationarity and seasonality of the time series through the Dickey-Fuller and Canova-Hansen tests. Likewise, an ARIMA model, a long short-term memory (LSTM) recurrent deep neural network, and a support vector machine (SVM) were trained to select the best model for each product based on a forecast performance metric. A comparison between classical forecasting techniques and machine learning models is shown. The LSTM neural network was the best model for most products because the internal architecture of the network allows not only to capture non-linear relationships between variables but is also capable of controlling the flow of information to preserve characteristics over time that are relevant for forecasts. The second-best model was the SVM, which allows capturing non-linear behaviors through kernel functions and uses a smaller amount of data for its estimation. Finally, the ARIMA model presented the lowest performance for all products. The objective of having various methodologies is that the system allows the best forecast to be selected according to the type of product, availability of information and methodology used, which will allow the company to integrate new products into the system over time. © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2024.

Rodríguez-Aguilar, R., Marmolejo-Saucedo, J. A., García-Llamas, E., Rodríguez-Aguilar, M., & Marmolejo-Saucedo, L. (2024). A Machine Learning-Based Analytical Intelligence System for Forecasting Demand of New Products Based on Chlorophyll: A Hybrid Approach. *Wireless Networks*, 30(9), 7457-7468. doi: 10.1007/s11276-024-03650-3. Article.

DEVELOPMENT OF A DIGITAL TWIN DRIVEN BY A DEEP LEARNING MODEL FOR FAULT DIAGNOSIS OF ELECTRO-HYDROSTATIC ACTUATORS

ABSTRACT. The first quarter of the 21st century has witnessed many technological innovations in various sectors. Likewise, the COVID-19 pandemic triggered the acceleration of digital transformation in organizations driven by artificial intelligence and communication technologies in Industry 4.0 and Industry 5.0. Aiming at the construction of digital twins, virtual representations of a physical system allow real-time bidirectional communication. This will allow the monitoring of operations, identification of possible failures, and decision making based on technical evidence. In this study, a fault diagnosis solution is proposed, based on the construction of a digital twin, for a cloud-based Industrial Internet of Things (IIoT) system contemplating the control of electro-hydrostatic actuators (EHAs). The system was supported by a deep learning model using Long Short-Term Memory (LSTM) networks for an effective diagnostic approach. The implemented study considers data preparation and integration and system development and application to evaluate the performance against the fault diagnosis problem. According to the results obtained, positive results are shown in the construction of the digital twin using a deep learning model for the fault diagnosis problem of an active EHA-IIoT configuration. © 2024 by the authors.

Rodríguez-Aguilar, R., Marmolejo-Saucedo, J. A., & Köse, U. (2024). Development of a Digital Twin Driven by a Deep Learning Model for Fault Diagnosis of Electro-Hydrostatic Actuators. *Mathematics*, 12(19), Article 3124. doi: 10.3390/math12193124. Article.

DIGITALIZATION OF HEALTHCARE SUPPLY CHAIN DESIGN

ABSTRACT. Healthcare supply chain digitalization is the process of applying digital technologies to healthcare supply chain processes and systems. It includes the use of technologies such as artificial intelligence, data analytics, robotics, and augmented reality to improve supply chain efficiency, precision, and transparency. It includes companies, facilities, and all business activities to supply, manufacture, store, and distribute products. This study presents an overview of current supply chain digitalization processes and a hypothetical example of how it could be migrated from a traditional case to one of digitalization in its early stages. The digitalization process focuses mainly on the collection of information regarding the management of several inventory policies and their impact on key performance indicators. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Marmolejo-Saucedo, J. A., Rodríguez-Aguilar, R., Marmolejo-Saucedo, L., Rodríguez-Aguilar, M. (2024). Digitalization of Healthcare Supply Chain Design. In *7th EAI International Conference on Computer Science and Engineering in Health Services, COMPSE 2023; Mexico City; Mexico; 16 November 2023 through 17 November 2023, EAI/Springer Innovations in Communication and Computing* (pp. 99-106). Springer. doi: 10.1007/978-3-031-67440-2_8. Conference paper.

DIMENSIONS RELATED TO NCD IN DEVELOPING COUNTRIES DURING WORKING AGE USING RIDGE, LASSO, AND ELASTIC NET REGRESSIONS

ABSTRACT. Noncommunicable diseases (NCDs) represent a significant burden for developing countries, affecting their annual GDP by 4% (PAHO, Pan American Health Organization, Leading causes of mortality and disability. Last accessed 06/01/2023. <https://www.paho.org/es/enlace/causas-principales-mortalidad-discapacidad>, 2022), and multiple factors have been observed to contribute to the occurrence of these diseases, including lack of physical activity, an unhealthy diet, tobacco, and alcohol consumption. Ridge, Lasso, and elastic net, as well as machine learning models, are effective in analyzing health variables and evaluating the impact that these variables have on NCD mortality. Six databases were used from 1990 to 2019 with more than 100 variables, including economic, food, and lifestyle indicators from 14 developing countries in the working population. Various econometric models were compared to obtain more robust results having as a dependent variable the mortality of cardiovascular, chronic respiratory, neoplasm, and diabetes mellitus diseases. It was observed that hours worked and disability-adjusted life-years (DALYs) were the economic indicators that affect most of the NCDs. Certain foods such as processed meat and consumption of seeds, fish, sugary drinks, and fats were found that also impact mortality indicators. Similarly, body mass index, smoking, and alcohol consumption are lifestyle elements that also affect mortality. Government spending was not found to be significant in the reduction of mortality in developing countries. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Arturo, D. M. S., & Rodríguez-Aguilar, R. (2024). Dimensions Related to NCD in Developing Countries During Working Age Using Ridge, Lasso, and Elastic Net Regressions. In *7th EAI International Conference on Computer Science and Engineering in Health Services, COMPSE 2023; Mexico City; Mexico; 16 November 2023 through 17 November 2023, EAI/Springer Innovations in Communication and Computing* (pp. 225-240). Springer. doi: 10.1007/978-3-031-67440-2_18. Conference paper.

EVOLUTIONARY OPTIMIZATION OF ENTANGLEMENT DISTILLATION USING CHIALVO MAPS

ABSTRACT. In quantum information theory, entanglement distillation is a key component for designing quantum computer networks and quantum repeaters. In this work, the practical entanglement distillation problem is re-designed in a bilevel optimization framework. The primary goal of this work is to propose and test an effective optimization technique that combines evolutionary algorithms (differential evolution) and the Chialvo map - for solving the bilevel practical entanglement distillation problem. The primary idea is to leverage on the complex dynamical behavior of Chialvo maps to improve the optimization capabilities of the evolutionary algorithm. Analysis on the computational results and comparisons with a standard evolutionary algorithm implementation is presented. © 2023, The Author(s), under exclusive license to Springer Nature Switzerland AG.

Ganesan, T., Rodríguez-Aguilar, R., Marmolejo-Saucedo, J. A., & Vasant, P. (2023). Evolutionary Optimization of Entanglement Distillation Using Chialvo Maps. In *6th International Conference on Intelligent Computing and Optimization, ICO 2023; Hua Hin; Thailand; 27 April 2023 through 28 April 2023, Lecture Notes in Networks and Systems, 852 LNNS* (pp. 19-26). Springer. doi: 10.1007/978-3-031-50330-6_2. Conference Paper.

GENETIC ELECTRO-SEARCH OPTIMIZATION FOR OPTIMUM ENERGY CONSUMPTION IN EDGE COMPUTING-BASED INTERNET OF HEALTHCARE THINGS

ABSTRACT. Energy consumption is a vital issue when optimum usage and carbon footprint are all considered in today's Internet of Things (IoT) environments. Considering edge computing, that becomes too critical in terms of wireless devices with limited battery power. Especially in healthcare applications, the defined IoHT approach requires sustainability while future massive solutions may result negative outputs in terms of carbon footprint. So, optimum energy consumption seems positive in terms of multiple ways. In the literature, one trendy method is using clustering for lowering the energy consumption within the Internet of Healthcare Things (IoHT) environment on edge computing. In this study, optimization of energy consumption in IoHT was done via improved Genetic Electro-Search Optimization (GESO) algorithm. According to the obtained findings in the performed applications, GESO was effective enough in finding optimum conditions of energy consumption for an active IoHT setup. © The Author(s) 2024.

Köse, U., Marmolejo-Saucedo, J. A., Rodríguez-Aguilar, R., Marmolejo-Saucedo, L., Rodríguez-Aguilar, M. (2024). Genetic Electro-Search Optimization for Optimum Energy Consumption in Edge Computing-Based Internet of Healthcare Things. *Wireless Networks*, 30(9), 7361-7368. doi: 10.1007/s11276-023-03623-y. Article.

K-MODES WITH BINARY LOGISTIC REGRESSION: AN APPLICATION IN MARKETING RESEARCH

ABSTRACT. Binary logistic regression is a statistical method used to analyze data with binary outcome variables. It is a type of generalized linear model (GLM) and is often used in fields such as medicine, psychology, and sociology. Using this model with some degree of data noise might give wrong results. © 2023, The Author(s), under exclusive license to Springer Nature Switzerland AG.

Rebolledo, J., & Rodríguez-Aguilar, R. (2023). K-Modes with Binary Logistic Regression: An Application in Marketing Research. In *6th International Conference on Intelligent Computing and Optimization, ICO 2023; Hua Hin; Thailand; 27 April 2023 through 28 April 2023, Lecture Notes in Networks and Systems, 855 LNNS* (pp. 56-64). Springer. doi: 10.1007/978-3-031-50158-6_6. Conference Paper.

MACHINE LEARNING FOR DIGITAL SHADOW DESIGN IN HEALTH INSURANCE SECTOR

ABSTRACT. The digital transformation process in organizations has accelerated significantly in recent years; the COVID-19 pandemic was a catalyst that highlighted the need for digitalization in all sectors. In the case of the health sector, this process is complex due to the processes inherent in health care as well as the integration of multiple sectors that allow the provision of health services. A first approach towards the construction of a Digital Twin in health organizations is a Digital Shadow that allows an orderly transition towards digital operation in real time. This paper presents a first approach to the design of a Digital Shadow for the health insurance sector and specifically for the care of patients diagnosed with COVID-19 through the implementation of an analytical intelligence system based on machine learning models to forecast and monitor to patients who represent catastrophic cases for the insurer. © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2024.

Rodríguez-Aguilar, R., Marmolejo-Suacedo, J. A., Rodríguez-Aguilar, M., Marmolejo-Suacedo, L. (2024). Machine Learning for Digital Shadow Design in Health Insurance Sector. *Mobile Networks and Applications*, 29(1), 221-234. doi: 10.1007/s11036-023-02289-2. Article.

MACHINE LEARNING MODELS IN HEALTH PREVENTION AND PROMOTION AND LABOR PRODUCTIVITY: A CO-WORD ANALYSIS

ABSTRACT. Objective. This article aims to carry out a co-word study on the application of machine learning models in health prevention and promotion and its effect on labor productivity. Design/Methodology/ Approach. The analysis of the relevant literature on the proposed topic, identified in the last 15 years in Scopus, is considered. Articles, books, book chapters, editorials, conference papers, and reviews of refereed publications were considered. A thematic mapping analysis was performed using factor analysis and strategy diagrams to derive primary research approaches and identify frequent themes and thematic evolution. Results/Discussion. The results of this study show the selection of 87 relevant publications with an average annual growth rate of 23.25% in related production. The main machine learning algorithms used, the main research approaches, and key authors derived from the analysis of thematic maps were identified. Conclusions. This study emphasizes the importance of using co-word analysis to understand trends in research on the impact of health prevention and promotion on labor productivity. The potential benefits of using machine learning models to address this issue are highlighted and anticipated to guide future research on improving labor productivity through prevention and health promotion. Originality/Value. Identifying the relationship between work productivity and health prevention and promotion through machine learning models is relevant, but little has been analyzed in recent literature. The analysis of co-words allows us to establish the reference point of the state of the art in this regard and future trends. © 2024, Pro-Metrics. All rights reserved.

Miranda, S. A. D., & Rodríguez-Aguilar, R. (2024). Machine Learning Models in Health Prevention and Promotion and Labor Productivity: A Co-Word Analysis. *Iberoamerican Journal of Science Measurement and Communication*, 4(1), 1-16. doi: 10.47909/ijsmc.85. Article.

MODELING THE OPTIMAL SUPPLY CHAIN OF LIQUEFIED NATURAL GAS AS FUEL IN FISHING VESSELS IN MEXICO

ABSTRACT. The global energy transition process has generated a set of modifications in the generation and consumption of energy. Environmental objectives have gained great relevance for regions, countries and companies. The fishing sector has been identified as having a broad environmental impact, which is why the transition to cleaner energy sources in this sector has been considered. One of the proposed strategies is based on the transition from the diesel engines of the ships to the use of liquefied natural gas (LNG), however, this transition requires guaranteeing the supply of fuel as well as the process of reconversion of units in operation and the impulse of LNG gas engines for new units. This work presents a proposal for the design of an LNG gas supply chain for the fishing industry in the State of Tampico in Mexico that allows evaluating the feasibility of the transition from the use of diesel to natural gas in fishing vessels. The main results show the feasibility of the transition in the fuel supply and economic and environmental benefits for the fishing industry. However, there is a significant challenge in converting units in operation to the use of natural gas due to the lack of public policies that promote and support its use in this sector. © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022. Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

Hernández-Palomo, G., Rodríguez-Aguilar, R., & Venegas-Martínez, F. (2022). Modeling the Optimal Supply Chain of Liquefied Natural Gas as Fuel in Fishing Vessels in Mexico. *Mobile Networks and Applications*, 29(1), 82-97. doi: 10.1007/s11036-022-02019-0. Article.

PROFESSIONAL SKILLS FOR THE DIGITAL TRANSFORMATION OF ORGANIZATIONS: A LITERATURE REVIEW

ABSTRACT. The evolution of the Fourth Industrial Revolution has triggered a constant transformation in organizations, in their business models, as well as in operations. The future vision of companies will be guided in the following years by digital technologies. The transformation process is taking place gradually, and it is highly relevant to structure and plan the said transformation. A key element is being able to have the appropriate technical resources for a successful digital transformation. Not only is a technological transformation necessary, but an organizational and cultural transformation is required in the institutions. This work addresses the main challenges in organizations to achieve digital transformation. Human capital is one of the necessary pillars and requires evolving beyond interdisciplinary teams, demanding a set of standard skills between the different areas of the organization to be digitalized. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Salgado-Reyes, A. P., & Rodríguez-Aguilar, R. (2024). Professional Skills for the Digital Transformation of Organizations: A Literature Review. In *7th EAI International Conference on Computer Science and Engineering in Health Services, COMPSE 2023; Mexico City; Mexico; 16 November 2023 through 17 November 2023, EAI/ Springer Innovations in Communication and Computing* (pp. 199-210). doi: 10.1007/978-3-031-67440-2_16. Springer. Conference paper.

THE ECONOMIC DIMENSIONS OF THE NON-COMMUNICABLE DISEASES: A PANEL DATA STUDY

ABSTRACT. Noncommunicable diseases (NCD) are the leading causes of death and the main public health problem worldwide and are associated with an acute picture of dyslipidemia that is part of the main risk factors along with smoking, sedentary activities, incorrect diet, and genetic factors that have caused diseases such as metabolic syndrome, oncological, cardiology, neurological and respiratory diseases. NCD are a major problem in low-income and middle-income countries, consuming increasing proportions of health care budgets. NCD are among the leading causes of disability and ill health and are the leading cause of preventable and premature death, having a significant impact on economies. NCD generate large out-of-pocket health costs for both individuals and families, as well as huge health outlays in national budgets. The analysis proposed can provide critical information to monitor trends in population health outcomes, recognize the pattern of diseases and injuries affecting premature mortality and disability. This paper shows an approach for the identification of the behavior of four main NCD (cardiovascular diseases, respiratory diseases, diabetes mellitus, and neoplasms) along thirteen countries selected and various economic variables related to the health and work issues from 1961 to 2021 with unbalanced data. The primary focus is the analysis on mortality in population within working age. © 2023, The Author(s), under exclusive license to Springer Nature Switzerland AG.

Domínguez-Miranda, S. A., & Rodríguez-Aguilar, R. (2023). The Economic Dimensions of the Non-communicable Diseases: A Panel Data Study. In *6th International Conference on Intelligent Computing and Optimization, ICO 2023; Hua Hin; Thailand, 27 April 2023 through 28 April 2023, Lecture Notes in Networks and Systems, 855 LNNS* (pp. 134-144). Springer. doi: 10.1007/978-3-031-50158-6_14. Conference Paper.

RELATED FACTORS WITH NCD IN DEVELOPING COUNTRIES: ECONOMIC, DIET AND RISK FACTORS DIMENSIONS

ABSTRACT. Introduction: Noncommunicable diseases (NCD) such as cardiovascular diseases, cancers, respiratory diseases, and diabetes mellitus are leading causes of global mortality. These conditions are often linked to lifestyle factors such as inadequate physical activity, poor diet, smoking, and excessive alcohol consumption. The economic burden of NCD is substantial, impacting both health systems and the broader economy, and severely affecting individuals' quality of life. Analysing mortality causes and applying mathematical models can help monitor health trends, understand disease patterns, assess intervention effectiveness, and inform health decision-making. Objectives: This study aims to evaluate the relationship between economic, dietary, and health risk factors and NCD among the economically active populations in 13 developing countries for 2019. The objectives include applying dimensionality reduction to detect variability across countries, analysing behavioural patterns of key variables, and generating indices to monitor NCD-related factors. Methods: A dataset for 2019 was compiled, including 76 variables related to economic, dietary, and lifestyle factors for 13 developing countries. Principal component analysis (PCA) was used to reduce dimensions and group relevant information, focusing on four NCD: cardiovascular diseases, chronic respiratory diseases, neoplasms, and diabetes mellitus. Indices for diet, economic factors, and risk factors related with mortality were created. A clustering model grouped countries based on these indices, and a Random Forest model was employed to identify significant predictors of NCD mortality. Results: Some relevant characteristics were identified in the countries analyzed, as well as interesting patterns among the factors related to NCD. The countries could be grouped considering their economic and nutritional behavior. It was observed that Latin American countries and Poland behave similarly, just as Asian countries show a similarity in eating behavior. The economic indicators of invest-

ment in health, as well as hours worked, behave in a similar way. It was identified that there are certain foods that have a similar behavior both in their consumption and in how they affect NCD. Thanks to the elaboration of the indices, it was observed that the countries of the Middle East and North Africa have a better food balance, but not the countries of Latin America. Using a Random Forest model the cardiovascular influence was identified as the most important predictors, highlighting the critical influence of cardiovascular health factors on NCD mortality. Conclusion: The application of a dimensionality reduction method and cluster analysis out of quantitative methods made it possible to characterize the behavior of a set of variables that impact NCD, as well as to synthesize this information into specific indices by category of analysis. Strategies focused on improving NCD indicators can have a greater impact by identifying similar behavior profiles among developing countries, in the same way, joint policies could be designed to address NCD through specific actions by dimension of analysis and extend these policies to countries with similar profiles. The use of the Random Forest model further underscored the importance of cardiovascular health factors, suggesting that targeted interventions in this area could significantly reduce NCD mortality. © 2024 S. A. Domínguez-Miranda et al.

Domínguez-Miranda, S. A., & Rodríguez-Aguilar, R. (2024). Related Factors with NCD in Developing Countries: Economic, Diet and Risk Factors Dimensions. *EAI Endorsed Transactions on Pervasive Health and Technology*, 10. doi: 10.4108/eetpht.10.3499. Article.

Román Rodríguez Aguilar

Senior Researcher C, SNII Level II

SELECTING THE DISTRIBUTION SYSTEM USING AHP AND FUZZY AHP METHODS

ABSTRACT. In this research, we present a supporting tool for decision making by designing a distribution system for a trading company of supplies for the welding industry in Mexico. The case study encompasses a distribution system with shortage problems and poor fleet capacity. To address these problems, improvement options were grouped into three possible scenarios through a third-party logistics (3PL) service. Furthermore, for the evaluation and selection of one of the scenarios, the Analytic Hierarchy Process (AHP) methodology was proposed integrating fuzzy logic as a tool for decision making, including factors of uncertainty and subjectivity as well as a comparison with traditional AHP obtaining the best scenario, meeting the requirements of the company, and showing potential improvements in the desired service level for its distribution system. © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2024.

Saucedo-Martínez, J. A., Salais-Fierro, T. E., Rodríguez-Aguilar, R., & Marmolejo-Saucedo, J. A. (2024). Selecting the Distribution System using AHP and Fuzzy AHP Methods. *Mobile Networks and Applications*, 29(1), 235-242. doi: 10.1007/s11036-023-02290-9. Article.

Román Rodríguez Aguilar

Senior Researcher C, SNII Level II

VOLATILITY IN PRIVATE HEALTH SERVICES AND SUPPLIES IN MEXICO, 2002-2023

ABSTRACT. Mexico's health sector has experienced important changes in recent years due to the structural changes generated by public policies and the impact that the COVID-19 pandemic has had on the cost of health services and supplies. A price index of health services and inputs was estimated based on the information published by the INEGI and two volatility models were estimated for the said prices—a stochastic model and a GARCH model—disaggregated by the health spending classification defined by the WHO for the horizon 2000-2023. The results show that starting in 2018 periods of high-price volatility have been identified, which were exacerbated by the COVID-19 pandemic and have continued to make access to health more expensive to date. The estimated volatility measures are intended to be an input for actuarial economic studies on out-of-pocket spending as well as financial health coverage in Mexico. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Rodríguez-Aguilar, M., Marmolejo-Saucedo, L., Rodríguez-Aguilar, R., Marmolejo-Saucedo, J. A. (2024). Volatility in Private Health Services and Supplies in Mexico, 2002-2023. In *7th EAI International Conference on Computer Science and Engineering in Health Services, COMPSE 2023, Mexico City, Mexico, 16 November 2023 through 17 November 2023. EAI/Springer Innovations in Communication and Computing* (pp. 157-168). Springer. doi: 10.1007/978-3-031-67440-2_13. Conference paper.

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Senior Researcher D, SNII Level I

THE EFFECT OF GEOPOLITICAL RISK AND GREEN TECHNOLOGY ON LOAD CAPACITY FACTORS IN BRICS

ABSTRACT. This study explores the interaction between geopolitics, natural resources, and load capacity factors (LCF) within BRICS countries. Using fixed effects, random effects, quantile regression, and Driscoll Kraay Standard Error approaches, we found that for every 1% increase in green technology adoption, LCF decreased by 0.14%–0.54%. This effect suggests that green technologies may reduce LCF. Geopolitical risk positively influences LCF, with a 1% increase resulting in a 0.14%–0.48% rise across quantiles, thus enhancing reliability and sustainability. Furthermore, economic growth, renewable energy, and natural resources enhance the ratio of biocapacity to ecological footprint. © 2024 Elsevier Ltd.

Voumik, L. C., Ghosh, S., Rashid, M., Das, M. K., Esquivias, M. A., & Rojas, O. (2024). The Effect of Geopolitical Risk and Green Technology on Load Capacity Factors in BRICS. *Utilities Policy*, 88, Article 101757. doi: 10.1016/j.jup.2024.101757. Article.

Omar Guillermo Rojas
Altamirano

Senior Researcher D, SNII Level I

TOURISM DESTINATION PERFORMANCE AND COMPETITIVENESS: THE IMPACT ON REVENUES, JOBS, THE ECONOMY, AND GROWTH

ABSTRACT. We analyzed the relationship between tourism destination competitiveness (TDC) and economic performance using the Travel and Tourism Development Index (TTDI) and various tourism metrics. Employing a Structural Equation Model (SEM) and the latest available 2021 data, we focused on factors such as connectivity, infrastructure, demand drivers, sustainability, and the enabling environment. The findings indicated a positive correlation between these factors and the pillars of destination competitiveness. Key elements such as connectivity, infrastructure, demand drivers, sustainability, and enabling environment significantly influence TDC in Asia. Our research demonstrates that these indicators strongly affect various aspects of performance in Asian countries, including tourism arrivals, revenue, and job creation. We found a negative correlation between certain aspects of destination performance and tourism growth, suggesting that highly competitive destinations may experience lower growth rates than less competitive ones, thereby affecting the overall development of the sector. This highlights the necessity of specific strategies to leverage the positive influence of competitive tourist destinations on economic dynamics and job creation within a destination. This study highlights the crucial role of core resources and infrastructure in enhancing tourism performance and competitiveness, and advocates targeted efforts for sustainable and resilient sector growth. These findings offer valuable insights into the relationship between competitiveness and performance in the Asian tourism industry. © 2024 Center for International Scientific Research of VSO and VSPP. All rights reserved.

Purwono, R., Esquivias, M. A., Sugiharti, L., & Rojas, O. (2024). Tourism Destination Performance and Competitiveness: The Impact on Revenues, Jobs, the Economy, and Growth. *Journal of Tourism and Services*, 15(28), 161-187. doi: 10.29036/jots.v15i28.629. Article.

Jacqueline Yvette
Sánchez García

Senior Researcher B, SNII Level I

Alejandra Núñez Acosta

Research Professor

LEADERSHIP IN PRIVATE UNIVERSITIES FOR THE SUSTAINABLE PERFORMANCE OF RESEARCH: A SYSTEM DYNAMICS APPROACH

ABSTRACT. In the context of private universities, improving researchers' performance is critical for universities to remain competitive. This article utilizes system dynamics to analyze how key variables related to leadership, such as satisfaction, motivation, efficiency, research capabilities, and morale, interact and influence each other. We use causal loop diagrams to illustrate these relationships based on the priority assessments of 86 private university researchers, evaluated using the Analytic Hierarchical Process (AHP). Our findings emphasize the critical importance of a balanced approach to strategy and policy design, suggesting that improving one factor may inadvertently affect others, thereby influencing the outcomes for leadership in educational settings. This study provides valuable insights for decision-makers and leaders who aim to foster and enhance their academic staff's sustainable performance. © 2024 by the authors.

Núñez-Acosta, A., & Sánchez-García, J. Y. (2024). Leadership in Private Universities for the Sustainable Performance of Research: A System Dynamics Approach. *Administrative Sciences*, 14(8), Article 166. doi: 10.3390/admsci14080166. Article.

BEYOND RULE-BASED ETHICS: LEARNING FROM COVID-19 TO PROMOTE A CULTURE OF INTEGRITY IN MEXICO

ABSTRACT. This chapter aims to overcome rule-based ethics approaches to business by exploring the potential of neo-Aristotelian virtue ethics for deepening our understanding of ethical organizations as a key driver towards building a culture of integrity, transparency and trust after the Covid-19 pandemic. In Mexico, the National Anti-Corruption System is promoted as a tool to combat corruption, in line with a variety of international instruments that have been proposed to counteract this problem. Since its creation, the National-Anti-Corruption System has attempted to disseminate a culture of business integrity among various key actors, thereby promoting actions within their organizations to curb corruption. However, the concept of a culture based on integrity needs to be explored in greater depth in order to understand its scope and its potential for going beyond mere regulatory compliance. To do so, this paper addresses a culture of integrity in light of a virtue ethics approach, which includes norms, goods, and virtues. Thus, this chapter's aim is twofold: first, it seeks to deepen our understanding of organizations by showing how a neo-Aristotelian approach to business can provide a more robust organizational culture beyond compliance; second, it explores the potential that a virtue ethics approach has for informing the Mexican National Anti-Corruption System and promoting a culture of integrity over the long term. © 2025 selection and editorial matter, Agata Stachowicz-Stanusch, Wolfgang Amann, Christian Hauser, Matthias Kleinhempel and Shiv Tripathi. All rights reserved.

Scalzo, G., Gallardo, Y., & Pinto-Garay, J. (2024). Beyond Rule-Based Ethics: Learning from Covid-19 to Promote a Culture of Integrity in Mexico. In A. Stachowicz-Stanusch, W. Amann, C. Hauser, M. Kleinhempel, S. Tripathi (Eds.), *Organizational Corruption, Crime and Covid-19: Upholding Integrity and Transparency in Times of Crisis* (pp. 259-269). Taylor and Francis. doi: 10.4324/9781003427933-17. Book Chapter.

CAN AI EMULATE SOFT SKILLS?: THE FUTURE OF WORK IN THE BALANCE

ABSTRACT. Debate on the future of work abounds largely motivated by the emerging demands of the so-called Fourth Industrial Revolution. In parallel, talent training and recruitment based on Soft Skills are at an all-time high. Therefore, it seems increasingly clear that the future work will not only increase demand for technological understanding, interaction and acumen, but also the ability to communicate and interact effectively with other people in all social environments. This multivariate of technology, talent and effective social interactions requires broad and profound analysis of the changing nature of work which is at the core of Human Centered Management. This chapter compares artificial intelligence with practical and emotional intelligence in order to evaluate human-centered leadership, enhancing the role of Soft Skills necessary to overcome a resource-centered vision of organizations. The chapter discusses a future where the social purpose of organizations and the wellbeing of workers is essential for organizational sustainability offering best products and services that continuously increase the wellbeing of users and customers and the collective community and society. © 2021 selection and editorial matter, Maria-Teresa Lepeley, Nicholas J. Beutell, Nureya Abarca and Nicolas Majluf.

Murcio, R., Scalzo, G., & Pinto, J. (2021). Can AI Emulate Soft Skills?: The Future of Work in the Balance. In M. T. Lepeley, N. Beutell, N. Abarca, & N. Majluf (Eds.), *Soft Skills for Human Centered Management and Global Sustainability* (pp. 139-147). doi: 10.4324/9781003094463-10-15. Book Chapter.

THE VIRGIN MARY AS AN ARCHETYPE OF FREEDOM: AN ANALYSIS OF THE HISTORICAL EVOLUTION OF MARIAN INVOCATIONS

ABSTRACT. This article analyzes the evolution of iconography associated with the Virgin Mary in Spain. It does so by studying Marian invocations in more than a thousand Marian sanctuaries and hermitages from between the fifth and nineteenth centuries. Although topographic invocations predominated in the early years, from the fourteenth to the sixteenth centuries, personal invocations that present Mary as a model or mediator between God and men began to predominate. Finally, from the seventeenth century onward, invocations that present Mary as a powerful intercessor began to gain strength. This is so especially in larger cities dominated by a commercial logic that presents Mary's will as an archetype of contractual freedom, i.e., that which gives rise to consent. We suggest that this development of mercantile logic tended to displace the rationality proper to the logic of the gift, especially of the maternal gift that Mary embodied. © 2023 Instituto Teológico de Cáceres, Universidad de Extremadura. All rights reserved.

Almárcegui, A. M., & Scalzo, G. (2023). The Virgin Mary as an Archetype of Freedom: An Analysis of the Historical Evolution of Marian Invocations. *Cauriensia*, 18, 1105-1138. doi: 10.17398/2340-4256.18.1105. Article.

Guillermo Sosa Gómez

Senior Researcher C, SNII Level I

Omar Guillermo
Rojas Altamirano

Senior Researcher D, SNII Level I

A METAHEURISTIC APPROACH FOR A TWO-DIMENSIONAL FUZZY VERSION OF THE VARIABLE SIZE AND COST BIN PACKING PROBLEM

ABSTRACT. The Variable Size and Cost Bin Packing Problem (VSCBPP) focuses on minimizing the overall cost of containers used to pack a specified set of items. This problem has significant applications across various fields, including energy, cargo transport, and informatics, among others. Most research conducted on this problem has concentrated on enhancing solution methodologies. Recently, some studies have investigated the use of fuzzy approaches to VSCBPP, which allow for the relaxation of certain constraints. In this paper, we introduce a metaheuristic method for solving the fuzzy version of VSCBPP, facilitating the simultaneous relaxation of two constraints: the overloading of containers and the exclusion of specific items from the packing process. Consequently, this two-dimensional fuzzy relaxation of the VSCBPP enables us to derive a range of solutions that present varying trade-offs between cost and the satisfaction levels of the original constraints. We employ mechanisms from the multi-objective metaheuristic approach to maximize the degrees of relaxation while minimizing the original cost function. To demonstrate the efficacy of our proposed solution, we utilized two well-known multi-objective evolutionary P-metaheuristics (Multi-Objective Genetic Algorithm and NSGA-II) and two S-metaheuristics (Multi-Objective Local Search and Ulungu Multi-Objective Simulated Annealing) specifically tailored for the fuzzy version of the VSCBPP. Computational experiments were conducted on 39 instances to validate the effectiveness of this approach. © The Author(s) 2024.

Franklin, J. H., Rosete, A., Sosa-Gómez, G., & Rojas, O. (2024). A Metaheuristic Approach for a Two-dimensional Fuzzy Version of the Variable Size and Cost Bin Packing Problem. *International Journal of Computational Intelligence Systems*, 17(1), Article 281. doi: 10.1007/s44196-024-00693-4. Article.

Guillermo Sosa Gómez

Senior Researcher C, SNII Level I

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NEW TEST TO DETECT CLUSTERED GRAPHICAL PASSWORDS IN PASSPOINTS BASED ON THE PERIMETER OF THE CONVEX HULL

ABSTRACT. This research paper presents a new test based on a novel approach for identifying clustered graphical passwords within the Passpoints scenario. Clustered graphical passwords are considered a weakness of graphical authentication systems, introduced by users during the registration phase, and thus it is necessary to have methods for the detection and prevention of such weaknesses. Graphical authentication methods serve as a viable alternative to the conventional alphanumeric password-based authentication method, which is susceptible to known weaknesses arising from user-generated passwords of this nature. The test proposed in this study is based on estimating the distributions of the perimeter of the convex hull, based on the hypothesis that the perimeter of the convex hull of a set of five clustered points is smaller than the one formed by random points. This convex hull is computed based on the points that users select as passwords within an image measuring 1920×1080 pixels, using the built-in function `convhull` in Matlab R2018a relying on the Qhull algorithm. The test was formulated by choosing the optimal distribution that fits the data from a total of 54 distributions, evaluated using the Kolmogorov-Smirnov, Anderson-Darling, and Chi-squared tests, thus achieving the highest reliability. Evaluating the effectiveness of the proposed test involves estimating type I and (Formula presented.) errors, for five levels of significance (Formula presented.), by simulating datasets of random and clustered graphical passwords with different levels of clustering. In this study, we compare the effectiveness and efficiency of the proposed test with existing tests from the literature that can detect this type of pattern in Passpoints graphical passwords. Our findings indicate that the new test demonstrates a significant improvement in effectiveness compared to previously published tests. Fur-

thermore, the joint application of the two tests also shows improvement. Depending on the significance level determined by the user or system, the enhancement results in a higher detection rate of clustered passwords, ranging from (Formula presented.) to (Formula presented.) compared to the most effective previous methods. This improvement leads to a decrease in the estimated probability of committing a type (Formula presented.) error. In terms of efficiency, the proposed test outperforms several previous tests; however, it falls short of being the most efficient, using computation time measured in seconds as a metric. It can be concluded that the newly developed test demonstrates the highest effectiveness and the second-highest efficiency level compared to the other tests available in the existing literature for the same purpose. The test was designed to be implemented in graphical authentication systems to prevent users from selecting weak graphical passwords, enhance password strength, and improve system security. © 2024 by the authors.

Herrera-Macías, J. A., Suárez-Plasencia, L., Legón-Pérez, C. M., Sosa-Gómez, G., & Rojas, O. (2024). New Test to Detect Clustered Graphical Passwords in Passpoints Based on the Perimeter of the Convex Hull. *Information (Switzerland)*, 15(8), 447. doi: 10.3390/info15080447. Article.

Guillermo Sosa Gómez

Senior Researcher C, SNII Level I

**Omar Guillermo
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Senior Researcher D, SNII Level I

OPTIMIZATION MODELS AND TECHNIQUES APPLIED TO TRANSPORTATION PROBLEMS

ABSTRACT. Introduction: Nowadays it is important to rationalize the available resources. In transportation problems, these resources are time, distance, and fuel. One way to guarantee quality solutions for this problem is Artificial Intelligence, through optimization techniques and the treatment of uncertainty. Objectives: To develop a solution for the vehicle routing problem with which to save fuel in the delivery of goods and to propose a mathematical model with fuzzy constraints for the school bus routing problem to offer decision-makers a set of better-quality options. Methods: A solution based on the combination of the p-median and Traveling Salesman Agent problems is proposed to solve the vehicle routing problem. This solution includes instance partitioning and the application of meta-heuristics. The inclusion of uncertainty in the school bus routing problem is modeled from the constraints of maximum walking distance and bus capacity. They are used the parametric approach and a novel strategy for exploring solutions to treat these constraints. Results: With the application of the proposed solution for the vehicle routing problem in the context of the TuEnvío virtual store, approximate savings of 68% are achieved in distances traveled and travel times. On the other hand, with the application of the fuzzy model to the school bus routing problem, decision-makers are offered a broader set of options. At the same time, savings of between 11% and 20% are evident. Conclusions: The results obtained after the evaluation of both proposals show a considerable decrease in the distance traveled by the corresponding vehicle fleets and therefore in the use of fuel and environmental pollution. © Los autores, 2024.

Ansola, E. S., Suárez, A. R., González, L. S., Pérez, A. C. P., Pando, H. D., Nodarse, C. P., Sosa-Gómez, G., Rojas, O., & Pérez, I. T. (2024). Optimization Models and Techniques Applied to Transportation Problems. *Anales de la Academia de Ciencias de Cuba*, 14(2), Article e1596. Article.

Guillermo Sosa Gómez

Senior Researcher C, SNII Level I

**Omar Guillermo
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Senior Researcher D, SNII Level I

PRACTICAL IMPROVEMENT IN THE IMPLEMENTATION OF TWO AVALANCHE TESTS TO MEASURE STATISTICAL INDEPENDENCE IN STREAM CIPHERS

ABSTRACT. This study describes the implementation of two algorithms in a parallel environment. These algorithms correspond to two statistical tests based on the bit's independence criterion and the strict avalanche criterion. They are utilized to measure avalanche properties in stream ciphers. These criteria allow for the statistical independence between the outputs and the internal state of a bit-level cipher to be determined. Both tests require extensive input parameters to assess the performance of current stream ciphers, leading to longer execution times. The presented implementation significantly reduces the execution time of both tests, making them suitable for evaluating ciphers in practical applications. The evaluation results compare the performance of the RC4 and HC256 stream ciphers in both sequential and parallel environments. © 2024 by the authors.

Madarro-Capó, E. J., Ramos Piñón, E. C., Sosa-Gómez, G., & Rojas, O. (2024). Practical Improvement in the Implementation of Two Avalanche Tests to Measure Statistical Independence in Stream Ciphers. *Computation*, 12(3), Article 60. doi: 10.3390/computation12030060. Article.

Manuel Soto Pérez

Senior Researcher B, SNII Level I

Hugo Briseño Ramírez

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**Lourdes Patricia
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Research Professor

DECENT WORK AND SUBJECTIVE WELL- BEING IN MEXICO

ABSTRACT. Purpose: This research aims to find which components of Decent Work are associated with Subjective Well-Being. Design/methodology/approach: With data from 2021 from the states of Mexico, econometric models are carried out. Findings: It is found that disposable income and satisfaction with leisure time have a significant positive relationship with employees' Subjective Well-Being. Likewise, the rate of critical occupancy conditions and informality rate have a significant negative relationship with Subjective Well-Being. The research suggests that influencing the Decent Work conditions of the population in Mexico could favour their Subjective Well-Being. Social implications: Share guidelines that enable employers and governments to establish strategies and policies that promote Decent Work to increase the Subjective Well-being of employees. Originality/value: This article evaluates different variables that make up the Decent Work construct in their level of influence on Subjective Well-being. These relationships and variables considered have not been identified in previous studies as a whole. © 2023, Emerald Publishing Limited.

Briseño, H., Maisterrena, L., & Soto-Pérez, M. (2023). Decent work and subjective well-being in Mexico. *International Journal of Sociology and Social Policy*, 44(1-2), 171-187. doi: 10.1108/IJSSP-06-2023-0133. Article.

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

COUNTRY-LEVEL ENVIRONMENTAL PERFORMANCE: INVESTMENT, EDUCATION, AND RESEARCH AND DEVELOPMENT

ABSTRACT. Background: Environmental deterioration has increased in recent years and is a worldwide concern. This study aims to analyze the influence of the resources and capacities of countries on their environmental performance. Methods: A cross-sectional study using secondary data was carried out quantitatively. A linear regression analysis was carried out to determine significant factors in countries' environmental performances. Results: Education innovation and investment were associated with environmental performance; however, investment in a country did not affect the country's performance. Conclusions: The scope of the proposed model was limited to the variables and countries of the secondary data analyzed, so future research can replicate this study using primary data. According to the results, the education of citizens can lead them to be more aware of their environment and pressure governments to generate positive changes for it. © 2024 by the authors.

Leyva-Hernández, S. N., & Terán-Bustamante, A. (2024). Country-Level Environmental Performance: Investment, Education, and Research and Development. *Social Sciences*, 13(3), Article 164. doi: 10.3390/socsci13030164. Article.

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

DIGITAL TRANSFORMATION IN MANAGEMENT AND ACCOUNTING SCIENCES: RESEARCH TRENDS IN SCOPUS

ABSTRACT. Objective. Identify thematic trends in digital transformation in administrative sciences and accounting. Design/Methodology/Approach. A bibliometric analysis was performed considering 7,519 documents indexed in the Scopus database between 1970 and 2023. The analysis was performed using the authors' keywords to identify thematic trends. Results/Discussion. Thematic cores related to Covid-19, digital marketing, emerging technologies, in-novation, industry 4.0, and Fintech were identified. Conclusions. Covid-19 promoted digital transformation and research in this field applied to administrative sciences and accounting. However, the advancement of digital technologies has influenced scientific production. Likewise, other trends, such as sustainability, converged in the generation of knowledge. © 2024 The author(s).

Salgado-García, J. A., Terán-Bustamante, A., & González-Zelaya, V. (2024). Digital Transformation in Management and Accounting Sciences: Research Trends in Scopus. *Iberoamerican Journal of Science Measurement and Communication*, 4(1). doi: 10.47909/ijsmc.884. Article.

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

Antonieta Teodora
Martínez Velasco

SNII Level I

DIGITAL TRANSFORMATION PARA COMPANY COMPETITIVENESS

ABSTRACT. Digital transformation is both a technological and sociocultural process that involves the adoption of digital technologies and modifications in business models and strategies of firms. The literature that studies relationships between digital transformation and the competitiveness of companies increased in the post-pandemic period; however, research before the pandemic is scarce, which is why the objective of this research is to analyze the effect of digital transformation on the competitiveness of companies before this crisis. The data used for the analysis is from the National Surveys on Productivity and Competitiveness of SMEs in Strategic Sectors in Mexico. The analysis was carried out in two parts: I. Geostatistical to search for natural geographical clusters, and II. Statistics using Ridge regression. The results showed that digital transformation and competitiveness are distributed unevenly in the territories; however, a positive effect of digital transformation on their competitiveness was found. Based on the above, it was concluded that companies that want to increase their competitiveness must increase their digital transformation, so governments must continue to establish digital transformation policies and programs in all sectors more equitably. © 2024, Universidad del Zulia. All rights reserved.

Salgado-García, J. A., Terán-Bustamante, A., & Martínez-Velasco, A. (2024). Digital transformation para Company Competitiveness. *Revista Venezolana de Gerencia*, 29(11-Esp.), 373-393. doi: 10.52080/rvgluz.29.e11.22. Article.

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

FOOD CONSUMPTION PATTERNS WITH A SOCIALLY RESPONSIBLE APPROACH

ABSTRACT. It is possible for countries through socially responsible consumption, sustainable growth, and achieving goal 12 of the United Nations Agenda. Therefore, it is essential to know food consumption patterns to develop effective communication strategies; however, after the COVID-19 pandemic, consumption patterns were modified, focusing on health care and the environment, among others. This study aims to develop the segmentation of socially responsible food consumers according to their behavior patterns after the COVID-19 pandemic. An exploratory and cross-sectional study collected a sample of 834 adults from the metropolitan region of Mexico City. A segmentation analysis was performed by two-step cluster analysis: Hierarchical and k-means. Three segments of socially responsible consumers were identified: Those concerned about the environment and society, the rational, and health caretakers. Knowledge of the characteristics of these consumers can allow the development of appropriate marketing strategies and public policy programs that promote this consumption.

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Leyva-Hernández, S. N., Terán-Bustamante, A., & Arango-Ramírez, P. M. (2024). Food Consumption Patterns with a Socially Responsible Approach. *Revista de Ciencias Sociales*, 30(2), 80-95. doi: 10.31876/rcs.v30i2.41892. Article.

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

Antonieta Teodora
Martínez Velasco

SNII Level I

KNOWLEDGE MANAGEMENT AND INNOVATION IN THE FURNITURE INDUSTRY IN MEXICO

ABSTRACT. Knowledge is an asset for all companies. Consequently, learning and accumulating new knowledge over time constitute the essence of the innovation process. Thus, knowledge management is of the utmost importance. This research aims to analyze and propose a knowledge management model for innovation through Bayesian networks with machine learning techniques in the furniture industry. We develop a model where we identify and quantify the impact of critical factors on the generation of innovative value. The results show that the most relevant factors for optimal knowledge management in the furniture industry are suppliers, distributors, the enterprises' business model structure, quality and risk management, strategic planning, value system model, national and international markets, e-commerce, and human capital. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Castillo-Girón, V. M., Ayala-Ramírez, S., Martínez-Velasco, A., & Terán-Bustamante, A. (2023). Knowledge Management and Innovation in the Furniture Industry in Mexico. In E. Murillo, P. R. Morganti, & J. Moreno (Eds.), *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy* (pp. 219-247). Springer Nature. doi: 10.1007/978-3-031-41386-5_10. Book Chapter.

Antonia Terán Bustamante

Senior Researcher A, SNII Level I

SECI MODEL OF KNOWLEDGE MANAGEMENT: A THEMATIC ANALYSIS WITH EMPHASIS ON AGRICULTURAL ORGANIZATIONS;

ABSTRACT. Objective. This research aimed to identify the thematic trends in knowledge management through Non-aka and Tekeuchi's socialization, externalization, combination, and internalization (SECI) model. First, an analysis of the application of the model in general and then in the field of agriculture was conducted. Design/Methodology/Approach. A bibliometric analysis was performed, and 2201 indexed papers from the Scopus database between the years 1994 and 2024 were considered. The study used the authors' keywords to identify thematic trends through word co-occurrences. Results/Discussion. Thematic cores related to innovation and open innovation were identified. This model has experienced a notable boom in recent years. In the agricultural sector, knowledge creation and transfer represent a part of the model that has experienced increasing use. The importance of understanding and effectively using the model to drive innovation and sustainable development in agriculture was stressed. Therefore, it was proposed that knowledge be transformed into a source of knowledge. Conclusions. Despite the criticisms received, this paper highlights the lack of research on using the SECI model in agriculture and its relevance in advancing knowledge management research. Furthermore, the results point out that, for the agricultural sector, future research on knowledge management should focus on organizational learning mechanisms, social innovation, critical success factors, business processes, and job satisfaction. © 2024 The author(s).

López-Meza, E., Terán-Bustamante, A., & Leyva-Hernández, S. N. (2024). SECI Model of Knowledge Management: A Thematic Analysis with Emphasis on Agricultural Organizations. *Iberoamerican Journal of Science Measurement and Communication*, 4(2). doi: 10.47909/ijsmc.133. Article.

Antonia Terán Bustamante*Senior Researcher A, SNII Level I***Antonieta Teodora
Martínez Velasco***SNII Level I***María Lorena de la Torre Díaz***Research Professor***WOMEN AND STEM SKILLS FOR
INNOVATION AND TECHNOLOGICAL
ENTREPRENEURSHIP**

ABSTRACT. The role of women in innovation and technological entrepreneurship is fundamental in all countries. However, there are two key factors that decision-makers and public policymakers must consider; the first factor is related to the presence of women in the university and professional fields in STEM (Science, Technology, Engineering, and Mathematics) and the skills that derive from it. The second relevant factor is stereotypes. Female entrepreneurship Professional Field, Pension, equal pay for equal work, marriage rights, and region/country. Gender and generate more innovation and jobs. This research aims to analyze the STEM competencies and entrepreneurship carried out by women and highlight the most relevant factors to reduce the gap. The methodological strategy is based on the use of machine learning techniques for which three databases were used: two from the World Bank Women, Business and the Law, another on business and law from the World Bank, and another on education from UNESCO, with emphasis on STEM competencies. The results show that women's most significant focus on STEM careers is in the health sciences, and the one that offers the lowest degree is engineering. It is also evident that the critical factors for the incursion of women as entrepreneurs in technological sectors are professional field, pension, equal pay for equal work, marriage rights, and region/country, and in these, some stereotypes are present. © 2024 Proceedings of the International Conference on Gender Research. All rights reserved.

Terán-Bustamante, A., Martínez-Velasco, A., & de la Torre-Díaz, L. (2024). Women and STEM skills for innovation and technological entrepreneurship. *Proceedings of the International Conference on Gender Research*, 7(1), 494-503. ICGR. doi: 10.34190/icgr.7.1.2295. Conference paper.

María Lorena de la Torre Díaz*Research Professor***ACCESS TO MICROFINANCE FOR SOCIAL
MOBILITY IN MEXICO**

ABSTRACT. A reduction on both income and expenses among Mexican families after the confinement set during the pandemic worsened economic inequality and set higher obstacles for upward social mobility. A conceptual model is presented for a novel scheme of microcredits designed to facilitate families the acquisition of a group of durable household assets that improve the living conditions and allow the next generations to achieve a better socioeconomic status. When income data is not reliable or available, asset accumulation can be used as an estimation of household wealth and asset indexes are commonly used in the evaluation of intergenerational social mobility. Microcredits, on the other hand, are small-scale loans targeting to low-income groups widely used as part of poverty alleviation strategies. Studies have shown a positive relation between microcredits and social mobility and this model's contribution is the link of these concepts with household assets that were not combined before. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Delatorre-Díaz, L. (2023). Access to Microfinance for Social Mobility in Mexico. In E. Murillo, P. R. Morganti, & J. Moreno (Eds.), *Creating Economic Stability Amid Global Uncertainty: Post-Pandemic Recovery in Mexico's Emerging Economy* (pp. 165-187). Springer Nature. doi: 10.1007/978-3-031-41386-5_8. Book Chapter.

Edgar Demetrio Tovar García*Senior Researcher D, SNII Level II***BINAURAL MUSIC AND EDUCATIONAL
ATTAINMENT: EVIDENCE FROM
LONGITUDINAL AND QUASI-
EXPERIMENTAL DATA**

ABSTRACT. This article investigates the impact of background binaural music on educational attainment within the context of a natural experiment. In a university business school, 73 undergraduate students participated in this study, providing a maximum of 707 observations at 16 points in time. The students were divided into three groups (Microeconomics A and B, and International Economics) and were further categorized into control and experimental groups at different stages of the courses. All students attended classes from January to June 2021, with the addition of binaural music as a treatment in either the first or second part of the courses (divided into three parts). After each lecture, students completed a multiple-choice quiz designed to assess their learning during the lecture. Utilizing t-tests for mean comparisons and panel data econometric techniques, the study found that the scores of the experimental groups were significantly higher than those of the control groups. Overall, binaural music was observed to increase quiz scores by 8 to 20 basis points. © 2024, Universidad Internacional de la Rioja. All rights reserved.

Tovar-García, E. D. (2024). Binaural Music and Educational Attainment: Evidence from Longitudinal and Quasi-Experimental Data. *Revista Española de Pedagogía*, 82(289), 667-693. doi: 10.22550/2174-0909.4164. Article.

Edgar Demetrio Tovar García

Senior Researcher D, SNII Level II

Francisco Moreno Abril

Research Professor

LABOR INCLUSION IN THE CONSTRUCTION SECTOR: EVIDENCE FROM MEXICO

ABSTRACT. This study aims to present empirical evidence demonstrating the receptiveness of construction professionals and individuals with spinal cord injuries to participate in the construction sector, challenging the prevalent belief that spinal cord injury precludes labor inclusion. Accordingly, in August 2021, this study conducted two surveys to collect data from distinct groups: builders and individuals with spinal cord injuries. The builder survey involved a representative sample of 52 respondents, drawn from a population of 322 members of the Mexican Chamber of the Construction Industry, Jalisco delegation. Simultaneously, 44 individuals with spinal cord injuries participated in the survey, sourced from a pool of 455 members affiliated with Don Bosco sobre Ruedas and Vida Independiente. The survey process facilitated a comprehensive diagnosis, identifying potential areas for enhanced inclusion within the construction sector. The empirical findings challenge conventional wisdom, indicating that a spinal cord injury does not act as a barrier to labor inclusion within the construction sector. On the contrary, the study emphasizes that having employees with disabilities can exert a positive impact on company dynamics. Moreover, the research identifies specific activities where individuals with spinal cord injuries exhibit a higher potential for inclusion, thereby redefining traditional expectations. Therefore, this study contributes to the originality of the existing discourse by providing concrete empirical evidence that counters widespread assumptions about the limitations faced by individuals with spinal cord injuries within the construction industry. © 2023, Griffith University. All rights reserved.

Ornelas-Barajas, L. A., Moreno-Abril, F., & Tovar-García, E. D. (2023). Labor Inclusion in the Construction Sector: Evidence from Mexico. *Journal of Social Inclusion*, 14(2). doi: 10.36251/josi321. Article.

Edgar Demetrio Tovar García

Senior Researcher D, SNII Level II

Rodrigo Navarro Guerrero

Research Professor

ECONOMIC GROWTH'S IMPACT ON WATER USE AND POLLUTION IN MEXICAN REGIONS

ABSTRACT. Following the Environmental Kuznets Curve hypothesis, an inverted U-shaped relationship is expected between economic growth and water utilization and pollution. As economic growth increases, so do water use and pollution. However, above a certain growth level (turning point), further growth has beneficial impacts, using less water and improving its quality. Recently, N-shaped relationships seem to prevail over inverted U curves — there is a rebound effect. However, the empirical evidence shows conflicting results, partly explained by the mobility and aggregation of economic activities across a large space (the whole country). Accordingly, we build a unique dataset with measures of water use (the ratio of water withdrawals to renewable water resources) and pollution (biological oxygen demand) to estimate water utilization and pollution equations using panel data from the 32 Mexican states (2005–2020). The article's contributions are threefold. First, it introduces methodological innovations to address endogeneity using advanced panel data econometric techniques. Second, it provides new insights into the economic growth-water relationship, identifying N-shaped patterns for water use and inverted N-shaped patterns for water pollution. Third, it discusses policy implications and future research directions in environmental management and sustainable development. The findings suggest improvements for inter-regional water trade and indicate that economic growth may lead to sustainable water pollution patterns, highlighting the potential for regulatory interventions to mitigate pollution and promote efficient water use. © The Author(s), under exclusive licence to Springer Nature Switzerland AG 2024.

Dávila-Sandoval, T. A., Navarro-Guerrero, R., & Tovar-García, E. D. (2024). Economic Growth's Impact on Water Use and Pollution in Mexican Regions. *Water, Air, and Soil Pollution*, 235(10), Article 678. doi: 10.1007/s11270-024-07489-4. Article.

Marisol Velázquez Salazar

SNII Level I

GLOBAL VALUE CHAINS IN THE COFFEE SECTOR: A COMPARATIVE ANALYSIS BETWEEN EL SALVADOR AND MEXICO

ABSTRACT. The objective of this chapter is to compare the coffee chains in Mexico and El Salvador under the theoretical framework of Global Value Chains (GVC) proposed by Gereffi, highlighting the dimensions of governance in the original version related to the control or dominance of the chain (Gereffi, Commodity chains and global capitalism, Praeger, 1994), linkage governance (2005), and governance by regulation (2014, 2018). It is also discussed around the institutional framework to observe similarities and differences, establishing some recommendations of good practice for both countries under the interest of enhancing the product and improving the socioeconomic conditions of the producers of each of them. The comparison methodology combines quantitative and qualitative analysis and deepens through case studies. The results show that apart from geography and the size of production, there are few differences between the two countries regarding the conditions of the coffee chain. However, we found coincidences in the input-output, institutional framework, and governance dimensions. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Velázquez-Salazar, M., & Lizama Gaitán, G. S. (2023). Global Value Chains in the Coffee Sector: A Comparative Analysis Between El Salvador and Mexico. In *Sustainable Development Goals Series* (Part. F2779, pp. 137-162). Springer. doi: 10.1007/978-3-031-33103-9_7. Book Chapter.

GLOBAL VALUE CHAINS EVOLUTION IN LATIN AMERICA

ABSTRACT. This chapter discusses the intertwined origins of economics and computer science, highlighting the invention of the blockchain by the mysterious Satoshi Nakamoto. The chapter emphasizes the importance of Nakamoto's innovation in creating a distributed ledger system, the permissionless blockchain, that requires no trust relationships. The chapter also delves into the economic implications of cryptocurrencies, arguing that tokens are essential to the operation of decentralized systems. The intention is to explore the inner workings of blockchain consensus and to make this literature more accessible to economists. The book focuses on trade-offs, such as security versus speed, and permissioned versus permissionless networks, and examines the incentives behind Proof of Work and Proof of Stake blockchains. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Pérez Akaki, P., Velázquez-Salazar, M., & Lizama Gaitán, G. S. (2023). Global Value Chains Evolution in Latin America. In *Sustainable Development Goals Series* (Part. F2779, pp. 3-14). Springer. doi: 10.1007/978-3-031-33103-9_1. Book Chapter.

SUSTAINABILITY AND QUALITY OF LIFE IN MARGINALIZED AREAS: AN IMPACT EVALUATION OF A COMMUNITY CENTER IN SANTA FE, MEXICO

ABSTRACT. The aim of this paper is to present the results of an impact evaluation of a community center in health, capacity building, and digital access, which form an approximation of quality of life, in the population of Santa Fe town in Mexico City, from 2022 to 2024. The methodology is quantitative, using an impact index and the differences in differences (DD) technique. The data were obtained from primary sources with surveys undertaken via questionnaires. The center is operated by a private university and funded by private firms. The results show a positive impact of 0.287127 out of 1 on the weighted impact index, which allows us to consider this program successful in improving the quality of life of the target population. Through impact evaluation, the effectiveness of interventions and opportunities for improvement are identified, fostering collaboration among local actors, including community members, state-run public programs, and community centers. This collaborative effort improves the quality of life, creating a sustainable community wherein each actor addresses specific needs. Impact evaluation plays a crucial role in measuring sustainability because it is a continuous improvement process that, when combined with other actions, enhances the community's overall well-being. © 2024 by the authors.

Velázquez-Salazar, M., & De la Torre-Díaz, L. (2024). Sustainability and Quality of Life in Marginalized Areas: An Impact Evaluation of a Community Center in Santa Fe, Mexico. *Sustainability* (Switzerland), 16(18), Article 7894. doi: 10.3390/su16187894. Article.

SCHOOL OF ENGINEERING

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Rubén Romo Gamboa

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STATISTICAL ANALYSIS OF LEAN CONSTRUCTION BARRIERS TO OPTIMIZE ITS IMPLEMENTATION USING PLS-SEM AND PCA

ABSTRACT. The construction industry performs many tasks scheduled and related to other activities. Companies must optimize their operations, increase efficiency, eliminate waste, and deliver better products to their customers. As a result, this study aims to identify the main challenges associated with the implementation of the Lean Construction model in small and medium-sized construction companies and optimize the implementation of this process using statistically-focused mathematical models. This study was conducted using the partial least squares (PLS-SEM) method and also carried out the principal component analysis to optimize Lean barriers so that they can be properly implemented in the construction industry. The most important obstacles are displayed, as well as the relationships with other factors. Significant relationships have been discovered between the barriers to Lean construction adoption, especially with regard to corporate culture, communication, training, leadership, and the influence of mentality on business and employee adaptability. Construction executives and managers can make well-informed policy and strategic decisions by having a thorough understanding of the main barriers to Lean implementation. This information enables them to focus on the implementation of Lean technologies in projects, to increase market competitiveness, reduce waste and enhance overall work efficiency. © 2024 by the authors.

Romo, R., Alejo-Reyes, A., & Orozco, F. (2024). Statistical Analysis of Lean Construction Barriers to Optimize Its Implementation Using PLS-SEM and PCA. *Buildings*, 14(2). doi: 10.3390/buildings14020486. Article.

Claudia Yohana Arias Portela

Research Professor

EXPERIENTIAL LEARNING FOR CIRCULAR OPERATIONS MANAGEMENT IN HIGHER EDUCATION

ABSTRACT. This research-to-practice article delves into novel learning experiences for operations management education, involving the circular economy and experiential learning. Higher Education academics are required to develop effective learning that actively and impactfully helps nurture in students the essential competency to face sustainable development demands. In operations management education, one possibility is to integrate real-world circular economy challenges into learning activities that address issues concerning solid waste generation in business processes and operations. This type of innovative learning experience involves both conceptual understanding and practical implementation. Accordingly, experiential learning is considered a suitable pedagogy for this purpose in this work because of its hands-on applications, critical thinking, and active engagement. To illustrate this proposition, this paper presents a case study concerning an operations management undergraduate course at a Mexican university. The case study indicates how to translate a situation of solid waste generation in a business into relevant disciplinary experiential learning. The results show that students regarded the learning experience as motivating, interesting, and relevant while widely accomplishing their learning objectives. However, limitations did exist regarding experiential learning, the methodological approach, data collection, and implementation challenges. Future work points to the need for further learning experiences and to improve research reliability, transferability, and validity. © 2024 by the authors.

Salinas-Navarro, D. E., Arias-Portela, C. Y., González de la Cruz, J. R., & Vilalta-Perdomo, E. (2024). Experiential Learning for Circular Operations Management in Higher Education. *Sustainability* (Switzerland), 16(2), 798. doi: 10.3390/su16020798. Article.

Gerardo Bárcena Ruíz

Research Professor

BERT TRANSFORMERS PERFORMANCE COMPARISON FOR SENTIMENT ANALYSIS: A CASE STUDY IN SPANISH

ABSTRACT. Despite the fact that the Spanish language is the second most spoken language in the world, research about AI and sentiment analysis is few compared with English language as research target. This paper refers to some works about sentiment analysis for the Spanish language that use BERT transformers and other technologies for this kind of sentiment analysis task; but the quality model based on indicators such as accuracy level could be different according to the tool or BERT version used. In addition, about the BERT family, it is challenging to determine which versions or subversions could perform better for sentiment analysis and also comply with the Spanish language when they are used on common platforms such as Colab. Therefore, the present study seeks to address this issue by establishing objectives, such as identifying relevant datasets based on the quality of Spanish used and having balanced subsets; also, locating different Spanish trained models; and proposing a method of comparison that involves relevant variables. We propose a weighted index that combines the F1-Score and the retraining time in different scenarios to help making better decisions. The results of this study indicate that the DistilBERT, RoBERTa, and ALBERT models have highest performances, but BERT remains in top positions as a consistent model. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Bárcena Ruiz, G., & De Jesús Gil, R. (2024). BERT Transformers Performance Comparison for Sentiment Analysis: A Case Study in Spanish. In *12th World Conference on Information Systems and Technologies, WorldCIST 2024*; Lodz; Poland; 26 March 2024 through 28 March 2024, *Lecture Notes in Networks and Systems*, 989 LNNS (pp. 152-164). Springer. doi: 10.1007/978-3-031-60227-6_13. Conference Paper.

A STACKED META APPROACH FOR OBJECT DETECTION TO REDUCE FALSE POSITIVES IN HIGHLY COMPLEX VIDEOS

ABSTRACT. False positives are a major problem when deploying object detection models in real-world conditions. Highly complex scenes are particularly difficult to process by standard object detection models. A novel meta-approach of stacked detection and the use of multiple frames to evaluate the preliminary detections is presented. The stacked approach leverages different types of architectures and performs multiple detections to reduce the number of false positives. The approach was qualitatively validated with videos taken from construction sites and compared with some of the most used architectures, i.e., Faster-RCNN and RetinaNet. Our approach can reduce the number of false positives and increase the detection accuracy. © 2024 Owner/Author.

Davila Delgado, J. M., & Barrera-Animas, A. Y. (2024). A stacked meta approach for object detection to reduce false positives in highly complex videos. In *8th International Conference on Innovation in Artificial Intelligence, ICI-AI 2024; Tokyo; Japan; 16 March 2024 through 18 March 2024, ACM International Conference Proceeding Series* (pp. 72-77). ACM. doi: 10.1145/3655497.3655501. Conference paper.

A SYNTHETIC DATA APPROACH FOR OBJECT DETECTION IN SUPER LOW RESOLUTION IMAGES

ABSTRACT. This paper presents a synthetic data approach to train object detection models to address the challenges with object detection in super low-resolution images. With a particular emphasis on person detection, the study uses 28 photorealistic 3D models of individuals, optimised for efficient rendering and minimal memory consumption. These models are seamlessly integrated into a 3D terrain model, mimicking diverse real-world situations. To ensure scalability and diversity, the methodology incorporates domain randomisation techniques, encompassing variations in factors like lighting conditions, seasonal effects, camera angles, lens specifications, and different image resolutions. The process of dataset generation is automated through a Python script in Blender, offering systematic scene configuration and camera positioning. The dataset created consists of 10,560 images across four resolutions. The evaluation was carried out using popular object detection algorithms, including Faster RCNN and RetinaNet, within the Detectron2 framework. Results highlight the effectiveness of synthetic datasets in training and testing object detection algorithms, showcasing visual comparisons, Average Precision (AP) metrics, and training performance statistics. Notably, RetinaNet outperforms Faster RCNN, achieving higher accuracy. This research offers invaluable insights into synthetic dataset generation and its application for object detection in low-resolution images. © 2024 Owner/Author.

Davoudi Kashkoli, M., Javied, A., Barrera-Animas, A. Y. y Davila Delgado, J. M. (2024). A synthetic data approach for object detection in super low resolution images. In *8th International Conference on Innovation in Artificial Intelligence, ICI-AI 2024; Tokyo; Japan; 16 March 2024 through 18 March 2024, ACM International Conference Proceeding Series* (pp. 86-91). ACM. doi: 10.1145/3655497.3655502. Conference paper.

TOWARDS A STANDARDIZED EVALUATION OF APIS NON-FUNCTIONAL REQUIREMENTS FOCUSED ON COMPLETENESS AND SOUNDNESS QUALITIES

ABSTRACT. Nowadays, well-designed user documentation plays a relevant role in the development and delivery of high-quality software products. It minimizes software maintenance costs either for developers and managers by following quality standards during software life-cycle process. In this research work it is proposed an assessment approach consisting of a set of metrics, a methodology, and a guideline focused on supporting the testing of non-functional requirements of Application Program Interfaces (APIs). An emphasis is made on the evaluation of soundness and completeness qualities of the official documentation of APIs to support its evaluation of documentation's usability. Furthermore, a straightforward criterion is proposed to rate the soundness and completeness qualities in an easily readable way. © 2023 Instituto Politecnico Nacional. All rights reserved.

Alvarado-Uribe, J., Barrera-Animas, A. Y., Gonzalez-Mendoza, M., Garcia-Gamboa, A. L., & Hernandez-Gress, N. (2023). Towards a Standardized Evaluation of APIs Non-Functional Requirements Focused on Completeness and Soundness Qualities. *Computación y Sistemas*, 27(4), 889-897. doi: 10.13053/CyS-27-4-4780. Article.

Gladys Bonilla Enríquez

SNII Candidate Level

APPROACHES TO IMPROVE THE DISTRIBUTION ASPECTS OF GASOLINE IN MEXICO

ABSTRACT. Gasoline distribution depends of a complex infrastructure which consists of refineries, storage depots, gasoline stations, roads and pipelines. In Mexico, recent research has supported the need to increase storage capability to ensure high service level in the event of disruption of pipeline distribution. The present work extends on this scenario by proposing alternatives focused on: (a) determining the balanced number of stations to be served by the storage depots to reduce their overload and thus, reduce the negative impact if such depots are closed, and (b) determining the outcomes of increasing the number of storage depots to reduce shortage and service distance. For this work, data regarding locations of gasoline depots and stations were considered. Also, due to the large size of this data, the adaptation of deterministic algorithms for assignment and location of facilities were considered. As result, it was determined that limited storage depots can affect the efficiency of distribution through tanker trucks. Thus, efforts should be aimed to increase the number of these facilities. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Caballero-Morales, S. O., Bonilla-Enríquez, G., & Martínez-Flores, J. L. (2024). Approaches to Improve the Distribution Aspects of Gasoline in Mexico. In *15th International Conferences on Computational Logistics, ICCL 2024; Monterrey, Mexico; 8 September 2024 through 10 September 2024, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 15168 LNCS (pp. 117-129). Springer. doi: 10.1007/978-3-031-71993-6_8. Conference paper.

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Ernesto Moya Albor

Senior Researcher D, SNII Level I

Hiram Eredín Ponce Espinosa

Senior Researcher D, SNII Level I

A NON-CONTACT OXYGEN SATURATION ESTIMATION USING VIDEO MAGNIFICATION AND A DEEP LEARNING METHOD

ABSTRACT. In this paper, we present a new non-contact strategy to estimate the Peripheral Oxygen Saturation (SpO₂) based on the Eulerian motion video magnification technique and a Machine Learning method. The magnification procedure was carried out using the Hermite decomposition on the blue and red channels of the image frame. The SpO₂ is estimated from a 3D Convolutional Neural Network from a ROI detected using transfer learning models on the Machine Learning Yolov5. In this proposal it is not needed a calibration step per subject for the estimation. We have tested the method on 18 healthy subjects. Each video includes the subject and the data of the contact pulse oximeter device that was detected automatically. To compare the performance of the methods, we compute the Mean Absolute Error, The Root Mean Squared Error and metrics issues from the Bland and Altman analysis to investigate the agreement of the methods with respect to a contact pulse oximeter device as reference. The proposed solution shows an agreement with respect to the reference of 98%. © 2023 IEEE.

Escobedo-Gordillo, A., Brieva, J., Moya-Albor, E., & Ponce, H. (2023). A non-contact oxygen saturation estimation using Video Magnification and a Deep Learning method. In *19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023; Mexico City; Mexico; 15 November 2023 through 17 November 2023, Proceedings of the 19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023*. IEEE. doi: 10.1109/SIPAIM56729.2023.10373518. Conference Paper.

Jorge Eduardo Brieva Rico

Senior Researcher D, SNII Level I

Ernesto Moya Albor

Senior Researcher D, SNII Level I

BIO-INSPIRED WATERMARKING METHOD FOR AUTHENTICATION OF FUNDUS IMAGES IN COMPUTER-AIDED DIAGNOSIS OF RETINOPATHY

ABSTRACT. Nowadays, medical imaging has become an indispensable tool for the diagnosis of some pathologies and as a health prevention instrument. In addition, medical images are transmitted over all types of computer networks, many of them insecure or susceptible to intervention, making sensitive patient information vulnerable. Thus, image watermarking is a popular approach to embed copyright protection, Electronic Patient Information (EPR), institution information, or other digital image into medical images. However, in the medical field, the watermark must preserve the quality of the image for diagnosis purposes. In addition, the inserted watermark must be robust both to intentional and unintentional attacks, which try to delete or weaken it. This work presents a bio-inspired watermarking algorithm applied to retinal fundus images used in computer-aided retinopathy diagnosis. The proposed system uses the Steered Hermite Transform (SHT), an image model inspired by the Human Vision System (HVS), as a spread spectrum watermarking technique, by leveraging its bio-inspired nature to give imperceptibility to the watermark. In addition, the Singular Value Decomposition (SVD) is used to incorporate the robustness of the watermark against attacks. Moreover, the watermark is embedded into the RGB fundus images through the blood vessel patterns extracted by the SHT and using the luma band of Y'CbCr color model. Also, the watermark was encrypted using the Jigsaw Transform (JST) to incorporate an extra level of security. The proposed approach was tested using the image public dataset MESSIDOR-2, which contains 1748 8-bit color images of different sizes and presenting different Diabetic Retinopathy (DR). Thus, on the one hand, in the experiments we evaluate the proposed bio-inspired watermarking method over the entire MESSIDOR-2 dataset, showing that the embedding process does not affect the quality of the fundus images

and the extracted watermark, by obtaining average Peak Signal-to-Noise Ratio (PSNR) values higher to 53 dB for the watermarked images and average PSNR values higher to 32 dB to the extracted watermark for the entire dataset. Also, we tested the method against image processing and geometric attacks successfully extracting the watermarking. A comparison of the proposed method against state-of-the-art was performed, obtaining competitive results. On the other hand, we classified the DR grade of the fundus image dataset using four trained deep learning models (VGG16, ResNet50, InceptionV3, and YOLOv8) to evaluate the inference results using the originals and marked images. Thus, the results show that DR grading remains both in the non-marked and marked images. © 2024 by the authors.

Moya-Albor, E., Gomez-Coronel, S. L., Brieva, J., & López-Figueroa, A. (2024). Bio-Inspired Watermarking Method for Authentication of Fundus Images in Computer-Aided Diagnosis of Retinopathy. *Mathematics*, 12(5), Article 734. doi: 10.3390/math12050734. Article.

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Ernesto Moya Albor

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CLASSIFICATION OF CORONARY STENOSIS USING A SUPPORT VECTOR MACHINE WITH AUTOMATIC PARAMETER TUNING

ABSTRACT. In this paper an improved method for stenosis classification which consists of three stages is proposed. In the first stage are extracted 49 different feature types such as texture, intensity and morphology. In the second stage, an automatic feature selection driven by the Boltzmann Univariate Marginal Algorithm and a Support Vector Machine-based (SVM) classifier is performed. Finally, in third step, an automatic fine tuning of several parameters for the SVM is applied. Relevant results were obtained in the second stage were a decreasing rate of 71% of the initial feature set was achieved using only 14 features to achieve the highest classification rate in terms of the accuracy metric. Additionally, the SVM classification performance was improved with the automatic parameter tuning achieving a classification efficiency of 0.91 in terms of the accuracy metric. © 2023 IEEE.

Gil-Rios, M. A., Cruz-Aceves, I., Chalopin, C., Brieva, J., Gomez-Coronel, S. L., & Moya-Albor, E. (2023). Classification of Coronary Stenosis using a Support Vector Machine with Automatic Parameter Tuning. In *19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023; Mexico City; Mexico; 15 November 2023 through 17 November 2023, Proceedings of the 19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023*. IEEE. doi: 10.1109/SIPAIM56729.2023.10373550. Conference Paper.

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COMPUTER-AIDED DIAGNOSIS OF DIABETIC RETINOPATHY LESIONS BASED ON KNOWLEDGE DISTILLATION IN FUNDUS IMAGES

ABSTRACT. At present, the early diagnosis of diabetic retinopathy (DR), a possible complication of diabetes due to elevated glucose concentrations in the blood, is usually performed by specialists using a manual inspection of high-resolution fundus images based on lesion screening, leading to problems such as high work-intensity and accessibility only in specialized health centers. To support the diagnosis of DR, we propose a deep learning-based (DL) DR lesion classification method through a knowledge distillation (KD) strategy. First, we use the pre-trained DL architecture, Inception-v3, as a teacher model to distill the dataset. Then, a student model, also using the Inception-v3 model, is trained on the distilled dataset to match the performance of the teacher model. In addition, a new combination of Kullback-Leibler (KL) divergence and categorical cross-entropy (CCE) loss is used to measure the difference between the teacher and student models. This combined metric encourages the student model to mimic the predictions of the teacher model. Finally, the trained student model is evaluated on a validation dataset to assess its performance and compare it with both the teacher model and another competitive DL model. Experiments are conducted on the two datasets, corresponding to an imbalanced and a balanced dataset. Two baseline models (Inception-v3 and YOLOv8) are evaluated for reference, obtaining a maximum training accuracy of 66.75% and 90.90%, respectively, and a maximum validation accuracy of 35.94% and 81.52%, both for the imbalanced dataset. On the other hand, the proposed DR classification model achieves an average training accuracy of 99.01% and an average validation accuracy of 97.30%, overcoming the baseline models and other state-of-the-art works. Experimental results show that the proposed model achieves competitive results in DR lesion detection and classification tasks, assisting in the early

diagnosis of diabetic retinopathy. © 2024 by the authors.

Moya-Albor, E., Lopez-Figueroa, A., Jacome-Herrera, S., Renza, D., & Brieva, J. (2024). Computer-Aided Diagnosis of Diabetic Retinopathy Lesions Based on Knowledge Distillation in Fundus Images. *Mathematics*, 12(16), Article 2543. doi: 10.3390/math12162543. Article.

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CONTACTLESS VIDEO-BASED VITAL-SIGN MEASUREMENT METHODS: A DATA-DRIVEN REVIEW

ABSTRACT. Nowadays, the healthcare is a priority for both governments and persons. Vital sign monitoring allows knowing the health status and is widely used for prevention, diagnosis, and treatment of determined illnesses. In particular, breathing and heart rate are traditionally considered the most relevant and accessible vital signs. However, oxygen saturation was essential in the COVID-19 pandemic. On the other hand, contact techniques to estimate these vital signs are a standard monitoring reference. However, non-contact estimation methods have gained relevance in the last few years in those cases where there is the possibility of suffering stress, pain, and skin irritation in specific situations, as in the case of vulnerable skin in burn patients and neonates. In this chapter, a review of contactless video-based vital-sign methods is presented. The selected methods have a data-driven approach as an alternative when there is not theoretical model of the physiological phenomenon. Finally, a new framework with a general data-driven approach to estimate the most used vital signs is proposed. This framework includes a region of interest extraction stage, a video magnification technique to reveals subtle changes, and a machine learning method to estimate the vital signs. In addition, each step describes some recommendations and best practices found. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Brieva, J., Moya-Albor, E., Ponce, H., & Escobedo-Gordillo, A. (2024). Contactless Video-Based Vital-Sign Measurement Methods: A

Data-Driven Review. In *Studies in Big Data* (vol. 148, pp. 1-38). Springer. doi: 10.1007/978-3-031-54277-0_1. Book Chapter.

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Senior Researcher D, SNII Level I

EXOSKELETON SYSTEM IN THE RIGHT ARM FOR PEOPLE WITH ATROPHIC MUSCLE DISORDER

ABSTRACT. The percentage of the population in Mexico with physical limitation or disability in the motion of an arm is 58.3 of the total disabilities. The possibility to suffer one of these mobility loss increase with the age. This produce a decreasing in muscular strength causing a long-term permanent handicap. In this work we propose a preliminary design of an exoskeleton for the right arm for people suffering of muscular atrophy. The device is easy to use and maintain, portable and light. We test the prototype in 6 subjects and obtaining 100% of success in the desired motion. © 2022 IEEE.

Amezcu, J. B. C., Escobar, J. A. G., Díaz, D. A. V., Pérez, S. C., Villafañe, A. D., Brieva, J., Moya-Albor, E., & Ponce, H. (2022). Exoskeleton system in the right arm for people with atrophic muscle disorder. In *2022 International Conference on Mechatronics, Electronics and Automotive Engineering, ICMEAE 2022; Cuernavaca; Mexico; 5 December 2022 through 9 December 2022, Proceedings - 2022 International Conference on Mechatronics, Electronics and Automotive Engineering, ICMEAE 2022* (pp. 3-6). ICMEAE. doi: 10.1109/ICMEAE58636.2022.00008. Conference Paper.

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SEMG BASED HAND GESTURE RECOGNITION FOR REHABILITATION PROSTHETICS BASED ON MACHINE LEARNING METHODS

ABSTRACT. The human hand plays a crucial role in daily activities, and individuals experiencing dysfunction due to strokes or accidents often require therapy to enhance their condition. The usage of surface electromyographic signals to control has become a important research area, being rehabilitation one of it's applications. The present work propose a CNN architecture that is able to predict six hand gestures with three channels. We enrolled 8 subjects that generated 14,400 samples in our dataset, each one with a hand gesture label. This CNN could work as a control system of a rehabilitation device, for which a database was prepared that accounted for possible hand movements to serve this purpose. The proposed solution shows an accuracy of 90.56% with an inference time of 1.515 ms. © 2023 IEEE.

Escobedo-Gordillo, A., Sepulveda, M., Villa, J., Villanueva, X., Garcia-Casas, S., Diaz, F., Brieva, J., Moya-Albor E., & Ponce H. (2023). SEMG based hand gesture recognition for rehabilitation prosthetics based on machine learning methods. In *19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023; Mexico City; Mexico; 15 November 2023 through 17 November 2023, Proceedings of the 19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023*. IEEE. doi: 10.1109/SIPAIM56729.2023.10373439. Conference Paper.

PERSONAL COMPETENCIES FOR WORK-FAMILY INTEGRATION AND ITS RELATIONSHIP WITH PRODUCTIVITY AND COMPREHENSIVE HEALTH IN SALARIED PROFESSIONALS

ABSTRACT. Work-Family Integration (WFI) is the decision-making process that enables an individual to effectively balance work, family, and personal responsibilities, generating a level of personal satisfaction aligned with the management of these demands. This research aims to explore the potential links between personal competencies facilitating work and family integration (WFI Competencies), employer-provided support (WFI Support), perceived satisfaction in role integration (WFI Satisfaction), and their association with organizational performance indicators and the overall health of professionals in dependent employment. Data were obtained via an online questionnaire administered to 270 professionals possessing a university education or higher, employed in public or private organizations spanning various sectors in Venezuela. The data were subsequently analyzed utilizing Structural Equation Modeling (SEM). The study was divided into two main parts: the factorial analysis (both exploratory and confirmatory) of measurement models and the analysis of the relationships and modeling inherent to the structural model. Initially, two diagnostic instruments were developed, one for WFI Competencies and another for WFI Indicators; though applied simultaneously, their structuring and validation were conducted separately. In the subsequent phase, conceptual models for structural analysis were defined. A positive relationship was observed between WFI Support and WFI Satisfaction, corroborating findings from previous research. The relationships between WFI Competencies and Satisfaction led to insights into the necessity of training to strengthen the personal decision-making process under the dual pressures of work and family roles. Future longitudinal studies could elucidate the effects of relationships within such programs on WFI Satisfaction. Concerning organizational indicators, this study found that WFI Satisfaction positively correlates with organizational commitment,

enhancing work productivity and mitigating negative health effects. This research presents a model that could be replicated in other countries and with various sample types, facilitating comparative analyses that enrich the body of knowledge on this subject. © 2024 by the authors.

Cachutt-Alvarado, C., Méndez-Gómez-Humaran, I., & Velasco-Álvarez, J. (2024). Personal Competencies for Work-Family Integration and Its Relationship with Productivity and Comprehensive Health in Salaried Professionals. *Safety*, 10(1), Article 28. doi: 10.3390/safety10010028. Article.

María Luisa Cruz López

SNII Level I

IN-LINE CELL-PHONE HOLOGRAPHIC MICROSCOPE USING PLANE WAVE ILLUMINATION AND AN ITERATIVE ALGORITHM

ABSTRACT. We propose an in-line cell-phone holographic microscope in combination with an iterative algorithm to retrieve the complex field of microscopic samples with high resolution at low cost. © 2023 The Author (s).

Cruz, M. L., Martínez-Márquez, M., & Torres-Plumarejo, L. (2023). In-line cell-phone holographic microscope using plane wave illumination and an iterative algorithm. In *3D Image Acquisition and Display: Technology, Perception and Applications*, 3D, COSI, DH, FLatOptics, IS, pcAOP 2023 - Part of Imaging and Applied Optics Congress 2023; Boston; United States; 14 August 2023 through 17 August 2023, 3D Image Acquisition and Display: Technology, Perception and Applications in Proceedings Optica Imaging Congress, 3D, COSI, DH, FLatOptics, IS, pcAOP 2023. Optica Publishing Group. doi: 10.1364/3D.2023.JTu4A.46. Conference Paper.

LARGE FIELD OF VIEW FULL-COLOR NEAR-EYE HOLOGRAPHIC DISPLAY

ABSTRACT. Near-eye displays (NED) are devices that are intended to project three dimensional images with wide-angle view. However, at present most of the 3D displays are based on stereoscopic principle, which does not satisfy the required parameters of human vision. This limitation can be overcome by implementing digital holograms within the NED. This is because a digital hologram contains the whole wavefront information of the scene. Thus, a holographic NED (HNED) is capable to reconstruct any three-dimensional scene while matching all the physiological cues of human vision. Nevertheless, truly immersion experience in HNED requires wide angle view and full colour reconstruction as well. In this work, we study HNED for pupil and non-pupil configuration that reconstructs large 3D colour scenes. The colour reconstruction is made by using RGB illumination and time multiplexing. Numerical analysis is carried out to test the FOV and the quality of reconstructions. Moreover, experimental colour reconstructions are made by employing laser for the pupil configuration and LED for non-pupil configuration. This is done to compare reconstruction quality and FOV of the displayed 3D scene. © 2024 SPIE.

Chlipala, M., Idicula, M. S., Kukotowicz, R., Cruz-López, M. L., Martínez-Carranza, J., & Kozacki, T. (2024). Large field of view full-color near-eye holographic display. In *Optics, Photonics, and Digital Technologies for Imaging Applications VIII 2024; Strasbourg; France; 9 April 2024 through 11 April 2024. Proceedings of SPIE - The International Society for Optical Engineering*, 12998, 129980S. SPIE. doi: 10.1117/12.3022440. Conference paper.

María Luisa Cruz López

SNII Level I

SIMPLE METHOD FOR HOLOGRAM MULTIPLEXING USING VERTICAL INTERLACING

ABSTRACT. We propose a simple method for multiplexing computer-generated holograms using random vertical interlacing and lineal phases. Three different images are multiplexed in a hologram increasing the reconstructed image size. © 2024 The Author(s).

Cruz-López, M. L., & Kozacki, T. (2024). Simple method for hologram multiplexing using vertical interlacing. In *Digital Holography and Three-Dimensional Imaging, DH 2024; Paestum; Italy; 3 June 2024 through 6 June 2024. Digital Holography and Three-Dimensional Imaging, DH 2024 in Proceedings Optica Digital Holography and Three-Dimensional Imaging 2024*. Optical Society of America. Conference paper.

María Luisa Cruz López

SNII Level I

SIMPLE METHOD FOR MICROSCOPE LENS CALIBRATION USING GRID LINES

ABSTRACT. We propose a simple method to calibrate a microscope lens using a grid lines pattern. We get four calibration patterns from each image, reducing the number of required images. In the final result, most of the spherical aberration is eliminated. © 2023 The Author (s).

Cruz-López, M. L. (2023). Simple method for microscope lens calibration using grid lines. In *3D Image Acquisition and Display: Technology, Perception and Applications, 3D, COSI, DH, FLatOptics, IS, pcAOP 2023 - Part of Imaging and Applied Optics Congress 2023; Boston; United States; 14 August 2023 through 17 August 2023, 3D Image Acquisition and Display: Technology, Perception and Applications in Proceedings Optica Imaging Congress, 3D, COSI, DH, FLatOptics, IS, pcAOP 2023*. Optical Society of America. doi: 10.1364/3D.2023.JTu4A.49. Conference Paper.

María Luisa Cruz López

SNII Level I

Héctor Eduardo Gilardi Velázquez

Senior Researcher B, SNII Level I

SPECKLE NOISE REDUCTION, IN AMPLITUDE HOLOGRAMS, USING A LIMITED-BANDWIDTH RANDOM PHASE GENERATED BY A CHAOTIC MAP

ABSTRACT. We propose a new method for generating a limited-bandwidth random phase using a chaotic function. The random phase is applied in the generation of amplitude holograms, reducing the speckle noise in the reconstructed image. © 2024 The Author(s).

Cruz-López, M. L., & Gilardi-Velázquez, H. (2024). Speckle noise reduction, in amplitude holograms, using a limited-bandwidth random phase generated by a chaotic map. In *Digital Holography and Three-Dimensional Imaging, DH 2024; Paestum; Italy; 3 June 2024 through 6 June 2024, Digital Holography and Three-Dimensional Imaging, DH 2024 in Proceedings Optica Digital Holography and Three-Dimensional Imaging 2024, DH*. Optical Society of America. Conference paper.

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SNII Level I

DIRECTIONALITY OF FIV3 GROUND-MOTION INTENSITIES DURING THE 6 FEBRUARY 2023 KAHRAMANMARAŞ, TÜRKİYE EARTHQUAKE DOUBLET

ABSTRACT. At present time, ground-motion prediction models neglect the directionality observed in horizontal components of earthquake ground motions, that is, the important changes in ground-motion intensity that occur with changes in azimuth. This study presents an investigation of the directionality of a recently proposed measure of ground-motion intensity during the 6 February 2023, Mw 7.8 Pazarcık and Mw 7.5 Elbistan earthquake doublet in the Kahramanmaraş region of Türkiye, which resulted in the collapse of more than 35,000 buildings and caused almost 60,000 fatalities. The studied intensity measure is referred to as FIV3, which has been shown to be better correlated with structural collapse than the spectral acceleration at the fundamental period of the structure. The improved intensity measure is period-dependent and is computed as the sum of the three largest incremental velocities with the same polarity obtained from the area under segments of a low-pass filtered ground acceleration time series. The following aspects are studied in this article: variation of FIV3 intensity with changes in the orientation; variation of FIV3 intensity with changes in the period of vibration; attenuation of FIV3 intensities with increasing distance; and spatial distribution of the orientation of maximum FIV3 intensity. This study is based on 231 pairs of records from the Mw 7.8 main event and 222 pairs of records from the Mw 7.5 event. Similarly to the directionality of spectral ordinates, it is found that the directionality of FIV3 intensity also increases with increasing period. Strong directionality occurred not only in the near field but up to distances as large as 400 km from the epicenter. The orientation of maximum FIV3 intensity is found to occur close to the transverse orientation, consistent with observations for the orientation of maximum spectral ordinates during strike-slip earthquakes. © The Author(s) 2024.

Bravo-Haro, M., Heresi, P., Dávalos, H., & Miranda, E. (2024). Directionality of FIV3 ground-motion intensities during the 6 February 2023 Kahramanmaraş, Türkiye earthquake doublet. *Earthquake Spectra*, 40(2), 1019-1041. doi: 10.1177/87552930231226075. Article.

DIRECTIONALITY OF HORIZONTAL COMPONENTS OF GROUND MOTIONS RECORDED ON SOFT SOIL SITES

ABSTRACT. The directionality of horizontal 5%-damped response spectral ordinates computed from ground motions recorded in soft soil deposits of Mexico City is investigated. Response spectral ordinates are computed at periods of vibration normalized by the predominant period of vibration of each site. A first parameter used to characterize the variation of ground motion intensity with changes in orientation corresponds to response spectral ordinates normalized by the maximum spectral ordinate from all rotation angles while the second normalizes them by the median spectral ordinate. Results suggest that the level of directionality is significant, tends to increase as the period of vibration increases, and has an important increment for normalized periods close to unity. Finally, models to estimate the level of directionality in response spectral ordinates of ground motions recorded in soft soils as a function of period ratio and orientation with respect to the azimuth of maximum response are proposed. © 2024 Elsevier Ltd.

Dávalos, H., Trejo, F., & Miranda, E. (2024). Directionality of horizontal components of ground motions recorded on soft soil sites. *Soil Dynamics and Earthquake Engineering*, 178, Article 108487. doi: 10.1016/j.soildyn.2024.108487. Article.

OPTIMAL NUMBER OF SUPERCAPACITORS PER SUBMODULE IN THE ENERGY STORAGE SYSTEM BASED ON A MODULAR MULTILEVEL CONVERTER WITH EMBEDDED BALANCE CONTROL

ABSTRACT. As renewable energy sources interconnected to the electric grid increase, deploying distributed energy storage systems along the grid is a viable solution to sustain grid stability. One of the critical aspects of any energy storage system is its efficiency in transferring power to the grid. Another important aspect is managing high power levels in a short time and being easily expandable in terms of energy capacity and power handling. For this reason, supercapacitors are suitable energy storage devices to fulfill these requisites. This article focuses on analyzing the losses and improving the efficiency of a supercapacitor energy storage system based on a modular multilevel converter, which accomplishes all the above-mentioned functions and capabilities. The analyzed energy storage system is based on submodules, including the power electronic interface and the supercapacitors. Hence, the system can be easily expanded because the submodule provides the functions of balancing the energy storage devices, the DC/AC, and the DC/DC conversions by using the modular multilevel converter topology approach. Therefore, any number of submodules can be connected, and the operator can make an array of the desired power, energy, and voltage ratings. This study details a probabilistic loss analysis for the proposed supercapacitor energy storage system and presents a case study using 3000F supercapacitor cells for a 6.6 kW single-phase system. The improved submodule version is validated through simulations and experimentally with a lab-scale prototype. The results show how the proposed methodology increases the system's overall efficiency with a 95 % confidence level. © 2024

Dávalos Hernández, F., Parsegov, S., Rosas-Caro, J. C., Bhatnagar, P., Martín Ibáñez, F. (2024). Optimal number of supercapacitors per submodule in the energy storage system based on a modular multilevel converter with embedded balance control. *International Journal of Electrical Power and Energy Systems*, 159, Article 110030. doi: 10.1016/j.ijepes.2024.110030. Article.

SIMPLE AND FAST METHOD FOR EXTRACTING THE PARAMETERS OF THE ONE-DIODE PHOTOVOLTAIC CELL MODEL

ABSTRACT. The one-diode photovoltaic cell model is non-linear and implicit, which poses difficulties for its implementation in photovoltaic applications. The scientific community is devoting great efforts to extract the five model parameters from experimental current-voltage curves. Many analytical or numerical methods have been developed for the parameter extraction. However, pseudo-analytical methods (methods that incorporate a numerical part and an analytical part) have been little explored. Pseudo-analytical methods have advantages such as easiness of programming and speed. In addition, they do not require an initial guess of the parameters as is required in numerical methods. In this study, a pseudo-analytical method has been developed and tested over four photovoltaic technologies. It has been compared to an analytical method and to an existing pseudanalytical method, showing better accuracy (42.6% relative improvement compared to the analytical and 3.30% compared to the pseudo-analytical). The proposed method is simple, easy to implement and fast, avoiding the inherent difficulties of the existing numerical algorithms (both classical and met-heuristic). © 2023 IEEE.

Dávalos-Orozco, O., Rodrigo, P. M., & Brambila-Paz, F. (2023). Simple and fast method for extracting the parameters of the one-diode photovoltaic cell model. In *2023 International Conference on Electrical and Information Technology, IEIT 2023; Malang; Indonesia; 14 September 2023 through 15 September 2023, Proceedings - IEIT 2023: 2023 International Conference on Electrical and Information Technology* (pp. 176-179). IEEE. doi: 10.1109/IEIT59852.2023.10335548. Conference Paper.

DEVELOPMENT OF FUNCTIONAL PANELA CHEESE ENRICHED WITH PREBIOTICS AND PROBIOTICS

ABSTRACT. Food trends show interest in functional foods, which provide health and nutrition. This research is focused on developing a functional Mexican-style panela cheese that incorporates the probiotics *Bifidobacterium animalis* subsp. *lactis*, *Lactobacillus delbrueckii* subsp. *bulgaricus* NCFB 2772, *Lactocaseibacillus rhamnosus* GG and 4% inulin as a prebiotic. Yield, and content of lactic acid bacteria (LAB) and CFU of total coliforms were evaluated. Scanning Electron Microscopy was performed to evaluate the incorporation of the bacteria in the matrix. Furthermore, shelf life was established. The cheese yielded 26.6% (w/v), and its microbial content reached 7.12×10^8 CFU/g, exceeding the Mexican Norm NOM 181. Inulin enhanced probiotic growth, and electron microscopy confirmed the successful integration of bacteria within the cheese matrix. Shelf-life studies demonstrated sustained LAB growth above 10^8 CFU/g for 22 days, though the shelf life was determined to be 13 days under refrigeration at 4 °C due to coliform bacteria detection. Sensory evaluation revealed through just about right within the 60% range where dairy flavor, mouthfeel moisture, creaminess, and adhesiveness; showing that no reformulation should take place. Furthermore, CATA analysis showed that attributes that better described the product were dairy flavor, mouth moisture, fresh milk smell, white color, and smooth texture. The cheese scored 5.03 ± 1.23 on a 7-point acceptance scale and achieved a 69% purchase intention rate. Therefore, a functional cheese product was obtained with LAB and inulin with adequate sensory characteristics. © 2024 Universidad de Ciencias Aplicadas y Ambientales U.D.C.A. All rights reserved.

Tiscareño-Ortega, K., Chávez-Vela, N. A., Domínguez-Soberanes, J., & Rodríguez-Serrano, G. M. (2024). Development of functional panela cheese enriched with prebiotics and probiotics. *Revista U.D.C.A Actualidad and Divulgación Científica*, 27(2), Article e2656. doi: 10.31910/rud-ca.v27.n2.2024.2656. Article.

HEALTH BENEFITS AND RISKS OF FERMENTED FOODS—THE PIMENTO INITIATIVE

ABSTRACT. Worldwide, fermented foods (FF) are recognized as healthy and safe. Despite the rapid increase of research papers, there is a lack of systematic evaluation of the health benefits and risks of FF. The COST Action CA20128 “Promoting innovation of fermented foods” (PIMENTO) aims to provide a comprehensive assessment on the available evidence by compiling a set of 16 reviews. Seven reviews will cover clinical and biological endpoints associated with major health indicators across several organ systems, including the cardiovascular, gastrointestinal, neurological, immune, and skeletal systems. Nine reviews will address broader biological questions associated with FF including bioactive compounds and vitamin production, nutrient bioavailability and bioaccessibility, the role of FF in healthy diets and personalized nutrition, food safety, regulatory practices, and finally, the health properties of novel and ethnic FF. For each outcome assessed in the reviews, an innovative approach will be adopted based on EFSA’s published guidance for health claim submissions. In particular, each review will be composed of three parts: (1) a systematic review of available human studies; (2) a non-systematic review of the mechanism of action related to the clinical endpoints measured by the human studies identified in part 1; and (3) a non-systematic review of the characterization of the FF investigated in the human studies identified in part 1. The evidence and research gaps derived from the reviews will be summarized and published in the form of a strategic road map that will pave the way for future research on FF. Copyright © 2024 Todorovic, Akpinar, Assunção, Bär, Bavaro, Berkel Kasikci, Domínguez-Soberanes, Capozzi, Cotter, Doo, Gündüz Ergün, Guzel, Harsa, Hastaoglu, Humblot, Hyseni, Hosoglu, Issa, Karakaş-Budak, Karakaya, Kesenkas, Keyvan, Künili, Kütt, Laranjo, Louis, Mantzouridou, Matalas, Mayo, Mojsova, Mukherjee, Nikolaou, Ortakci, Paveljšek, Perrone, Pertziger, Santa, Sar, Savary-Auzeloux, Schwab, Starowicz, Stojanović, Syrpas, Tamang, Yerlikaya,

Yilmaz, Malagon-Rojas, Salminen, Frias, Chassard and Vergères.

Todorovic, S., Akpinar, A., Assunção, R., Bär, C., Bavaro, S. L., Berkel Kasikci, M., Domínguez-Soberanes, J., Capozzi, V., Cotter, P. D., Doo, E. H., Gündüz Ergün, B., Guzel, M., Harsa, H. S., Hastaoglu, E., Humblot, C., Hyseni, B., Hosoglu, M. I., Issa, A., Karakaş-Budak, B., Karakaya, S., Kesenkas, H., Keyvan, E., Künili, I. E., Kütt, M. L., Laranjo, M., Louis, S., Mantzouridou, F. T., Matalas, A., Mayo, B., Mojsova, S., Mukherjee, A., Nikolaou, A., Ortakci, F., Paveljšek, D., Perrone, G., Pertziger, E., Santa, D., Sar, T., Savary-Auzeloux, I., Schwab, C., Starowicz, M., Stojanović, M., Syrpas, M., Tamang, J. P., Yerlikaya, O., Yilmaz, B., Malagon-Rojas, J., Salminen, S., Frias, J., Chassard, C., & Vergères, G. (2024). Health benefits and risks of fermented foods—the PIMENTO initiative. *Frontiers in Nutrition*, 11, Article 1458536. doi: 10.3389/fnut.2024.1458536. Article.

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Senior Researcher A, SNII Level I

PHYSICOCHEMICAL AND TECHNO-FUNCTIONAL CHARACTERIZATION OF SOLUBLE PROTEINS EXTRACTED BY ULTRASOUND FROM THE CRICKET ACHETA DOMESTICUS

ABSTRACT. The growing interest in using insects for human consumption is due to their numerous benefits. Insects offer efficient protein generation, rapid growth rates, and high nutritional value. The objective of this work was to evaluate the physicochemical and techno-functional properties of the different soluble protein fractions of the cricket *Acheta domesticus* using various methods: grinding (CF), defatting (DCF), alkalization (SPA), and ultrasound-assisted extraction (SPS). CF, DCF, SPA, and SPS were used as extenders in food models and compared with a control group prepared with meat and a commercial soy protein (SPI). Defatting increased the protein content (52 %) in CF, improving digestibility, while the SPS extraction method improved solid recovery (40.46 %), protein recovery (41.94 %), total protein content (53.85 %), and digestibility (53.7 %) compared to SPA. Proteins exhibited pH-dependent solubility, with higher solubility at pH 12–13 and an isoelectric point of 4.5. In techno-functional properties, SPS had the highest water/oil retention capacity (2.8 g/g, 3.49 g/g), foam formation (386.66 %), and emulsifying stability (32.96 m2/g). CF showed no foam formation, although defatting (DCF) improved foam formation (8.33 %) and emulsifying stability (6.23 m2/g). Heat coagulation was higher for CF and DCF (30.58 % and 30.33 % respectively). All meat models with SPA and SPS showed high elasticity and cohesiveness but low hardness, gumminess, and chewiness. The model prepared with 15 % SPS reduced cooking losses (0.91 %) and total expressible fluid separation (1 %), improved water retention capacity (83.02 %), and increased total soluble protein content (5.32 mg/mL). The ultrasound-assisted extraction method proved to be an efficient way to obtain soluble proteins from *Acheta domesticus* with techno-functional properties suitable for use as a food additive or meat extender. © 2024 The Authors

Cruz-López, S. O., Escalona-Buendía, H. B., Martínez-Arellano, I., Domínguez-Soberanes,

J., Álvarez-Cisneros, Y. M. (2024). Physicochemical and techno-functional characterization of soluble proteins extracted by ultrasound from the cricket *Acheta domesticus*. *Heliyon*, 10(23), Article e40718. doi: 10.1016/j.heliyon.2024.e40718. Article.

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URBAN GARDENS IMPACT ON FOOD AND ENVIRONMENTAL SUSTAINABILITY: STUDY CASE OF AGUASCALIENTES, MEXICO

ABSTRACT. Implementing Urban Gardens in Aguascalientes, Mexico, is an initiative that aims to address the scarcity of services relative to the population density. The conceptual framework of this research follows the United Nations Sustainable Development Goals (SDGs). Through a multidisciplinary approach, this study incorporates pedagogical and technological methodologies to execute educational strategies rooted in culturally relevant practices. It shows the participants' expectations about the teaching and learning process using horizontal communication, involving them in decision-making. Key parameters evaluated include learning outcomes and the engagement of the community, as well as technical parameters such as seed selection, water scarcity, mitigation strategies, crop cycles, and community consumption patterns. Findings reveal that the benefits of the Urban Gardens initiative are positively perceived by the community's socio-economic advantages. This investigation elaborates on strategies for implementing community support for similar projects; the Urban Gardens initiative in Aguascalientes, Mexico, is a model for the world to follow. © 2024 IST-Africa Institute and Authors.

Hernández-Herrera, M. T., Domínguez-Soberanes, J., Reyes-Cedeno, I. G., López-Anaya, J.-H., & Medrano-Medina, D. (2024). Urban Gardens Impact on Food and Environmental Sustainability: Study Case of Aguascalientes, Mexico. In *2024 IST-Africa Conference, IST-Africa 2024; Virtual, Online; Ireland; 20 May 2024 through 24 May 2024, 2024 IST-Africa Conference, IST-Africa 2024*. IEEE. doi: 10.23919/IST-Africa63983.2024.10569952. Conference paper.

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DESIGNING A GAMIFIED APPROACH FOR DIGITAL DESIGN EDUCATION ALIGNED WITH EDUCATION 4.0

ABSTRACT. Introduction: Gamification integrates game-like elements, such as points, badges, and leaderboards, into the educational process. This study examines the influence of a gamified approach on improving graphic design education. By implementing this methodology, we aim to create a more dynamic learning environment that could lead to better academic outcomes. Methods: A quasi-experimental design was employed to compare students' average grades and academic achievements using the gamified technique with those taught using conventional methods. Thirty-two students participated in the study, with these students enrolled in three different terms. Data collection involved tracking students' grades, participation, and completion rates of gamified activities. Results: Participants in the August–December 2023 semester (Experimental 2 group) who experienced the gamified approach with the proposed platform showed significant improvement, with a p-value of 0.033, compared to those in the August–December 2022 semester (Control group), which used only conventional approaches. Furthermore, better learning outcomes were obtained when the Experimental 2 group was compared with the January–May 2023 semester (Experimental 1 group), which used only the gamification methodology (p-value = 0.025). Additionally, out of 15 students in the Experimental 2 group, 10 achieved certification in Adobe Illustrator and 13 in Photoshop, suggesting that gamification elements applied through a digital platform can improve academic performance and enhance students' practical skills and readiness for professional challenges in graphic design. Discussion: Results indicate that the gamified methodology can improve learning outcomes. Nevertheless, the proposed approach also has limitations and areas for improvement. Manual data capture, integration

with external tools, the amount of teachers applying the approach, and the sample size of participants are limitations of the study that could have affected the accuracy of the results. Future work will focus on developing a proprietary platform that integrates course content and automates the tracking system to improve efficiency and accuracy. Moreover, a subsequent study will include a larger sample of students and professors to validate the present study's findings. Copyright © 2024 Cal y Mayor-Peña, Barrera-Animas, Escobar-Castillejos, Noguez and Escobar-Castillejos.

Cal y Mayor-Peña, F., Barrera-Animas, A. Y., Escobar-Castillejos, D., Noguez, J., & Escobar-Castillejos, D. (2024). Designing a gamified approach for digital design education aligned with Education 4.0. *Frontiers in Education*, 9, Article 1439879. doi: 10.3389/educ.2024.1439879. Article.

David Escobar Castillejos

SNII Level I

ENHANCING BUOYANT FORCE LEARNING THROUGH A VISUO-HAPTIC ENVIRONMENT: A CASE STUDY

ABSTRACT. Introduction: This study aimed to develop, implement, and test a visuo-haptic simulator designed to explore the buoyancy phenomenon for freshman engineering students enrolled in physics courses. The primary goal was to enhance students' understanding of physical concepts through an immersive learning tool. Methods: The visuo-haptic simulator was created using the VIS-HAPT methodology, which provides high-quality visualization and reduces development time. A total of 182 undergraduate students were randomly assigned to either an experimental group that used the simulator or a control group that received an equivalent learning experience in terms of duration and content. Data were collected through pre- and post-tests and an exit-perception questionnaire. Results: Data analysis revealed that the experimental group achieved higher learning gains than the control group ($p = 0.079$). Additionally, students in the experimental group expressed strong enthusiasm for the simulator, noting its positive impact on their understanding of physical concepts. The VIS-HAPT methodology also reduced the average development time compared to similar visuo-haptic simulators. Discussion: The results demonstrate the efficacy of the buoyancy visuo-haptic simulator in improving students' learning experiences and validate the utility of the VIS-HAPT method for creating immersive educational tools in physics. Copyright © 2024 Neri, Noguez, Escobar-Castillejos, Robledo-Rella, García-Castelán, González-Nucamendi, Magana and Benes.

Neri, L., Noguez, J., Escobar-Castillejos, D., Robledo-Rella, V., García-Castelán, R. M. G., González-Nucamendi, A., Magana, A. J., & Benes, B. (2024). Enhancing Buoyant force learning through a visuo-haptic environment: a case study. *Frontiers in Robotics and AI*, 11, Article 1276027. doi: 10.3389/frobt.2024.1276027. Article.

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ENHANCING METHODS ENGINEERING EDUCATION WITH A DIGITAL PLATFORM: USABILITY AND EDUCATIONAL IMPACT ON INDUSTRIAL ENGINEERING STUDENTS

ABSTRACT. Introduction: Work study aims to comprehend the potential of human work by assessing the duration of tasks and identifying methods for reducing them to enhance productivity and efficiency. On the other hand, methods engineering analyzes job processes to determine the most efficient and cost-effective techniques, resulting in improved operations. These areas are essential in the field of industrial engineering. Traditionally, they are taught using printed manuals and classroom-based instruction. Nevertheless, these conventional strategies frequently encounter difficulties engaging students and generating solid comprehension of the topics. Methods: This study involved the development of a digital platform to improve methods engineering education. The platform adapts the curriculum of the methods engineering course offered at Universidad Panamericana. Each laboratory's practice includes detailed instructions and tasks for students to complete. Upon finishing, students submit their reports, which the professor then assesses. If the report meets the required standards, it is approved; otherwise, students must repeat the activities. An experience system serves as a tracker for course completion and keeps track of the student's progress. Results: An experimental group of 26 students who responded to Doll and Torkzadeh's end-user computer satisfaction survey tested the platform. Participants responded positively, particularly regarding the platform's accuracy (73.08% high satisfaction), ease of use (majority rated 5 for user-friendliness), and timeliness (majority satisfied with up-to-date information). However, the format dimension received mixed ratings, indicating areas for improvement. Additionally, participants appreciated the platform's ability to track progress and motivate the comple-

tion of laboratories, with 61.54% finding the content relevant and valuable for learning methods engineering concepts. Discussion: The results suggest that integrating digital platforms into educational settings could significantly enhance educational settings, particularly in engineering courses where conventional approaches struggle to maintain student interest and engagement. Participants' positive responses support digital platforms' potential to complement and improve teaching methods. Future research will focus on integrating adaptive learning and generating micro-credentials to certify student expertise. Copyright © 2024 Escobar-Castillejos, Sigüenza-Noriega, Noguez, Escobar-Castillejos and Berumen-Glinz.

Escobar-Castillejos, D., Sigüenza-Noriega, I., Noguez, J., Escobar-Castillejos, D., & Berumen-Glinz, L. A. (2024). Enhancing methods engineering education with a digital platform: usability and educational impact on industrial engineering students. *Frontiers in Education*, 9, Article 1438882. doi: 10.3389/fed-uc.2024.1438882. Article.

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SNII Level I

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ENHANCING STEAM IN EDUCATION 4.0: A REVIEW OF DATA-DRIVEN TECHNOLOGICAL IMPROVEMENTS

ABSTRACT. Universities have fulfilled the role of organizations dedicated to the promotion of intellectual knowledge and the fostering of creative thinking. Educational institutions function as the central place for students to acquire specialized knowledge in their respective disciplines, while also developing competencies and beliefs that contribute to the progress of society. As technology advances, universities are facing a new revolution in the paradigms of education, which is making them adapt their established methodologies. Education 4.0 aims to improve education through cutting-edge technology and automation. Furthermore, the use of data-driven methodologies allows educators to automate the processes of assessment and evaluation, which could enhance the accuracy of comprehending educational outcomes. Universities are currently promoting the integration of analytical reasoning and creative expression using multidisciplinary techniques such as STEAM. This approach ensures that students not only acquire technical expertise, but also develop the essential skills of creativity, adaptability, and humanistic understanding that are necessary in the current job market. The objective of this chapter is to discuss the development and importance of STEAM within Education 4.0, emphasizing the potential of data-driven technologies. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Escobar-Castillejos, D., Barrera-Animas, A. Y., Lozada-Flores, O., & Noguez J. (2024). Enhancing STEAM in Education 4.0: A Review of Data-Driven Technological Improvements. In *Studies in Big Data*, (vol. 148, pp. 39-65). Springer. doi: 10.1007/978-3-031-54277-0_2. Book Chapter.

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Octavio Lozada Flores

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IMPROVING ENGINEERING STUDENTS' UNDERSTANDING OF CLASSICAL PHYSICS THROUGH VISUO-HAPTIC SIMULATIONS

ABSTRACT. Introduction: The teaching process plays a crucial role in the training of professionals. Traditional classroom-based teaching methods, while foundational, often struggle to effectively motivate students. The integration of interactive learning experiences, such as visuo-haptic simulators, presents an opportunity to enhance both student engagement and comprehension. Methods: In this study, three simulators were developed to explore the impact of visuo-haptic simulations on engineering students' engagement and their perceptions of learning basic physics concepts. The study used an adapted end-user computing satisfaction questionnaire to assess students' experiences and perceptions of the simulators' usability and its utility in learning. Results: Feedback from participants suggests a positive reception towards the use of visuo-haptic simulators, highlighting their usefulness in improving the understanding of complex physics principles. Discussion: Results suggest that incorporating visuo-haptic simulations into educational contexts may offer significant benefits, particularly in STEM courses, where traditional methods may be limited. The positive responses from participants underscore the potential of computer simulations to innovate pedagogical strategies. Future research will focus on assessing the effectiveness of these simulators in enhancing students' learning and understanding of these concepts in higher-education physics courses. Copyright © 2024 González-Mena, Lozada-Flores, Murrieta Caballero, Noguez and Escobar-Castillejos.

González-Mena, G., Lozada-Flores, O., Murrieta Caballero, D., Noguez J., & Escobar-Castillejos, D. (2024). Improving engineering students' understanding of classical physics through visuo-haptic simulations. *Frontiers in Robotics and AI*, 11, Article 1305615. doi: 10.3389/frobt.2024.1305615. Article.

A DEEP LEARNING-BASED IMAGE PRE-PROCESSING PIPELINE FOR ENHANCED 3D COLON SURFACE RECONSTRUCTION ROBUST TO ENDOSCOPIC ILLUMINATION ARTIFACTS

ABSTRACT. This contribution demonstrates the efficacy of targeted image pre-processing techniques in enhancing deep-learning-based 3D reconstruction of colon surfaces. It challenges the conventional approach of applying global image illumination corrections or only specular reflection removal in colonoscopy by advocating for the correction of local under- and over-exposures. Initially, an overview of the pipeline, encompassing image exposure correction coupled with a Recurrent Neural Network Simultaneous Localization and Mapping (RNN-SLAM) system is provided. Subsequently, this paper quantifies the reconstruction accuracy of endoscope trajectories within the colon, comparing results obtained with and without appropriate illumination correction. Notably, the results underscore the significant impact of the Endo-LMSPEC method on trajectory accuracy. Through targeted exposure correction, the average pose error (APE) is notably reduced, accompanied by a decrease in the root mean square error (RMSE). Moreover, the median pose error experiences a substantial improvement, highlighting the robustness of the Endo-LMSPEC method in mitigating local illumination artifacts. These findings underscore the critical role of tailored image pre-processing techniques in achieving more accurate and reliable 3D reconstructions of colon surfaces during endoscopic procedures. © 2024 IEEE.

Espinosa, R., Cerriteno, J., González-Domínguez, S., Ochoa-Ruiz, G., & Daul, C. (2024). A deep learning-based image pre-processing pipeline for enhanced 3D colon surface reconstruction robust to endoscopic illumination artifacts. In *37th IEEE International Symposium on Computer-Based Medical Systems, CBMS 2024; Hybrid, Guadalajara; Mexico; 26 June 2024 through 28 June 2024, Proceedings - IEEE Symposium on Computer-Based Medical Systems* (pp. 81-88). IEEE. doi: 10.1109/CBMS61543.2024.00022. Conference paper.

COLOR-AWARE EXPOSURE CORRECTION FOR ENDOSCOPIC IMAGING USING A LIGHTWEIGHT VISION TRANSFORMER

ABSTRACT. Endoscopy is a widely used imaging technique for diagnosing diseases in hollow organs. However, endoscopic images often suffer from limited visibility and can be affected by many imaging artifacts, such as those related to under or overexposure, which can hamper the performance of AI-based diagnostic tools. Addressing this issue is challenging; thus, most previous work has focused on enhancing underexposed images. In this contribution, we propose an extension to the objective function and deep neural network layers of the IAT Vision Transformer model (Illumination Adaptive Transformer), designed initially for enhancing lowlight or ill-exposed images from natural scenes. Our approach specifically targets exposure correction in endoscopic imaging to preserve color and fine-scale details. First, an extra color normalization layer inside the IAT model has been integrated into the model, and secondly, the objective function has been extended with a Laplacian Pyramid Loss to evaluate different image patches, whereas a histogram-aware loss (HistoLoss) has been used to preserve the color quality of the enhanced endoscopic image, both of these combined allow for the output images not only to improve quantitatively but also qualitatively. We evaluate our method on the Endo4IE dataset and demonstrate significant improvements over a previous method (Endo-LMSPEC) tailored specifically to endoscopic imaging. Compared with the state-of-the-art (Endo-LMSPEC), our approach achieves an SSIM increase of 2.3% and PSNR increase of 0.523 dB for overexposed images, along with an increase of 2.7% and 1.458 dB improvement in PSNR for underexposure, all while employing only $\approx 90k$ parameters and running at an inference time of ≈ 74 FPS, outperforming existing state-of-the-art methods on the same dataset and objective. © 2024 IEEE.

Espinosa, R., Hernández, E., Ochoa-Ruiz, G., & Daul, C. (2024). Color-aware Exposure Correction for Endoscopic Imaging using a Lightweight Vision Transformer. In *37th IEEE International Symposium on Computer-Based Medical Systems, CBMS 2024; Hybrid, Guadalajara; Mexico; 26 June 2024 through 28 June 2024, Proceedings - IEEE Symposium on Computer-Based Medical Systems* (pp. 376-382). IEEE. doi: 10.1109/CBMS61543.2024.00069. Conference paper.

GYMETRICPOSE: A LIGHT-WEIGHT ANGLE-BASED GRAPH ADAPTATION FOR ACTION QUALITY ASSESSMENT

ABSTRACT. Improving the overall quality of exercise is crucial for achieving effective and safe techniques during gym workouts. Moreover, identifying errors during workouts can optimize training benefits and minimize the risk of injury. In this paper, we propose a cross-domain method to exploit angle information in human pose skeletons, aiming to detect fine-grained posture problems in complex real-world environments. Specifically, we integrate the Geometric Representation Extraction (GRE) module along with transformer-based pose estimation. Our approach demonstrates efficacy on the Fitness-AQA dataset, which comprises authentic exercise samples captured in real-world gym settings. This performance is achieved after pose estimation with approximately 164k parameters in its base configuration. The experimental results highlight that our method is a competitive approach compared to self-supervised video/image approaches in complex environments. In the Back Squat exercise, our method outperforms Motion Disentangling (MD) in detecting Knee Inward Error (KIE) with an F1-score of 0.4398. For Static Shallow Squat Error, it achieved the second-best F1-score of 0.8677, just 0.0017 below Cross-View Cross-Subject Pose Contrastive Learning (CVCSPC). In the Overhead Press exercise, the method significantly improved the detection of Knee error, achieving an F1-score of 0.8160, surpassing CVCSPC and other methods. Overall, these results demonstrate that the proposed method provides competitive performance compared to the state-of-the-art models while using $\approx 187x$ fewer parameters than the model with the highest performance in the AQA dataset, the Motion Disentangling (MD) approach. Code will be available at: <https://github.com/CaroFernando/GymPose> © 2024 IEEE.

Gallardo, U., Caro, F., Hernández, E., Espinosa, R., & Ochoa-Ruiz, G. (2024). GYMetricPose: A light-weight angle-based graph adaptation for action quality assessment. In *37th IEEE International Symposium on Computer-Based Medical Systems, CBMS 2024; Hybrid, Guadalajara; Mexico; 26 June 2024 through 28 June 2024, Proceedings - IEEE Symposium on Computer-Based Medical Systems* (pp. 43-50). IEEE. doi: 10.1109/CBMS61543.2024.00016. Conference paper.

**María del Carmen
García Higuera**

Research Professor

PERCEPTIONS OF COVID-19 PATIENTS IN THE USE OF BIOETHICAL PRINCIPLES AND THE PHYSICIAN-PATIENT RELATIONSHIP: A QUALITATIVE APPROACH

ABSTRACT. Background: The COVID-19 pandemic has influenced the approach to the health-disease system, raising the question about the principles of bioethics present in physician-patient relations. The principles while widely accepted may not be sufficient for a comprehensive ethical analysis. Therefore, the aim of this study was to explore the perception of these principles and the physician-patient relationship during a hospital stay through a qualitative approach. Method: Sixteen semi-structured interviews took place to know the patients' perception during their 2020 hospitalization for COVID-19. The data was analyzed through the constant comparison method, creating categories and comparing them. In the end, seven categories were established and were grouped in three: bioethical principles (dignity, charity, vulnerability, autonomy), doctor-patient relationship (participant commitment, informed consent, health staff-patient relationship) and the experience of the disease (illness, the role of the family). Results: The research found that most patients described a positive experience, with the feeling of having been well cared for with no sense of discrimination or injustice done. The majority also reported that their autonomy was respected in the treatment decisions. The evaluation of these attitudes is an area of opportunity, especially when the patients' vulnerability is at risk. Conclusions: The ethics of virtue offers a better reflection of how human beings manifest themselves by emphasizing the development of virtuous character and behaviors that allow them to realize their values in life. Authorized by the Research Ethics Committee with registration: DI/18/105-B/3/308. © The Author(s) 2024.

Cantú Quintanilla, G., Gómez-Guerrero, I. E., Aguilera-Chiñas, N., López Cervantes, M., Jaramillo Flores, I. D., Slon Rodríguez, P. A., Bravo Vargas, C. F., Arroyo-Valerio, A., & García-Higuera, M. D. C. (2024). Perceptions of COVID-19 Patients in the Use of Bioethical Principles and the Physician-Patient Relationship: A Qualitative Approach. *BMC Medical Ethics*, 25(16). doi: 10.1186/s12910-024-01009-z. Article.

**Héctor Eduardo
Gilardi Velázquez**

Senior Researcher B, SNII Level I

EMERGENT BEHAVIORS IN COUPLED MULTI-SCROLL OSCILLATORS IN NETWORK WITH SUBNETWORKS

ABSTRACT. This paper presents the emergence of two collective behaviors in interconnected networks. Specifically, the nodes in these networks belong to a particular class of piece-wise linear systems. The global topology of the network is designed in the form of connected subnetworks, which do not necessarily share the same structure and coupling strength. In particular, it is considered that there are two levels of connection, the internal level is related to the connection between the nodes of each subnetwork; while the external level is related to connections between subnetworks. In this configuration, the internal level is considered to provide lower bounds on the coupling strength to ensure internal synchronization of subnetworks. The external level has a relevant value in the type of collective behavior that can be achieved, for which, we determine conditions in the coupling scheme, to achieve partial or complete cluster synchronization, preserving the internal synchronization of each cluster. The analysis of the emergence of stable collective behavior is presented by using Lyapunov functions of the different coupling. The theoretical results are validated by numerical simulations. © 2024 Akif AKGUL. All rights reserved.

Ruiz-Silva, A., Cassal-Quiroga, B. B., Ávila-Martínez, E. J., Gilardi-Velázquez, H. E. (2024). Emergent Behaviors in Coupled Multi-scroll Oscillators in Network with Subnetworks. *Chaos Theory and Applications*, 6(2), 122-130. doi: 10.51537/chaos.1376501. Article.

**Héctor Eduardo
Gilardi Velázquez**

Senior Researcher B, SNII Level I

PREDICTING TIPPING POINTS IN A FAMILY OF PWL SYSTEMS: DETECTING MULTISTABILITY VIA LINEAR OPERATORS PROPERTIES

ABSTRACT. The study of dynamical systems is based on the solution of differential equations that may exhibit various behaviors, such as fixed points, limit cycles, periodic, quasi-periodic attractors, chaotic behavior, and coexistence of attractors, to name a few. In this paper, we present a simple and novel method for predicting the occurrence of tipping points in a family of Piece-Wise Linear systems (PWL) that exhibit a transition from monostability to multistability with the variation of a single parameter, without the need to compute time series, i.e., without solving the differential equations of the system. The linearized system of the model is analyzed, the stable and unstable manifolds are taken to be real vectors in space, and the changes suffered by these vectors as a result of the modification of the parameter are examined using such simple metrics as the magnitude of a vector or the angle between two vectors in space. The results obtained with the linear analysis of the system agree well with those obtained with the numerical resolution of the dynamical system itself. The work presented here is an extension of previous results on this topic and contributes to the understanding of the mechanisms by which a system changes its stability by fragmenting its basin of attraction. This, in turn, enriches the field by providing an alternative to numerical resolution to identify quantitative changes in the dynamics of complex systems without having to solve the differential equation system. © 2024 Akif AKGUL. All rights reserved.

Echenausia-Monroy, J. L., Cuesta-García, J. R., Gilardi-Velázquez, H. E., Muni, S. S., & Álvarez, J. (2024). Predicting Tipping Points in a Family of PWL Systems: Detecting Multistability via Linear Operators Properties. *Chaos Theory and Applications*, 6(2), 73-82. doi: 10.51537/chaos.1376123. Article.

DEPENDENCY OF THE ACCIDENTAL TORSION BUILDING RESPONSE ON BOTH LIVE-TO-DEAD LOAD RATIO AND MATERIAL STIFFNESS VARIATION

ABSTRACT. Numerical simulations were performed in this work to assess the impact of the ratio of live-to-dead load (ρ) and the stiffness variability of the constitutive materials on the accidental torsional response of buildings. Three values of ρ (0.2, 0.5 and 0.8) and two materials (reinforced concrete and steel) were studied. Story drifts and ductility demands were the main structural response parameters analyzed to evaluate the significance of both variables. Six structural models, representative of frame buildings with different lateral vibration periods (0.25 to 1.5 s), were subjected to five earthquake ground motions recorded on firm soils. With the Monte Carlo method, the intensity and location of the live load, as well as the flexural stiffness of the structural members, were randomly varied to simulate building cases with accidental torsion. According to the results, the effect of the live-to-dead load ratio (ρ) on the torsional response is more significant than that of the material stiffness variation. For both materials, the maximum torsion response for $\rho = 0.8$ resulted 66% greater than that for $\rho = 0.2$. For both materials and considering all earthquakes and structural models, the increase in the average peak accidental torsional response for $\rho = 0.8$ was approximately 20% greater than that for $\rho = 0.2$. These results corroborate that the accidental torsional response of buildings increases in proportion to ρ . Discrimination between concrete and steel buildings was not significant. © The Author(s), under exclusive licence to the Iran University of Science and Technology 2024.

De-la-Colina, J., Valdés-González, J., González-Pérez, C. A. (2024). Dependency of the Accidental Torsion Building Response on Both Live-to-Dead Load Ratio and Material Stiffness Variation. *International Journal of Civil Engineering*, 22(10), 1919-1932. doi: 10.1007/s40999-024-00979-w. Article.

IN VIVO HUMAN VERTEBRA IMAGE RECONSTRUCTION AND MECHANICAL SIMULATION

ABSTRACT. Computational tomography-based scans contain information that can be used to reconstruct a human vertebra and, along with densitometry studies, help in the understanding of bone failure. Though the human vertebra is constituted by trabecular and cortical tissue, in patients suffering osteoporosis, mechanical loads are primarily absorbed by the cortical wall. Through the use of conventional tomography and image processing, 3D virtual and rapid-prototyping vertebra models were generated in order to analyze stresses and failure modes of the cortical wall. An in vivo digital model of a human lumbar vertebra was developed using common tomography images, and a reconstruction of the cortical tissue of a male patient was done to obtain a virtual model and used in mechanical finite element simulations as well as in 3D printing with ABS material to perform mechanical compression tests. Both ABS and finite element models, obtained from the patient's tomography images, suffer failure in a similar mode and location, even though the accuracy of the image processing analysis is not very high (0.25 mm). The mechanical failure of the ABS model during compression can be accurately predicted by the finite element simulation and, the combination of the rapid prototyping models and the finite element simulation may be a good approximation to understand vertebra stresses and failure zones due to bone ailments, specially if new materials with properties closer to bone are used in prototyping machines. © 2023 IEEE.

González-Ruiz, A., Ortiz-Prado, A., Alfonso-López, I., & González-Ojeda, R. (2023). In Vivo Human Vertebra Image Reconstruction and Mechanical Simulation. In *19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023; Mexico City; Mexico; 15 November 2023 through 17 November 2023, Proceedings of the 19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023*. IEEE. doi: 10.1109/SIPAIM56729.2023.10373553. Conference Paper.

SHOULD I MOVE ASIDE AND LET A PROFESSIONAL CEO RUN MY COMPANY?

ABSTRACT. This chapter addresses the stage at which entrepreneurs figure out that they have reached their level of incompetence (Peter & Hull, 1969) and how they might overcome it. Recommendations are made to aid entrepreneurs realize when this key moment has arrived, as well as to lay out an action plan to help them either become a professional Chief Executive Officer (CEO) or move aside and let a professional CEO run their company. Based on a state of the art review, this chapter identifies the most valued personality traits and skills, as well as leadership styles, for both entrepreneurs and professional CEOs. Those attributes are summarized as ideal job descriptions to help CEOs detect gaps between their current personality profile and the one that best meets company needs at each stage of the business' lifecycle. © 2020 Emerald Publishing Limited.

Hurtado-Hernández, M., Debernardo, H., & Ordoñez-Torres, A. (2020). Should I Move Aside and Let a Professional CEO Run My Company? In S. García-Álvarez, & C. Atristain-Suárez (Eds.), *Strategy, Power and CSR: Practices and Challenges in Organizational Management* (pp. 165-185). Emerald Group Publishing. doi: 10.1108/978-1-83867-973-620201010. Book Chapter.

Juan Carlos López Pimentel*Senior Researcher B, SNII Level I***Carolina del Valle Soto***Senior Researcher D, SNII Level I***José Alberto del Puerto Flores***SNII Level I***DISTRIBUTED SOFTWARE ARCHITECTURE FOR ACCESSING THE NFT-VEHICLE**

ABSTRACT. Smart contracts have gained significant attention in the software development community because they are the mechanism for building blockchain applications. This work provides a distributed software architecture and an implementation for accessing a smart contract, called NFT-Vehicle, implemented on the Ethereum blockchain platform. The main idea behind NFT-Vehicle is the digitization process of a motorized vehicle in a digital asset. The architecture outlines two security protocols, one from the stakeholders who connect towards the back-end, and the other internally. The back-end includes mainly two parts: an API-gateway and the smart contract located in a blockchain. We report the acquired experiences and a list of identified errors found during the unit tests that are difficult to notice with simple requests. Our solution can be used as a base for real implementations of tokenizing physical cars into digital assets. © 2024 The Authors

López-Pimentel, J. C., Morales-Rosales, L. A., Del-Valle-Soto, C., Del Puerto-Flores, J. A. (2024). Distributed software architecture for accessing the NFT-Vehicle. *SoftwareX*, 27, Article 101820. doi: 10.1016/j.softx.2024.101820. Article.

Octavio Lozada Flores*SNII Level I***DESIGN OF PROMISING URANYL(VI) COMPLEXES THIN FILMS WITH POTENTIAL APPLICATIONS IN MOLECULAR ELECTRONICS**

ABSTRACT. In this work, it is proposed the development of organic semiconductor (OS) based on uranyl(VI) complexes. The above by means of the synthesis and the characterization of the complexes by Infrared spectroscopy, Nuclear magnetic resonance spectroscopy, mass spectrometry, and X-ray diffraction. Films of these complexes were deposited and subsequently, topographic and structural characterization was carried out by Scanning Electron Microscopy, X-ray diffraction, and Atomic Force Microscopy. Additionally, the nanomechanical evaluation was performed to know the stiffness of uranyl films using their modulus of elasticity. Also, the optical characterization took place in the devices and their bandgap value ranges between 2.40 and 2.93 eV being the minor for the film of the uranyl complex with the N on pyridine in position 4 (2 c). Finally, the electrical behavior of the uranyl(VI) films was evaluated, and important differences were obtained: the uranyl complex with the N on pyridine in position 2 (2 a) film is not influenced by changes in lighting and its current density is in the order of 10–3 A/cm². The film with uranyl complex with the N on pyridine in position 3 (2 b) and 2 c presents a greater current flow under lighting conditions and two orders of magnitude larger than in film 2 a. In these films 2 b and 2 c, ohmic behavior occurs at low voltages, while at high voltages the charge transport changes to space-charge limited current behavior. © 2023 The Authors. ChemistryOpen published by Wiley-VCH GmbH.

Monzón González, C. R., Sánchez Vergara, M. E., Elías-Espinosa, M. C., Rodríguez-Valencia, S. A., López-Mayorga, B. J., Castillo-Arroyave, J. L., Toscano, R. A., Lozada-Flores, O., Álvarez Toledano, C. (2024). Design of Promising Uranyl(VI) Complexes Thin Films with Potential Applications in Molecular Electronics. *ChemistryOpen*, 13(6), Article e202300219. doi: 10.1002/open.202300219. Article.

Octavio Lozada Flores*SNII Level I***ORGANIC SEMICONDUCTOR DEVICES FABRICATED WITH RECYCLED TETRA PAK®-BASED ELECTRODES AND PARA-QUINONE METHIDES**

ABSTRACT. This work presents the synthesis of para-quinone methides (p-QMs), which were deposited as films using the high vacuum sublimation technique after being chemically characterized. The p-QMs films were characterized morphologically and structurally using scanning electron microscopy, atomic force microscopy, and X-ray diffraction. In addition, their optical behavior was studied by means of ultraviolet-visible spectroscopy, and the optical gaps obtained were in the range of 2.21–2.71 eV for indirect transitions, indicating the semiconductor behavior of the p-QMs. The above was verified through the manufacture and evaluation of the electrical behavior of rigid semiconductor devices, in which fluorine-doped tin oxide-coated glass slides (FTO) were used as an anode and substrate. Finally, as an original, ecological, and low-cost application, the FTO was replaced by substrates and anodes made from recycled Tetra Pak®, generating flexible semiconductor devices. Although the electrical current transported depends on the type of p-QMs, the substituent in its structure, and the morphology, the kinds of substrate and anode also influence the type of electrical behavior of the device. This current-voltage study demonstrates that p-QM2 with 4-Cl-Ph as a radical, p-QM3 with 4-Et2N-Ph as a radical, and p-QM6 with 5-(1,3-benzodioxol) as a radical can be used in optoelectronics as semiconductor films. © 2024 by the authors.

Sánchez Vergara, M. E.; Santillán Esquivel, E. A., Bal-linas-Indilí, R., Lozada-Flores, O., Miranda-Ruv-alcaba, R., & Álvarez-Toledano, C. (2024). Organic Semiconductor Devices Fabricated with Recycled Tetra Pak®-Based Electrodes and para-Quinone Methides. *Coatings*, 14(8), Article 998. doi: 10.3390/coatings14080998. Article.

Isaí Gerardo Reyes Cedeño

Research Professor

Hugo Luna Villavicencio

Research Professor

IDENTIFICATION OF DOCUMENTED CONSTRUCTIVE STAGES OF THE SAN IGNACIO BRIDGE (AGUASCALIENTES, MEXICO) USING ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT)

ABSTRACT. The non-destructive technique known as Electrical Resistivity Tomography (ERT) has been used in the analysis of historical buildings in recent years. It provides insights into the internal structure of the structural elements, such as layer thicknesses, and potential irregularities. In this investigation the ERT technique was applied to the ancient San Ignacio Bridge, located in the state of Aguascalientes, Mexico. The resulting resistivity profiles unveil the primary construction stages of the bridge, which corroborate and enhance the historical information regarding its construction phases. Additionally, the profiles indicate the presence of moisture concentrations in the pavement fillings, which could be attributed to rainwater infiltration. The usefulness of the ERT technique applied to edified patrimony is demonstrated in this study. © (2024) Grupo Espanol International Institute for Conservation. All rights reserved.

Padilla-Ceniceros, R., Pacheco-Martínez, J., González-Cervantes, N., López-Escobar, M. I., Soto-Zamora, M. Á., Luna-Villavicencio, H., Reyes-Cedeño, I. G. (2024). Identification of documented constructive stages of the San Ignacio Bridge (Aguascalientes, Mexico) using electrical resistivity tomography (ERT). *Ge-Conservacion*, 25(1), 132-141. doi: 10.37558/GEC.V25I1.1276. Article.

Yovani Marrero Ponce

SNII Level III

UNVEILING ENCRYPTED ANTIMICROBIAL PEPTIDES FROM CEPHALOPODS' SALIVARY GLANDS: A PROTEOLYSIS-DRIVEN VIRTUAL APPROACH

ABSTRACT. Antimicrobial peptides (AMPs) have potential against antimicrobial resistance and serve as templates for novel therapeutic agents. While most AMP databases focus on terrestrial eukaryotes, marine cephalopods represent a promising yet underexplored source. This study reveals the putative reservoir of AMPs encrypted within the proteomes of cephalopod salivary glands via in silico proteolysis. A composite protein database comprising 5,412,039 canonical and noncanonical proteins from salivary apparatus of 14 cephalopod species was subjected to digestion by 5 proteases under three protocols, yielding over 9 million of nonredundant peptides. These peptides were effectively screened by a selection of 8 prediction and sequence comparative tools, including machine learning, deep learning, multiquery similarity-based models, and complex networks. The screening prioritized the antimicrobial activity while ensuring the absence of hemolytic and toxic properties, and structural uniqueness compared to known AMPs. Five relevant AMP datasets were released, ranging from a comprehensive collection of 542,485 AMPs to a refined dataset of 68,694 nonhemolytic and nontoxic AMPs. Further comparative analyses and application of network science principles helped identify 5466 unique and 808 representative nonhemolytic and nontoxic AMPs. These datasets, along with the selected mining tools, provide valuable resources for peptide drug developers. © 2024 The Authors. Published by American Chemical Society.

Agüero-Chapin G., Domínguez-Pérez, D.; Marrero-Ponce, Y., Castillo-Mendieta, K.; Antunes, A. (2024). Unveiling Encrypted Antimicrobial Peptides from Cephalopods' Salivary Glands: A Proteolysis-Driven Virtual Approach. *ACS Omega*, 9(43), 43353-43367. doi: 10.1021/acsomega.4c01959. Article.

Yovani Marrero Ponce

SNII Level III

Félix Orlando Martínez Ríos

Senior Researcher C, SNII Level I

INNOVATIVE ALIGNMENT-BASED METHOD FOR ANTIVIRAL PEPTIDE PREDICTION

ABSTRACT. Antiviral peptides (AVPs) represent a promising strategy for addressing the global challenges of viral infections and their growing resistances to traditional drugs. Lab-based AVP discovery methods are resource-intensive, highlighting the need for efficient computational alternatives. In this study, we developed five non-trained but supervised multi-query similarity search models (MQSSMs) integrated into the StarPep toolbox. Rigorous testing and validation across diverse AVP datasets confirmed the models' robustness and reliability. The top-performing model, M13+, demonstrated impressive results, with an accuracy of 0.969 and a Matthew's correlation coefficient of 0.71. To assess their competitiveness, the top five models were benchmarked against 14 publicly available machine-learning and deep-learning AVP predictors. The MQSSMs outperformed these predictors, highlighting their efficiency in terms of resource demand and public accessibility. Another significant achievement of this study is the creation of the most comprehensive dataset of antiviral sequences to date. In general, these results suggest that MQSSMs are promissory tools to develop good alignment-based models that can be successfully applied in the screening of large datasets for new AVP discovery. © 2024 by the authors.

De Llano García, D., Marrero-Ponce, Y., Agüero-Chapin, G., Ferri, F. J., Antunes, A., Martínez-Ríos, F., & Rodríguez, H. (2024). Innovative Alignment-Based Method for Antiviral Peptide Prediction. *Antibiotics*, 13(8), Article 768. doi: 10.3390/antibiotics13080768. Article.

PEPTIDE HEMOLYTIC ACTIVITY ANALYSIS USING VISUAL DATA MINING OF SIMILARITY-BASED COMPLEX NETWORKS

ABSTRACT. Peptides are promising drug development frameworks that have been hindered by intrinsic undesired properties including hemolytic activity. We aim to get a better insight into the chemical space of hemolytic peptides using a novel approach based on network science and data mining. Metadata networks (METNs) were useful to characterize and find general patterns associated with hemolytic peptides, whereas Half-Space Proximal Networks (HSPNs), represented the hemolytic peptide space. The best candidate HSPNs were used to extract various subsets of hemolytic peptides (scaffolds) considering network centrality and peptide similarity. These scaffolds have been proved to be useful in developing robust similarity-based model classifiers. Finally, using an alignment-free approach, we reported 47 putative hemolytic motifs, which can be used as toxic signatures when developing novel peptide-based drugs. We provided evidence that the number of hemolytic motifs in a sequence might be related to the likelihood of being hemolytic. © The Author(s) 2024.

Castillo-Mendieta, K., Agüero-Chapin, G., Márquez, E. A., Pérez-Castillo, Y., Barigye, S. J., Vispo, N. S., García-Jacas, C. R., Marrero-Ponce, Y. (2024). Peptide hemolytic activity analysis using visual data mining of similarity-based complex networks. *Npj Systems Biology and Applications*, 10(1), Article 115. doi: 10.1038/s41540-024-00429-2. Article.

MD-LAIS SOFTWARE: COMPUTING WHOLE-SEQUENCE AND AMINO ACID-LEVEL "EMBEDDINGS" FOR PEPTIDES AND PROTEINS

ABSTRACT. Several computational tools have been developed to calculate sequence-based molecular descriptors (MDs) for peptides and proteins. However, these tools have certain limitations: 1) They generally lack capabilities for curating input data. 2) Their outputs often exhibit significant overlap. 3) There is limited availability of MDs at the amino acid (aa) level. 4) They lack flexibility in computing specific MDs. To address these issues, we developed MD-LAIs (Molecular Descriptors from Local Amino acid Invariants), Java-based software designed to compute both whole-sequence and aa-level MDs for peptides and proteins. These MDs are generated by applying aggregation operators (AOs) to macromolecular vectors containing the chemical-physical and structural properties of aas. The set of AOs includes both nonclassical (e.g., Minkowski norms) and classical AOs (e.g., Radial Distribution Function). Classical AOs capture neighborhood structural information at different k levels, while nonclassical AOs are applied using a sliding window to generalize the aa-level output. A weighting system based on fuzzy membership functions is also included to account for the contributions of individual aas. MD-LAIs features: 1) a module for data curation tasks, 2) a feature selection module, 3) projects of highly relevant MDs, and 4) low-dimensional lists of informative global and aa-level MDs. Overall, we expect that MD-LAIs will be a valuable tool for encoding protein or peptide sequences. The software is freely available as a stand-alone system on GitHub (https://github.com/Grupo-Medicina-Molecular-y-Traslacional/MD_LAIS). © 2024 American Chemical Society.

Contreras-Torres, E., & Marrero-Ponce, Y. (2024). MD-LAIs Software: Computing Whole-Sequence and Amino Acid-Level "Embeddings" for Peptides and Proteins. *Journal of Chemical Information and Modeling*, 64(23), 8665-8672. doi: 10.1021/acs.jcim.3c01189. Article.

A TRANSFER LEARNING APPLIED FOR MALARIA DISEASE DETECTION ON BLOOD SMEAR IMAGES

ABSTRACT. In this work, we developed a convolutional neural network, which we used to diagnose malaria parasites in images of red blood cells in blood smear samples. A method was developed from the study of the sizes of the images to modify them with the minimum change to their original proportions to process them with a convolutional neural network previously trained using transfer learning techniques. In this paper, we also use data augmentation techniques to improve the efficiency of our predictor. The comparison of our method and the convolutional neural network architecture developed with the other twenty-one classification models reported in the literature is presented. Our proposal achieves an efficiency of 96% in image classification. This result is equal to the best result obtained with models reported in the literature, and it also has the advantage that it is a small convolutional neural network that does not consume much time and resources in its training. © 2023 IEEE.

Martínez-Ríos, F., & Álvarez, L. A.-G. (2023). A Transfer Learning Applied for Malaria Disease Detection on Blood Smear Images. In *19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023; Mexico City; Mexico; 15 November 2023 through 17 November 2023, Proceedings of the 19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023*. IEEE. doi: 10.1109/SIPAIM56729.2023.10373482. Conference Paper.

Félix Orlando Martínez Ríos

Senior Researcher C, SNII Level I

Yovani Marrero Ponce

SNII Level III

BIOPHYSICAL ANALYSIS OF POTENTIAL INHIBITORS OF SARS-COV-2 CELL RECOGNITION AND THEIR EFFECT ON VIRAL DYNAMICS IN DIFFERENT CELL TYPES: A COMPUTATIONAL PREDICTION FROM IN VITRO EXPERIMENTAL DATA

ABSTRACT. Recent reports have suggested that the susceptibility of cells to SARS-CoV-2 infection can be influenced by various proteins that potentially act as receptors for the virus. To investigate this further, we conducted simulations of viral dynamics using different cellular systems (Vero E6, HeLa, HEK293, and CaLu3) in the presence and absence of drugs (anthelmintic, ARBs, anti-coagulant, serine protease inhibitor, antimalarials, and NSAID) that have been shown to impact cellular recognition by the spike protein based on experimental data. Our simulations revealed that the susceptibility of the simulated cell systems to SARS-CoV-2 infection was similar across all tested systems. Notably, CaLu3 cells exhibited the highest susceptibility to SARS-CoV-2 infection, potentially due to the presence of receptors other than ACE2, which may account for a significant portion of the observed susceptibility. Throughout the study, all tested compounds showed thermodynamically favorable and stable binding to the spike protein. Among the tested compounds, the anticoagulant nafamostat demonstrated the most favorable characteristics in terms of thermodynamics, kinetics, theoretical antiviral activity, and potential safety (toxicity) in relation to SARS-CoV-2 spike protein-mediated infections in the tested cell lines. This study provides mathematical and bioinformatic models that can aid in the identification of optimal cell lines for compound evaluation and detection, particularly in studies focused on repurposed drugs and their mechanisms of action. It is important to note that these observations should be experimentally validated, and this research is expected to inspire future quantitative experiments. © 2024 The Authors. Published by American Chemical Society.

González-Paz, L., Lossada, C., Hurtado-León, M. L., Vera-Villalobos, J., Paz, J. L., Marrero-Ponce, Y., Martínez-Ríos, F., & Alvarado, Y. J. (2023). Biophysical Analysis of Potential Inhibitors of SARS-CoV-2 Cell Recognition and Their Effect on Viral Dynamics in Different Cell Types: A Computational Prediction from In Vitro Experimental Data. *ACS Omega*, 9(8), 8923-8939. doi: 10.1021/acsomega.3c06968. Article.

Félix Orlando Martínez Ríos

Senior Researcher C, SNII Level I

Omar Eduardo Jiménez López

Research Professor

NEW PARTICLE SWARM OPTIMIZER ALGORITHM WITH CHAOTIC MAPS FOR COMBINATORIAL GLOBAL OPTIMIZATION PROBLEMS. AN APPLICATION TO THE DECONVOLUTION OF MÖSSBAUER SPECTRA

ABSTRACT. In this chapter, we present a novel method for addressing global optimization problems inspired by evolutionary algorithms found in nature. We integrate the Comprehensive Learning Particle Swarm Optimization (CLPSO) algorithm with random value generation based on chaotic maps. The resulting algorithm is applied to the computationally complex task of deconvoluting Mossbauer spectra. We implement ten chaotic maps to generate random values and compare their performance with traditional random number generators. Through experiments, we demonstrate that the developed algorithm excels in exploring the search space and exhibits fast intensification in finding the global minimum. In addition, we perform a comprehensive review of existing solutions to the Mossbauer spectrum deconvolution problem, highlighting the scarce availability of developments in this area. We also present a user-friendly program designed with an intuitive interface to facilitate the deconvolution process by Spector Mossbauer. This program will be freely distributed without operational restrictions. Experimental validation is performed on Mossbauer spectra generated using the developed program and those obtained by experimental means, affirming the efficiency of the new algorithm conceived. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Martínez-Ríos, F., Jiménez-López, O., Álvarez Guillen, L. A. (2024). New Particle Swarm Optimizer Algorithm with Chaotic Maps for Combinatorial Global Optimization Problems. An Application to the Deconvolution of Mössbauer Spectra. In *Studies in Big Data*, (vol. 148, pp. 155-193). Springer. doi: 10.1007/978-3-031-54277-0_7. Book Chapter.

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RETHINKING THE APPLICABILITY DOMAIN ANALYSIS IN QSAR MODELS

ABSTRACT. Notwithstanding the wide adoption of the OECD principles (or best practices) for QSAR modeling, disparities between in silico predictions and experimental results are frequent, suggesting that model predictions are often too optimistic. Of these OECD principles, the applicability domain (AD) estimation has been recognized in several reports in the literature to be one of the most challenging, implying that the actual reliability measures of model predictions are often unreliable. Applying tree-based error analysis workflows on 5 QSAR models reported in the literature and available in the QsarDB repository, i.e., androgen receptor bioactivity (agonists, antagonists, and binders, respectively) and membrane permeability (highest membrane permeability and the intrinsic permeability), we demonstrate that predictions erroneously tagged as reliable (AD prediction errors) overwhelmingly correspond to instances in subspaces (cohorts) with the highest prediction error rates, highlighting the inhomogeneity of the AD space. In this sense, we call for more stringent AD analysis guidelines which require the incorporation of model error analysis schemes, to provide critical insight on the reliability of underlying AD algorithms. Additionally, any selected AD method should be rigorously validated to demonstrate its suitability for the model space over which it is applied. These steps will ultimately contribute to more accurate estimations of the reliability of model predictions. Finally, error analysis may also be useful in "rational" model refinement in that data expansion efforts and model retraining are focused on cohorts with the highest error rates. © The Author(s), under exclusive licence to Springer Nature Switzerland AG 2024.

Mora, J. R., Márquez, E. A., Pérez-Pérez, N., Contreras-Torres, E., Pérez-Castillo, Y., Agüero-Chapin, G., Martínez-Ríos, F., Marrero-Ponce, Y., Barigye S. J. (2024). Rethinking the applicability domain analysis in QSAR models. *Journal of Computer-Aided Molecular Design*, 38(1), Article 9. doi: 10.1007/s10822-024-00550-8. Article.

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UNRAVELING THE HEMOLYTIC TOXICITY TAPESTRY OF PEPTIDES USING CHEMICAL SPACE COMPLEX NETWORKS

ABSTRACT. Peptides have emerged as promising therapeutic agents. However, their potential is hindered by hemotoxicity. Understanding the hemotoxicity of peptides is crucial for developing safe and effective peptide-based therapeutics. Here, we employed chemical space complex networks (CSNs) to unravel the hemotoxicity tapestry of peptides. CSNs are powerful tools for visualizing and analyzing the relationships between peptides based on their physicochemical properties and structural features. We constructed CSNs from the StarPepDB database, encompassing 2,004 hemolytic peptides, and explored the impact of seven different (dis)similarity measures on network topology and cluster (communities) distribution. Our findings revealed that each CSN extracts orthogonal information, enhancing the motif discovery and enrichment process. We identified 12 consensus hemolytic motifs, whose amino acid composition unveiled a high abundance of lysine, leucine, and valine residues, whereas aspartic acid, methionine, histidine, asparagine, and glutamine were depleted. Additionally, physicochemical properties were used to characterize clusters/communities of hemolytic peptides. To predict hemolytic activity directly from peptide sequences, we constructed multi-query similarity searching models, which outperformed cutting-edge machine learning-based models, demonstrating robust hemotoxicity prediction capabilities. Overall, this novel in silico approach uses complex network science as its central strategy to develop robust model classifiers, characterize the chemical space, and discover new motifs from hemo-

lytic peptides. This will help to enhance the design/selection of peptides with potential therapeutic activity and low toxicity. © The Author(s) 2024. Published by Oxford University Press on behalf of the Society of Toxicology. All rights reserved.

Castillo-Mendieta, K., Agüero-Chapin, G., Mora, J. R., Pérez, N., Contreras-Torres, E., Valdes-Martini, J. R., Martínez-Ríos, F., Marrero-Ponce, Y. (2024). Unraveling the hemolytic toxicity tapestry of peptides using chemical space complex networks. *Toxicological Sciences*, 202(2), 236-249. doi: 10.1093/toxsci/kfae115. Article.

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ADDRESSING CLASS IMBALANCE IN HEALTHCARE DATA: MACHINE LEARNING SOLUTIONS FOR AGE-RELATED MACULAR DEGENERATION AND PREECLAMPSIA

ABSTRACT. The use of machine learning in healthcare has transformed the way diseases are diagnosed and treatments are optimized. However, medical databases often lack balanced data due to challenges in data collection caused by privacy regulations. Certain health conditions are under represented, which hampers machine learning performance. To address this problem, a hybrid approach has been proposed that combines the Synthetic Minority Oversampling Technique (SMOTE) with under sampling and uses two specific techniques tailored for imbalanced datasets. Comparative evaluations were conducted using various thresholds to reduce one class and employing Balanced Accuracy to mitigate bias toward the majority class, with popular machine learning methods. The results showed that Balanced Bagging and Balanced Random Forest consistently outperformed other methods, performing the best with an average ranking of 1.42 and 3.58 out of 32 configurations in the two datasets, respectively. Tree-based approaches such as Random Forest and Gradient Boosting demonstrated similar effectiveness, emphasizing the power of aggregating predictions from multiple trees to reduce bias. Notably, under sampling and SMOTE proved advantageous for non-tree-based models like KNN, SVM, and Logistic Regression showcasing their usefulness across different algorithms. This study provides a robust solution for handling imbalanced datasets in healthcare, which could potentially optimize healthcare interventions and improve patient outcomes and care. © 2003-2012 IEEE.

Martínez-Velasco, A., Martínez-Villaseñor, L., Miralles-Pechuan, L. (2024). Addressing Class Imbalance in Healthcare Data: Machine Learning Solutions for Age-Related Macular Degeneration and Preeclampsia. *IEEE Latin America Transactions*, 22(10), 806-820. doi: 10.1109/TLA.2024.10705995. Article.

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CRITICAL FACTORS IN THE PARTICIPATION OF WOMEN IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS -STEM- DISCIPLINES IN MEXICO

ABSTRACT. Currently, women participate in STEM areas, still with a very marked gender gap. Taking this as a reference, in this work, an investigation has been carried out based on questionnaires applied to students of STEM careers. The information obtained was analyzed using multi-criteria decision methods. In particular, the Order of Preference by Similarity to the Ideal Solution (TOPSIS) method was applied to determine the most favorable conditions for women to study a STEM career. Through this analysis, this research has found that women's choice of a STEM career is strongly influenced firstly by the father's profession, secondly by the mother's profession, and also has a positive impact on the discrimination to which the person has been subjected, self-motivation. And self-esteem. These results indicate that it is necessary to influence the early educational stages to provide support from the family and school environment to women so that they develop their skills around STEM careers. In future work, the data obtained could be analyzed in greater depth, considering that the richness of the open responses may be lost by coding the respondents' opinions as categorical variables. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Martínez-Velasco, A., Terán-Bustamante, A., De La Torre-Díaz, L., González, F. J. M. (2024). Critical Factors in the Participation of Women in Science, Technology, Engineering, and Mathematics -STEM- Disciplines in Mexico. In *Studies in Big Data* (vol. 148, pp. 135-153). Springer. doi: 10.1007/978-3-031-54277-0_6. Book Chapter.

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DECISION-MAKING MODEL IN ANCESTRAL KNOWLEDGE MANAGEMENT: THE CASE OF THE RAICILLA IN MEXICO

ABSTRACT. Ancestral knowledge is essential in the construction of learning to preserve the sense of relevance, transmit and share knowledge according to its cultural context, and maintain a harmonious relationship with nature and sustainability. The objective of this research is to study and analyze the management of ancestral knowledge in the production of the Raicilla to provide elements to rural communities, producers, and facilitators in decision-making to be able to innovate and be more productive, competitive, sustainable, and improve people's quality of life. The methodological strategy was carried out through Bayesian networks and Fuzzy Logic. To this end, a model was developed to identify and quantify the critical factors that impact optimally managed technology to generate value that translates into innovation and competitive advantages. The evidence shows that the optimal and non-optimal management of knowledge, technology, and innovation management and its factors, through the causality of the variables, permits us to capture the interrelationship more adequately and manage them. The results show that the most relevant factors for adequate management of ancestral knowledge in the Raicilla sector are facilitators, denomination of origin, extraction and fermentation, and government. The proposed model will support these small producers and help them preserve their identity, culture, and customs, contributing greatly to environmental sustainability. © 2024 by author(s).

Martínez-Velasco, A., Terán-Bustamante, A., Ayala-Ramírez, S., Castillo-Girón, V. M. (2024). Decision-making model in ancestral knowledge management: The case of the Raicilla in Mexico. *Journal of Infrastructure, Policy and Development*, 8(9), Article 6171. doi: 10.24294/jipd.v8i9.6171. Article.

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ETHICAL DESIGN FRAMEWORK FOR ARTIFICIAL INTELLIGENCE HEALTHCARE TECHNOLOGIES

ABSTRACT. The healthcare industry has undergone a profound transformation with the integration of artificial intelligence(AI) and emerging technologies, leading in a new era of personalized treatments and healthcare solutions. However, this technological advancement has not been without its ethical and practical challenges, which have hindered the real-world application of intelligent systems in clinical settings. Numerous international entities have published principles, guidelines, and regulations to tackle these issues, yet a significant gap persists between theoretical initiatives and the practical incorporation of ethical design in intelligent systems. Within this study, we delineate the substantial transformation taking place in the healthcare landscape due to artificial intelligence. We provide a condensed overview of the opportunities and challenges that accompany this disruptive shift. The main goal of this work is introducing an ethical design framework tailored to healthcare technologies and delineating the ethical design process for a machine learning-based support tool designed for Age-related Macular Degeneration risk assessment. To the best of our knowledge, this work represents one of the few documented instances of the practical implementation of ethical design principles in intelligent healthcare systems. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Martínez-Villaseñor, L., & Ponce, H. (2024). Ethical Design Framework for Artificial Intelligence Healthcare Technologies. In *Studies in Big Data* (vol. 148, pp. 223-246). Springer. doi: 10.1007/978-3-031-54277-0_9. Book Chapter.

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EXPLAINABLE ARTIFICIAL HYDROCARBON NETWORKS CLASSIFIER APPLIED TO PREECLAMPSIA

ABSTRACT. Explainability is crucial in domains where system decisions have significant implications for human trust in black-box models. Lack of understanding regarding how these decisions are made hinders the adoption of so-called clinical decision support systems. While neural networks and deep learning methods exhibit impressive performance, they remain less explainable than white-box approaches. Artificial Hydrocarbon Networks (AHN) is an effective black-box model that can be used to support critical clinical decisions if accompanied by explainability mechanisms to instill confidence among clinicians. In this paper, we present a use case involving global and local explanations for AHN models, provided with an automatic procedure so-called eXplainable Artificial Hydrocarbon Networks (XAHN). We apply XAHN to preeclampsia prognosis, enabling interpretability within an accurate black-box model. Our approach involves training a suitable AHN model using the cross-validation with ten repetitions, followed by a comparative analysis against four well-known machine learning techniques. Notably, the AHN model outperformed the others, achieving an F1-score of 74.91%. Additionally, we assess the efficacy of our XAHN explainer through a survey applied to clinicians, evaluating the goodness and satisfaction of the provided explanations. To the best of our knowledge, this work represents one of the earliest attempts to address the explainability challenge in preeclampsia prediction. © 2024 The Author(s)

Ponce, H., Martínez-Villaseñor, L., & Martínez-Velasco, A. (2024). Explainable artificial hydrocarbon networks classifier applied to preeclampsia. *Information Sciences*, 670, Article 120556. doi: 10.1016/j.ins.2024.120556. Article.

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EXPLAINING FACTORS OF STUDENT ATTRITION AT HIGHER EDUCATION

ABSTRACT. The examination of student attrition within higher education is a dynamic field that seeks to tackle the complex task of preventing dropout occurrences and formulating effective retention strategies. This challenge becomes particularly pertinent within the realm of Science, Technology, Engineering, and Mathematics (STEM) disciplines. In the pursuit of these objectives, this research endeavors to assess prevailing data mining methodologies, specifically focusing on Decision Trees (DT), Random Forest (RF), Support Vector Machine (SVM), and Artificial Neural Networks (ANN) - all of which are widely employed for the prediction of student attrition. The study is conducted on a comprehensive dataset encompassing engineering students from a prominent Mexican university, with a specific emphasis on the application of variable selection through Recursive Feature Elimination (RFE) and addressing class imbalance via Synthetic Minority Over-sampling Technique (SMOTE). The outcomes of this investigation conspicuously identify Random Forest as the most optimal predictive model, yielding an impressive accuracy rate of 98%. Additionally, the research underscores the effectiveness of RFE in discerning influential variables. Furthermore, to provide complex insights and decision support, the study harnesses the Local Interpretable Model-Agnostic Explanations (LIME) technique to expound upon the factors that wield significant impact. This multifaceted analysis contributes to the advancement of strategies for enhancing student retention within STEM disciplines. © 2023 Instituto Politécnico Nacional. All rights reserved.

Alcauter, I., Martínez-Villaseñor, L., & Ponce, H. (2023). Explaining Factors of Student Attrition at Higher Education. *Computación y Sistemas*, 27(4), 929-940. doi: 10.13053/CyS-27-4-4776. Article.

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GLOBAL VALUE CHAINS: PRODUCTION AND INNOVATION CLUSTERS

ABSTRACT. Today, Global Value Chains (GVCs) have become an essential component of the economic development of both developed and less developed countries, offering significant opportunities to expand exports, diversify production, make costs more efficient, access various transit services, new technologies, and innovate. The objective of this research is to analyze the added value of global value chains at the country level through its main components: added value (Foreign Value Added FVA), domestic value added - domestic value included in a country's exports -(DVA Domestic Value Added) and indirect value-added exports DVX, through machine learning. In addition, the evidence shows that through clustering and correlations, there is another methodology for the study of the added value of GVCs, which allows analyzing countries in groups more similar to each other and different concerning the values inherent to their geographic place. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2023.

Terán-Bustamante, A., Martínez-Velasco, A. (2023). Global Value Chains: Production and Innovation Clusters. In *Sustainable Development Goals Series* (Part. F2779, pp. 29-52). Springer. doi: 10.1007/978-3-031-33103-9_3. Book Chapter.

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INSOLE DESIGN AND OPTIMIZATION PROCESSES FOR GAIT ANALYSIS

ABSTRACT. Gait analysis is becoming increasingly central in various fields such as biomechanics, medicine, and sports. This complex study assesses how individuals walk, weighing in on aspects like bone alignment, joint range of motion, and neuro-muscular activity. Its profound importance emanates from its capability to identify potential walking anomalies at an early stage, which can offset the need for invasive medical interventions and offer valuable insights for clinicians to make well-informed decisions. Inspiration for this in-depth gait analysis research was sourced from previous attempts that employed tools like step mats and cameras to track and analyze movement. Several design imperatives were consolidated within this framework, including the vital need of user safety, assuring comfort throughout usage, preserving system stability, and the undoubtedly significant feature of keeping the insole lightweight. These priorities were not merely for user comfort but were essential for the fidelity of the data being captured. In this paper, it is described the design and optimization processes of an insole for gait analysis following an agile methodology which involves the following stages: requirements, design, implementation and testing. This study delves deeply into the challenges of designing, implementing, and optimizing instrumented insoles for gait analysis. The requirements were successfully achieved by creating a 3mm-thick, flexible insole using TPU 95 material through 3D printing. This insole effectively encapsulates electronic components, ensuring comfort, durability, and safety. © 2023 IEEE.

Orozco Villanueva, K. A., Richter, M., Villa, C., Martínez-Villaseñor, L., Ponce, H., Barrera-Animas, A. Y. (2023). Insole Design and Optimization Processes for Gait Analysis. In *2023 IEEE Symposium Series on Computational Intelligence, SSCI 2023; Mexico City; Mexico; 5 December 2023 through 8 December 2023, 2023 IEEE Symposium Series on Computational Intelligence, SSCI 2023* (pp. 1340-1345). IEEE. doi: 10.1109/SSCI52147.2023.10372003. Conference Paper.

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MULTIMODAL GAIT ANALYSIS ACQUISITION SYSTEM: CHALLENGES AND LESSONS LEARNED

ABSTRACT. Nowadays, gait data analysis has become an extremely valuable tool that, without much knowledge, provides significant support in various areas, especially in medicine. This type of analysis not only contributes to generating accurate diagnoses but also plays a fundamental role in physical rehabilitation processes. To harness the potential of this analysis, a multimodal system is being developed with the purpose of enhancing the storage, analysis, and synchronization of multiple modules. The imperative arises from certain constraints within prevailing devices and methods, which stem from their intricate and delicate nature. Therefore, the aim of the study involves creating an implementation that prioritizes flexibility, lightness, and autonomy, all with the ultimate aim of attaining complete self-sufficiency in future advancements. © 2023 IEEE.

Ruiz, K. M. M., Cervantes, P. P., Villa, C., Martínez-Villaseñor, L., Ponce, H., & Barrera-Animas, A. Y. (2023). Multimodal Gait Analysis Acquisition System: Challenges and Lessons Learned. In *2023 IEEE Symposium Series on Computational Intelligence, SSCI 2023; Mexico City; Mexico; 5 December 2023 through 8 December 2023, 2023 IEEE Symposium Series on Computational Intelligence, SSCI 2023* (pp. 1060-1065). IEEE. doi: 10.1109/SSCI52147.2023.10371930. Conference Paper.

Francisco Moreno Abril

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ADDITIVE MANUFACTURING IN THE CONSTRUCTION INDUSTRY

ABSTRACT. New sustainable technologies, such as additive manufacturing (AM), have recently been adopted in the construction industry, significantly reducing construction completion times and effectively repairing and remanufacturing components. While AM's implementation in construction is still diffuse, this review contributes to a better understanding of how this technology is interpreted and utilized, exploring the main trends in AM within the construction industry. The systematic review of recent publications identified eight critical topics for AM, whose processes are characterized by their materials: aggregate-based materials, metals, and polymers. The findings reveal an increase in the published works, with the United States, Germany, and China rising as the prominent contributors, where AM technologies are mainly defined by processes such as Material extrusion, Particle bed, Powder bed fusion, Directed energy deposition and Vat photopolymerization. Finally, other challenges regarding AM in the construction industry, such as its role in large-scale construction and prefabrication, are also discussed. © 2024

Forcael, E., Medina, M., Opazo-Vega, A., Moreno, F., & Pincheira, G. (2025). Additive manufacturing in the construction industry. *Automation in Construction*, 169, Review 105888. doi: 10.1016/j.autcon.2024.105888. Review.

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AGILE PROJECT MANAGEMENT IN THE PRE-CONSTRUCTION STAGE: FACING THE CHALLENGES OF PROJECTIFICATION IN THE CONSTRUCTION INDUSTRY

ABSTRACT. Given the complex and dispersed nature of construction projects, which demand collaboration among varied experts, it is crucial to reevaluate project management and execution approaches to enhance their performance. Agile principles offer a path towards heightened responsiveness within tasks and processes, addressing the construction industry's fast-paced nature and growing client demands for timely project completion. However, adopting new management methodologies, such as Agile, needs a significant cultural shift, enabling the cultivation of multi-skilled and self-managing teams. Projectification, a growing trend in contemporary society where more activities are managed as projects, has gained significant relevance in recent years. This study examines the application of Agile project management (specifically Agile Scrum methodology) during the pre-construction phase of a construction project through the lens of Projectification. As evidenced by the research results, applying the Agile methodology in the pre-construction phase may help enhance flexibility and collaboration, enabling teams to adapt quickly to evolving project requirements and unforeseen challenges. The findings demonstrate that Agile methodologies offer numerous benefits, including enhanced adaptability, flexibility, accountability, transparency, and teamwork. Additionally, there were significant reductions in time and costs, emphasizing the value of Agile practices in construction project management. © 2024 by the authors.

Moreno, F., Forcael, E., Romo, R., Orozco, F., Moroni, G., & Baesler, F. (2024). Agile Project Management in the Pre-Construction Stage: Facing the Challenges of Projectification in the Construction Industry. *Buildings*, 14(11), Article 3551. doi: 10.3390/buildings14113551. Article.

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ARTIFICIAL BEE COLONY ALGORITHM TO OPTIMIZE THE SAFETY DISTANCE OF WORKERS IN CONSTRUCTION PROJECTS

ABSTRACT. This paper presents the results of a simulation model regarding the productivity and safety working space for construction workers through the floors of a building using swarm intelligence (SI), a field of artificial intelligence (AI), and specifically using artificial bee colony (ABC) optimization. After designing the algorithm used to build the simulation model, the simulation was used in an actual building project by comparing the travel times of workers conventionally transporting material with another group working on routes optimized by the algorithm. Thus, the proposed algorithm provides routes combining shorter travel times and correct distances between workers when transporting materials in a construction site, handling the interference between crews. After validating the algorithm on-site, no statistically significant differences were found between the travel times of workers and the times delivered by the algorithm. Additionally, the travel times using the routes obtained through the algorithm were significantly lower than those made by workers who moved freely without a predefined route. In summary, the algorithm proposed may help construction practitioners maintain safe movements that respond to hazard contexts imposed by any restriction that demands a safety distance. © 2024 by the authors.

Forcael, E., Carriel, I., Opazo-Vega, A., Moreno, F., Orozco, F., Romo, R., Agdas, D. (2024). Artificial Bee Colony Algorithm to Optimize the Safety Distance of Workers in Construction Projects. *Mathematics*, 12(13), Article 2087. doi: 10.3390/math12132087. Article.

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A HERMITE TRANSFORM BASED METHOD FOR PHYSIOLOGICAL SIGNAL WATERMARKING

ABSTRACT. In this work, a watermarking algorithm for physiological signals is presented. We use photoplethysmography (PPG) signals used to estimate the instantaneous heart rate, and as a watermark, we use fourteen different audio files, emulating the medical audio reports used for diagnosis purposes. We use the Hermite transform (HT) to decompose the PPG signals and insert the watermark in the components with less energy. According to the results, the watermark does not significantly modify the original PPG signals preserving the content. In addition, the extracted watermark is very similar to the original. Finally, the performance of our proposal was assessed using correlation and peak signal-to-noise ratio, and it was compared with other works using physiological signals showing competitive results. © 2023 IEEE.

Gomez-Coronel, S. L., Moya-Albor, E., Brieva, J., Gil-Rios, M. A., Cruz-Aceves, I., & Chalopin, C. (2023). A Hermite Transform based Method for Physiological Signal Watermarking. In *19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023; Mexico City; Mexico; 15 November 2023 through 17 November 2023, Proceedings of the 19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023*. IEEE. doi: 10.1109/SIPAIM56729.2023.10373481. Conference Paper.

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A PHOTOPLETHYSMOGRAPHY SIGNAL ENCRYPTION APPROACH BASED ON THE MODULAR DERIVATIVE AND LANGTON'S ANT

ABSTRACT. In this work, a photoplethysmography signal encryption/decryption approach is presented. The modular discrete derivative and Langton's Ant encrypt signals obtained from a contact-less heart rate estimation method. On the one hand, the modular discrete derivative efficiently hides the information of the signals. On the other hand, the Langton's Ant, a cellular automaton, incorporates a high key space. Thus, through statistical tests, performance against attacks analysis, and security tests, a secure and trustworthy encryption method applied to photoplethysmography signals is evaluated. © 2023 IEEE.

Romero-Arellano, A., Moya-Albor, E., Pérez-Echeverría, A. E., Gomez-Coronel, S. L., & Brieva, J. (2023). A Photoplethysmography Signal Encryption Approach Based on the Modular Derivative and Langton's Ant. In *19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023; Mexico City; Mexico; 15 November 2023 through 17 November 2023, Proceedings of the 19th International Symposium on Medical Information Processing and Analysis, SIPAIM 2023*. IEEE. doi: 10.1109/SIPAIM56729.2023.10373512. Conference Paper.

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A VISION-BASED ROBOTIC NAVIGATION

ABSTRACT. The paper presents a fuzzy Q-learning (FQL) and optical flow-based autonomous navigation approach. The FQL method takes decisions in an unknown environment and without mapping, using motion information and through a reinforcement signal into an evolutionary algorithm. The reinforcement signal is calculated by estimating the optical flow densities in areas of the camera to determine whether they are "dense" or "thin" which has a relationship with the proximity of objects. The results obtained show that the present approach improves the rate of learning compared with a method with a simple reward system and without the evolutionary component. The proposed system was implemented in a virtual robotics system using the CoppeliaSim software and in communication with Python. © The Author(s) 2024.

Cuesta-Solano, R., Moya-Albor, E., Brieva, J., & Ponce, H. (2024). A Vision-based Robotic Navigation Method Using an Evolutionary and Fuzzy Q-Learning Approach. *Journal of Artificial Intelligence and Technology*, 4(4), 363-369. doi: 10.37965/jait.2024.0511. Article.

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ADVERSARIAL VALIDATION IN IMAGE CLASSIFICATION DATASETS BY MEANS OF CUMULATIVE SPECTRAL GRADIENT

ABSTRACT. The main objective of a machine learning (ML) system is to obtain a trained model from input data in such a way that it allows predictions to be made on new i.i.d. (Independently and Identically Distributed) data with the lowest possible error. However, how can we assess whether the training and test data have a similar distribution? To answer this question, this paper presents a proposal to determine the degree of distribution shift of two datasets. To this end, a metric for evaluating complexity in datasets is used, which can be applied in multi-class problems, comparing each pair of classes of the two sets. The proposed methodology has been applied to three well-known datasets: MNIST, CIFAR-10 and CIFAR-100, together with corrupted versions of these. Through this methodology, it is possible to evaluate which types of modification have a greater impact on the generalization of the models without the need to train multiple models multiple times, also allowing us to determine which classes are more affected by corruption. © 2024 by the authors.

Renza, D., Moya-Albor, E., & Chavarro, A. (2024). Adversarial Validation in Image Classification Datasets by Means of Cumulative Spectral Gradient. *Algorithms*, 17(11), Article 531. doi: 10.3390/a17110531. Article.

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CONVNEXT AS A BASIS FOR INTERPRETABILITY IN COFFEE LEAF RUST CLASSIFICATION

ABSTRACT. The increasing complexity of deep learning models can make it difficult to interpret and fit models beyond a purely accuracy-focused evaluation. This is where interpretable and eXplainable Artificial Intelligence (XAI) come into play to facilitate an understanding of the inner workings of models. Consequently, alternatives have emerged, such as class activation mapping (CAM) techniques aimed at identifying regions of importance for an image classification model. However, the behavior of such models can be highly dependent on the type of architecture and the different variants of convolutional neural networks. Accordingly, this paper evaluates three Convolutional Neural Network (CNN) architectures (VGG16, ResNet50, ConvNext-T) against seven CAM models (GradCAM, XGradCAM, HiResCAM, LayerCAM, GradCAM++, GradCAMElementWise, and EigenCAM), indicating that the CAM maps obtained with ConvNext models show less variability among them, i.e., they are less dependent on the selected CAM approach. This study was performed on an image dataset for the classification of coffee leaf rust and evaluated using the RemOve And Debias (ROAD) metric. © 2024 by the authors.

Chavarro, A., Renza, D., Moya-Albor, E. (2024). ConvNext as a Basis for Interpretability in Coffee Leaf Rust Classification. *Mathematics*, 12(17), Article 2668. doi: 10.3390/math12172668. Article.

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HIGH-DIMENSIONAL FEATURE SELECTION FOR AUTOMATIC CLASSIFICATION OF CORONARY STENOSIS USING AN EVOLUTIONARY ALGORITHM

ABSTRACT. In this paper, a novel strategy to perform high-dimensional feature selection using an evolutionary algorithm for the automatic classification of coronary stenosis is introduced. The method involves a feature extraction stage to form a bank of 473 features considering different types such as intensity, texture and shape. The feature selection task is carried out on a high-dimensional feature bank, where the search space is denoted by O (Formula presented.) and (Formula presented.). The proposed evolutionary search strategy was compared in terms of the Jaccard coefficient and accuracy classification with different state-of-the-art methods. The highest feature selection rate, along with the best classification performance, was obtained with a subset of four features, representing a (Formula presented.) discrimination rate. In the last stage, the feature subset was used as input to train a support vector machine using an independent testing set. The classification of coronary stenosis cases involves a binary classification type by considering positive and negative classes. The highest classification performance was obtained with the four-feature subset in terms of accuracy (Formula presented.) and Jaccard coefficient (Formula presented.) metrics. In addition, a second dataset containing 2788 instances was formed from a public image database, obtaining an accuracy of (Formula presented.) and a Jaccard Coefficient of (Formula presented.). Finally, based on the performance achieved with the four-feature subset, they can be suitable for use in a clinical decision support system. © 2024 by the authors.

Gil-Rios, M. A., Cruz-Aceves, I., Hernández-Aguirre, A., Moya-Albor, E., Brieva, J., Hernández-González, M. A., & Solorio-Meza, S. E. (2024). High-Dimensional Feature Selection for Automatic Classification of Coronary Stenosis Using an Evolutionary Algorithm. *Diagnostics*, 14(3), Article 268. doi: 10.3390/diagnostics14030268. Article.

Isabel Joaquína Niembro García

SNII Candidate Level

EXPLORING THE CONNECTION BETWEEN DIGITAL SYSTEMS AND SUSTAINABILITY: SYNERGY FOR A BRIGHTER FUTURE

ABSTRACT. This chapter delves into the pervasive integration of digital systems into daily life and their repercussions. It underscores the critical role of sustainable development across economic, societal, and environmental domains, endorsed by the UN's '2030 Agenda for Sustainable Development'. This exploration emphasizes the strategic potential within the Sustainable Development Goals (SDGs) for the corporate sector. Additionally, it delves into the interconnectedness of digital systems with the environment, addressing their ecological footprint and advocating for sustainable remedies, considering both their positive contributions and negative impacts. This comprehensive review encompasses the evaluation of greenhouse gas emissions and the management of electronic waste, alongside creating eco-conscious digital systems using renewable materials and energies. The discourse extends to the efficacy of data management and cloud services, stressing the imperative shift towards eco-friendly practices, notably within energy-efficient data centers. Moreover, it scrutinizes how digital systems are leveraged to advance sustainability in society, notably in domains like intelligent transportation and the evolution of smart cities. Finally, it touches upon global initiatives such as the Paris Agreement and the Digital Green Deal, aimed at propelling the adoption of sustainable digital systems, encompassing both their beneficial aspects and adverse effects. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Paniagua, K. L., & Niembro-García, J. (2024). Exploring the Connection Between Digital Systems and Sustainability: Synergy for a Brighter Future. In *Studies in Big Data* (vol. 148, pp. 77-110). Springer. doi: 10.1007/978-3-031-54277-0_4. Book Chapter.

AN INVENTORY SERVICE-LEVEL OPTIMIZATION PROBLEM FOR A MULTI-WAREHOUSE SUPPLY CHAIN NETWORK WITH STOCHASTIC DEMANDS

ABSTRACT. This research aims to develop a mathematical model and a solution approach for jointly optimizing a global inventory service level and order sizes for a single-commodity supply chain network with multiple warehouses or distribution centers. The latter face stochastic demands, such as most real-world supply chains do nowadays, yielding significant model complexity. The studied problem is of high relevance for inventory management, inventory location, and supply chain network design-related literature, as well as for logistics and supply chain managers. The proposed optimization model minimizes the total costs associated with cycle inventory, safety stock, and stock-out-related events, considering a global inventory service level and differentiated order sizes for a fixed and known set of warehouses. Subsequently, the model is solved by employing the Newton-Raphson algorithm, which is developed and implemented assuming stochastic demands with a normal approximation. The algorithm reached optimality conditions and the convergence criterion in a few iterations, within less than a second, for a variety of real-world sized instances involving up to 200 warehouses. The model solutions are contrasted with those obtained with a previous widely employed approximation, where safety stock costs were further approximated and order sizes were optimized without considering stock-out-related costs. This comparison denotes valuable benefits without significant additional computational efforts. Thus, the proposed approach is suitable for managers of real-world supply chains, since they would be able to attain system performance improvements by simultaneously optimizing the global inventory service level and order sizes, thereby providing a better system cost equilibrium. © 2024 by the authors.

León, R., Miranda-González, P. A., Tapia-Ubeda, F. J., & Olivares-Benítez, E. (2024). An Inventory Service-Level Optimization Problem for a Multi-Warehouse Supply Chain Network with Stochastic Demands. *Mathematics*, 12(16), Article 2544. doi: 10.3390/math12162544. Article.

DYNAMIC OPTIMIZATION OF A SUPPLY CHAIN OPERATION MODEL WITH MULTIPLE PRODUCTS

ABSTRACT. Determination of the optimal operational policy for an automotive supply chain is explored under a centralized management approach using dynamic programming. A deterministic optimal control model is proposed to meet multi-product demand over a period while minimizing a cost performance index for a five-echelon network. The production-inventory levels are the state variables and the raw material acquisition rates are the control variables to be decided in the problem. The novelties include parts mixing operations, assembly requirements, and a push-pull chain operation strategy. The continuous model is solved using Iterative Dynamic Programming, an algorithm with successful applications in chemical engineering problems. Its implementation here is the first in supply chain (SC) management models. The results demonstrate that the proposal is suitable to represent the dynamic behavior of the SC and provides useful information to outline a cooperative decision-making process. Managerial insights are derived to improve the resilience and efficiency of the chain. © 2024 by the authors.

Lopez-Landeros, C. E., Valenzuela-González, R., & Olivares-Benítez, E. (2024). Dynamic Optimization of a Supply Chain Operation Model with Multiple Products. *Mathematics*, 12(15), Article 2420. doi: 10.3390/math12152420. Article.

LOGISTICS 4.0 IN THE AGRI-FOOD SUPPLY CHAIN WITH BLOCKCHAIN: A CASE STUDY

ABSTRACT. Blockchain is an emerging technology with the potential to radically transform logistics in the highly complex environment of the agri-food supply chain. The key challenges of the agri-food sector include overcoming the limitations (time, cost and quality) to developing global and efficient transparency and traceability of food, eliminating expensive intermediaries, and ensuring no disruption between suppliers and retailers. This paper describes a practical approach by not only using smart contracts to integrate various stakeholders but also incorporating a Public Participation Geographic Information System platform to ensure traceability of the operations conducted in an agri-food supply chain. As a factor in improving distribution and minimising intermediaries, third-party logistics participation is included in this research. Through a case study, the entities and interactions between processes within a blockchain system based on a smart contract are identified. The findings reveal an innovative blockchain approach to logistics in the agri-food supply chain. © 2023 Informa UK Limited, trading as Taylor & Francis Group.

Granillo-Macías, R., González Hernández, I. J., & Olivares-Benítez, E. (2023). Logistics 4.0 in the agri-food supply chain with blockchain: a case study. *International Journal of Logistics Research and Applications*, 27(10), 1766-1786, Article 2024. doi: 10.1080/13675567.2023.2184467. Article.

Hiram Eredín Ponce Espinosa

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AN INTELLIGENT CLIMATE MONITORING SYSTEM FOR HYGROTHERMAL VIRTUAL MEASUREMENT IN CLOSED BUILDINGS USING INTERNET-OF-THINGS AND ARTIFICIAL HYDROCARBON NETWORKS

ABSTRACT. Studies analyzing indoor thermal environments comprising temperature and humidity may be insufficient when obtaining data from sensors, which may be susceptible to inaccurate or failed information from internal and external factors. Therefore, this study proposes an intelligent climate monitoring using a supervised learning method for virtual hygrothermal measurement in enclosed buildings used to predict temperature and relative humidity when a sensor failure is detected. The methodology comprises the data collection from a wireless sensor network, the building of the learning model for predicting the dynamics of environmental variables, and the implementation of a sensor failure detection model. We use an artificial hydrocarbon network as the learning model for their simplicity and effectiveness under uncertain and noisy data. The experiments use data acquired in two settings: (1) a laboratory office and (2) a museum storage room. The first scenario has multiple workstations, and the staff turns on or off the air conditioning depending on the feeling of comfort, generating an uncontrolled environment for the variables of interest. The second scenario has controlled temperature and humidity to ensure the conservation conditions of the museum pieces. Both scenarios used 12 sensors that acquired data for one month, providing an average of 58,300 values for each variable. Results of the proposed methodology provide 95% of accuracy in terms of sensor failure detection and identification, and less than 0.22% of tolerance variability in temperature and humidity after sensor accommodation in both scenarios. © 2024 The Author(s)

Ponce, H., Gutiérrez, S., Botero-Valencia, J., Marquez-Viloria, D., & Castano-Londono, L. (2024). An intelligent climate monitoring system for hygrothermal virtual measurement in closed buildings using Internet-of-things and artificial hydrocarbon networks. *Heliyon*, 10(11), Article e31716. doi: 10.1016/j.heliyon.2024.e31716. Article.

Hiram Eredín Ponce Espinosa

Senior Researcher D, SNII Level I

ALGOTRADING R2ED: A MACHINE LEARNING APPROACH

ABSTRACT. Machine learning models have become increasingly popular in the financial markets because of their usability in the trading desks. This study explores the application of different machine learning algorithms to develop an automated trading system for the ETF 'QQQ' (which is a tracker of the NASDAQ-100 Index). Our aim is to build a model capable of consistently generating positive returns over time by predicting buy and sell signals that help the investor making investment decisions. The methodology involves using historical price data and technical indicators, particularly the Moving Average Convergence Divergence (MACD) as input features. We compare several machine learning techniques, including XGBoost, Random Forest, and Logistic Regression. Data preparation of our models is based on sequence splitting, feature scaling, and dimensionality reduction through Principal Component Analysis (PCA). The models are trained and evaluated using cross-validation and hyper-parameter tuning via Grid Search. Our results indicate that XGBoost shows the highest return of 34.13 percent over the test period. The Random Forest algorithm demonstrates the highest accuracy with an f1-score of 0.744. The outcome of our models show the appropriateness of Machine Learning algorithms when applied to testing strategies due to their predictive ability and enhancement capabilities. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2025.

Martínez, R., Tinoco, D., Huerta, R.; Flores, E.; & Ponce, H. (2025). Algotrading R2ED: A Machine Learning Approach. In *23rd Mexican International Conference on Artificial Intelligence, MICAI 2024; Tonantzinla; Mexico; 21 October 2024 through 25 October 2024, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 15246 LNAI (pp. 160-170). Springer. doi: 10.1007/978-3-031-75540-8_12. Conference paper.

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FROM PROJECT-BASED LEARNING TO INNOVATIVE TECHNOLOGIES IN MECHATRONICS COURSE: A CASE STUDY IN A PRIVATE UNIVERSITY IN MEXICO CITY

ABSTRACT. Mechatronics engineering is a challenging discipline that needs different thinking and practices in contrast with traditional engineering. This challenging is mainly due to the demand of integration, collaboration and holistic approaches required during the design methodology. This study examines the transformation from traditional education to an in-deep professional and research focused projects. The key factor in the mechatronics learning practice includes the implementation of a major project focused on positive social impact solutions and the road map developed for this purpose. This work proposes a methodology that allows students develop a major project with a holistic view, including design constraints related to specific contextual aspects as economics, environmental, societal, ethical, health and sustainability. Also, students are able to develop professional and research skills. The methodology also allows students propose a major project focused on positive social impact with design constraints. It also exposes students different engineering and computational tools for collaboration and integration. The study uses data from 69 students enrolled along four years, from 2016 to 2019. Results show that the student learning outcomes increased significantly at the end of the period time, from 1.26 ± 0.31 to 2.92 ± 0.14 (in range between 0 to 4), reaching the satisfactory level (year-2016 as baseline). Also, 100% of the scientific papers derived from the major projects were accepted for publication in international conferences. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Ponce, H., Moya-Albor, E., & Brieva, J. (2024). From Project-Based Learning to Innovative Technologies in Mechatronics Course: A Case Study in a Private University in Mexico City. In *Studies in Big Data* (vol. 148, pp. 111-134). Springer. doi: 10.1007/978-3-031-54277-0_5. Book Chapter.

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PRICE ESTIMATION FOR PRE-OWNED VEHICLES USING MACHINE LEARNING

ABSTRACT. This article presents the initial analysis of pre-owned car pricing using machine learning techniques. We explore three approaches: classic linear regression, tree boosting, and quantile regression algorithms. The scope of the article includes comparing these models and understanding the underlying data structure. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2025.

Rivera, M., Campos, B., Galicia, A., Noguera, E., & Ponce, H. (2025). Price Estimation for Pre-owned Vehicles Using Machine Learning. In *23rd Mexican International Conference on Artificial Intelligence, MICAI 2024; Tonantzintla; Mexico; 21 October 2024 through 25 October 2024, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 15246 LNAI (pp. 148-159). Springer. doi: 10.1007/978-3-031-75540-8_11. Conference paper.

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QUÉ MAX-TE-LATTE PERSONALIZED PRODUCT RECOMMENDATIONS IN THE COFFEE SHOP INDUSTRY: ENHANCING CUSTOMER EXPERIENCE AND LOYALTY

ABSTRACT. Association Rule Mining (ARM) is a Machine Learning technique widely used to enhance the predictability of bundling goods and services purchased together. In the competitive world of coffee shops, providing enticing and customized product combinations is crucial for enhancing customer experience and building loyalty. We utilized a newly generated transactional database from a coffee shop franchise in Mexico to identify unique itemsets using a standard Apriori principle. Furthermore, our main contribution is the application of a Two-Phase High Utility Itemset algorithm to predict tailored baskets based on both frequency and monetary revenue simultaneously. Whether suggesting a well-rounded breakfast or a light lunch, smart recommendations can encourage firms to explore new product options and increase their average revenue. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2025.

De Jesús Luis Ortiz, J., Navarro, M., Prud'Homme, C., Vázquez, F., & Ponce, H. (2025). QUÉ MAX-TE-LATTE Personalized Product Recommendations in the Coffee Shop Industry: Enhancing Customer Experience and Loyalty. In *23rd Mexican International Conference on Artificial Intelligence, MICAI 2024; Tonantzintla; Mexico; 21 October 2024 through 25 October 2024, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 15246 LNAI (pp. 135-147). Springer. doi: 10.1007/978-3-031-75540-8_10. Conference paper.

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TOWARDS THE DESIGN OF A DUAL-CAMERA VISION SYSTEM FOR ATTENTION AND MONITORING

ABSTRACT. In this work, we propose a proof-of-concept design of a camera-based vision system for a quadruped robot by mimicking the behavior of the chameleon's eyes, in order to provide an attention and monitoring system for objects of interest during a robot task. The system comprises two depth cameras placed in a spiral housing. This mechanism enables to move an independent camera around 200 degrees by mimicking the motion of the chameleon's eyes. We implement the mechatronics engineering process for designing the dual-camera vision system through the identification of the functionality and the components required. Later on, we validate our system through simulations. © 2022 IEEE.

Amaya, A., Zavala, A., Álvarez, D., Regueira, O., Ibarrondo, J., Ponce, H., Moya-Albor, E., & Brieva, J. (2022). Towards the Design of a Dual-Camera Vision System for Attention and Monitoring. In *2022 International Conference on Mechatronics, Electronics and Automotive Engineering, ICMEAE 2022; Cuernavaca; Mexico; 5 December 2022 through 9 December 2022, Proceedings - 2022 International Conference on Mechatronics, Electronics and Automotive Engineering, ICMEAE 2022* (pp. 42-47). IEEE. doi: 10.1109/ICMEAE58636.2022.00015. Conference Paper.

USING SOCIAL ROBOTICS TO IDENTIFY EDUCATIONAL BEHAVIOR: A SURVEY

ABSTRACT. The advancement of social robots in recent years has opened a promising avenue for providing users with more accessible and personalized attention. These robots have been integrated into various aspects of human life, particularly in activities geared toward students, such as entertainment, education, and companionship, with the assistance of artificial intelligence (AI). AI plays a crucial role in enhancing these experiences by enabling social and educational robots to interact and adapt intelligently to their environment. In social robotics, AI is used to develop systems capable of understanding human emotions and responding to them, thereby facilitating interaction and collaboration between humans and robots in social settings. This article aims to present a survey of the use of robots in education, highlighting the degree of integration of social robots in this field worldwide. It also explores the robotic technologies applied according to the students' educational level. This study provides an overview of the technical literature in social robotics and behavior recognition systems applied to education at various educational levels, especially in recent years. Additionally, it reviews the range of social robots in the market involved in these activities. The objects of study, techniques, and tools used, as well as the resources and results, are described to offer a view of the current state of the reviewed areas and to contribute to future research. © 2024 by the authors.

Romero-C. de Vaca, A. J., Melendez-Armenta, R. A., & Ponce, H. (2024). Using Social Robotics to Identify Educational Behavior: A Survey. *Electronics* (Switzerland), 13(19), Review 3956. doi: 10.3390/electronics13193956. Review.

IMPLICATIONS FOR SERIOUS GAME DESIGN: QUANTIFICATION OF COGNITIVE STIMULATION IN VIRTUAL REALITY PUZZLE GAMES THROUGH MSC AND SPEN EEG ANALYSIS

ABSTRACT. This paper investigates the cognitive stimulation experienced by players engaging in virtual reality (VR) puzzle games through the analysis of electroencephalography (EEG) data. The study employs magnitude-square coherence (MSC) and spectral entropy (SpEn) metrics to quantify neural activity patterns associated with problem-solving processes during gameplay. Results reveal unique coherence and entropy profiles across different VR gaming tasks, with Tetris gameplay eliciting heightened coherence and entropy values compared to other games. Specifically, Tetris demonstrates increased coherence between frontal and temporal brain regions, indicative of enhanced visuospatial processing and decision making. These findings underscore the importance of considering both spectral coherence and entropy when assessing the cognitive effects of video game tasks on brain activity. Insights from this study may inform the design of serious VR games aimed at promoting cognitive development and problem-solving skills in players. © 2024 by the authors.

GomezRomero-Borquez, J., Del-Valle-Soto, C., Del-Puerto-Flores, J. A., Castillo-Soria, F. R., & Maciel-Barboza, F. M. (2024). Implications for Serious Game Design: Quantification of Cognitive Stimulation in Virtual Reality Puzzle Games through MSC and SpEn EEG Analysis. *Electronics* (Switzerland), 13(11), Article 2017. doi: 10.3390/electronics13112017. Article.

MACHINE LEARNING STRATEGIES FOR RECONFIGURABLE INTELLIGENT SURFACE-ASSISTED COMMUNICATION SYSTEMS—A REVIEW

ABSTRACT. Machine learning (ML) algorithms have been widely used to improve the performance of telecommunications systems, including reconfigurable intelligent surface (RIS)-assisted wireless communication systems. The RIS can be considered a key part of the backbone of sixth-generation (6G) communication mainly due to its electromagnetic properties for controlling the propagation of the signals in the wireless channel. The ML-optimized (RIS)-assisted wireless communication systems can be an effective alternative to mitigate the degradation suffered by the signal in the wireless channel, providing significant advantages in the system's performance. However, the variety of approaches, system configurations, and channel conditions make it difficult to determine the best technique or group of techniques for effectively implementing an optimal solution. This paper presents a comprehensive review of the reported frameworks in the literature that apply ML and RISs to improve the overall performance of the wireless communication system. This paper compares the ML strategies that can be used to address the RIS-assisted system design. The systems are classified according to the ML method, the databases used, the implementation complexity, and the reported performance gains. Finally, we shed light on the challenges and opportunities in designing and implementing future RIS-assisted wireless communication systems based on ML strategies. © 2024 by the authors.

Ibarra-Hernández, R. F., Castillo-Soria, F. R., Gutiérrez, C. A., García-Barrientos, A., Vásquez-Tolledo, L. A., Del-Puerto-Flores, J. A. (2024). Machine Learning Strategies for Reconfigurable Intelligent Surface-Assisted Communication Systems—A Review. *Future Internet*, 16(5), Review 173. doi: 10.3390/fi16050173. Review.

APPLICATION OF VERTICAL ELECTRICAL SOUNDING AND TOXICITY TESTS FOR THE ANALYSIS OF VERTICAL HYDRAULIC CONNECTIVITY THROUGH THE VADOSE ZONE

ABSTRACT. In this research, a hydraulic characterization of a 14 km segment of the San Pedro River, flowing through the center of the Aguascalientes Valley, was conducted. More than 50 years of flow measurement records were processed to obtain daily flows during dry and rainy seasons. Through geospatial analysis, areas with hydraulic retention, influenced by the region's topography and sediment accumulation during the flood season, were identified. Similarly, the digital map of geological surface features revealed that some of these structures spatially coincide with these retention areas. Later, potential hydraulic connectivity between the surface and the aquifer were evaluated in the identified hydraulic stagnation areas (HSAs) using vertical electrical soundings (VESs). Finally, through an experimental process in which water collected from the San Pedro River flowed through a device filled with surface soil taken from the retention areas, the potential retention of pollutants by the local soil was evaluated based on toxicity tests using the monogonont rotifer *Lecane papuana*. The findings suggest the presence of three hydraulic stagnation areas (HSAs) in the examined section of the river, with one of them intersected by a surface discontinuity. According to the results of the VES, the water table beneath the HSA varies between 70 and 90 m in depth. Further analysis of the vertical electrical sounding (VES) results suggests the presence of vertical hydraulic connectivity between the San Pedro River and the local aquifer in the hydraulic stagnation areas (HSA). This is indicated by the identification of low-resistivity strata associated with highly saturated soil above the water table, as measured in the adjacent pumping wells. Additionally, the experiments involving the device filled with soil showed a reduction in water toxicity (ranging from 12 to 40%) as the San Pedro River water flowed through a 1 m column of local near-surface soil. The results of this experimental work suggest that the soil acts

as a natural filter for contaminant transport under conditions in time and space similar to those of the experiment. However, there is still a significant research niche in conducting an experimental campaign in terms of hydrogeochemistry to obtain more specific results. © 2024 by the authors.

Reyes-Cedeño, I. G., Hernández-Marín, M., Pacheco-Martínez, J., Rico-Martínez, R., Arzate-Cárdenas, M. A., Pacheco-Guerrero, A., Luna-Villavicencio, H., Padilla-Ceniceros, R. (2024). Application of Vertical Electrical Sounding and Toxicity Tests for the Analysis of Vertical Hydraulic Connectivity through the Vadose Zone. *Water* (Switzerland), 16(2), Article 222. doi: 10.3390/w16020222. Article.

A SINGLE-OUTPUT-FILTER DOUBLE DUAL ĆUK CONVERTER

ABSTRACT. This study introduces an innovative version of a recently studied converter. A Double Dual Ćuk Converter was recently studied with advantages like the possibility of designing it for achieving a low-input current ripple. The proposed converter, called the Improved Double Dual Ćuk Converter, maintains the advantages of the former one, and it is characterized by requiring one less capacitor and inductor than its predecessor. This allows addressing the challenge of optimizing the topology to reduce component count without compromising the operation; this work proposes an efficient design methodology based on theoretical analysis and experimental validation. Results demonstrate that the improved topology not only retains the advantages of the previous version, including high efficiency and robustness, but also enhances power density by reducing the number of components. These advancements open new possibilities for applications requiring compact and efficient power converters, such as renewable energy systems, electric vehicles, and portable power supply systems. This work underscores the importance of continuous innovation in power converter design and lays the groundwork for future research aimed at optimizing converter topologies. A detailed discussion of the operating principles and modeling of the converter is provided. Furthermore, simulation outcomes highlighting differences in steady-state duration, output voltage, input current ripple, and operational efficiency are shared. The results from an experimental test bench are also presented to corroborate the efficacy of the improved converter. © 2024 by the authors.

Robles-Campos, H. R., Rosas-Caro, J. C., Valderrábano-Gonzalez, A., & Posada, J. (2024). A Single-Output-Filter Double Dual Ćuk Converter. *Electronics* (Switzerland), 13(10), Article 1838. doi: 10.3390/electronics13101838. Article.

Pedro Manuel Rodrigo Cruz

Senior Researcher C

Julio César Rosas Caro

Senior Researcher D, SNII Level I

Óscar Dávalos Orozco

Research Professor

AN ACCURATE EXPLICIT SIX-PARAMETER SOLAR CELL MODEL BASED ON SINGLE-DIODE AND ITS PARAMETER EXTRACTION FOR SEVEN PHOTOVOLTAIC TECHNOLOGIES

ABSTRACT. The mathematical modeling of solar cells and panels is critical in many photovoltaic applications. However, the standard single-diode solar cell model, commonly selected to model these devices, is implicit and difficult to integrate into simulation software. Therefore, exact explicit solutions of this model, more suitable for computing purposes, have been proposed based on the Lambert W-function. This work introduces an explicit single-diode, easy-to-use six-parameter solar cell model. The proposed model is formulated with elementary functions. The model is developed and tested over seven photovoltaic technologies as an alternative to traditional approaches. Results of the extensive comparison of the three models (implicit, explicit Lambert W, and explicit six-parameter) show that the proposed approach is more accurate (14.81% relative improvement on average compared to the traditional methods), almost as fast as the Lambert W approach and much faster than the implicit approach. Due to its simplicity and accuracy, the proposed model will become an alternative in photovoltaic applications such as energy prediction and maximum power point tracking. Copyright © 2023 by ASME.

Dávalos-Orozco, Ó., Rodrigo, P. M., Brambila-Paz, F., & Rosas-Caro, J. C. (2024). An Accurate Explicit Six-Parameter Solar Cell Model Based on Single-Diode and Its Parameter Extraction for Seven Photovoltaic Technologies. *Journal of Solar Energy Engineering*, 146(2), Article 21008. doi: 10.1115/1.4063621. Article.

Pedro Manuel Rodrigo Cruz

Senior Researcher C

COMPARATIVE ANALYSIS OF BATTERY ENERGY STORAGE SYSTEMS' OPERATION STRATEGIES FOR PEAK SHAVING IN INDUSTRIES WITH OR WITHOUT INSTALLED PHOTOVOLTAIC CAPACITY

ABSTRACT. Battery energy storage systems can address energy security and stability challenges during peak loads. This study examines the integration of such systems for peak shaving in industries, whether or not they have photovoltaic capacity. The battery-sizing problem has been analyzed extensively. However, most analyses assume a specific battery operation strategy and ignore the impact of battery-charging schemes on system behavior. In this paper, the authors compare three different operation strategies for charging batteries in an industrial peak-shaving application based on historical demand data from a large electricity consumer in El Salvador. The three strategies are fast charging, time-based charging, and low-power threshold charging. The study analyzes the possible integration of a photovoltaic system with two different sizes for a range of battery sizes (from 250 to 1,500 kWh capacity), examining optimal peak shaving levels, economic savings, and battery degradation. Results indicate that fast-charging reduces monthly billing but degrades batteries faster. The estimated lithium-ion battery lifespan is 10-10.5 years, with a maximum difference of five months. These differences could affect the life cycle economics due to the high costs of battery replacement. The economic savings achieved by the peak shaving operation of the storage system are not enough to compensate the battery investment in this study. However, other case studies with different load profiles or other locations with more expensive electricity tariffs could make the adoption of these systems economically viable. © 2024 Elsevier Ltd

Cienfuegos, C., Rodrigo, P. M., Cienfuegos, I., & Díaz-Ponce, A. (2024). Comparative analysis of battery energy storage systems' operation strategies for peak shaving in industries with or without installed photovoltaic capacity. *Renewable Energy Focus*, 49, Article 100574. doi: 10.1016/j.ref.2024.100574. Article.

Pedro Manuel Rodrigo Cruz

Senior Researcher C

Óscar Dávalos Orozco

Research Professor

Alfredo Pedroza Díaz

Research Professor

Eduardo de la Vega Segura

SNII Candidate Level

REVIEW OF EXPLICIT MODELS FOR PHOTOVOLTAIC CELL ELECTRICAL CHARACTERIZATION

ABSTRACT. For modeling solar cells, the single diode model presents difficulties in implementation and is expensive computationally because it involves a transcendental and implicit mathematical equation. Some authors have proposed explicit, easy-to-use, and computationally efficient models that approximate its behavior. It is challenging to select the proper model for each specific application because the different proposals were tested for different solar panels, operating conditions, and performance metrics, and, therefore, a direct comparison based on the published information is not possible. In this study, the existing explicit models are reviewed, presenting their equations and discussing their mathematical approximations. Four new models are introduced, and a classification of models is proposed. Furthermore, a comparative analysis of all the models under many photovoltaic technologies and operating conditions is carried out using the same performance metrics and parameter extraction method. This allows developing a framework that makes the selection of models easier for each application. The comparative results show that three models proposed by the research team are more accurate than the implicit approach, with average root mean squared errors as low as 0.41 % (versus 0.54 % error of the implicit model). However, the parameters in these models lack physical sense. Among the explicit models incorporating physical parameters and formulated with elementary functions, the most accurate is based on a first order Padé approximation (0.55 % error). The ranking of models is expected to become a valuable tool for the photovoltaic community in various solar cell modeling tasks. © 2024 Elsevier Ltd

Pedroza-Díaz, A., Rodrigo, P. M., Dávalos-Orozco Ó., De-la-Vega, E., & Valera-Albacete, Á. (2025).

Review of explicit models for photovoltaic cell electrical characterization. *Renewable and Sustainable Energy Reviews*, 207, Review 114979. doi: 10.1016/j.rser.2024.114979. Review.

Arturo Jafet Rodríguez Muñoz

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**AFFECT-DRIVEN VR ENVIRONMENT
FOR INCREASING MUSCLE ACTIVITY IN
ASSISTED GAIT REHABILITATION**

ABSTRACT. In recent years, the focus on gait therapy research has intensified, driven by a desire to enhance session efficiency. Accelerating rehabilitation timelines is imperative to accommodate a larger patient population annually. For instance, the Centro de Rehabilitación Infantil Teleton, a prominent rehabilitation center in Mexico, operates at total capacity, leading to patient rejections. The acceleration of rehabilitation relies on encouraging patients to engage in active muscle efforts. Significant strides have been made in this direction, leveraging motivational techniques like virtual reality. However, a crucial aspect that requires attention is the customization of the environment to adapt to the evolving motivational states of patients. This personalized approach is an essential dimension that remains to be fully explored. Our research addresses this gap by introducing a rehabilitation scenario with a patient in a walking machine while immersed in a virtual reality environment and having a brain-computer interface tracking his affective states encompassing engagement, boredom, meditation, frustration, and excitement. The virtual reality environment dynamically adjusts in real-time using affect to trigger motivational stimuli. A study involving 27 participants, with 13 in the control group and 14 in the experimental group, showed the potential of this approach. The results indicate a significant improvement in the active effort for subjects in the experimental group, yielding an efficiency increase of 54.25% with a p-value below 0.05. © 2013 IEEE.

Rodríguez, J., Del-Valle-Soto, C., & González-Sánchez, J. (2024). Affect-Driven VR Environment for Increasing Muscle Activity in Assisted Gait Rehabilitation. *IEEE Access*, 12, 81593-81607. doi: 10.1109/ACCESS.2024.3412108. Article.

**Alejandro Esteban
Rodríguez Sánchez**

SNII Level I

**EVIDENTIAL NEURAL NETWORK
FOR TENSILE STRESS UNCERTAINTY
QUANTIFICATION IN THERMOPLASTIC
ELASTOMERS**

ABSTRACT. This work presents the use of artificial neural networks (ANNs) with deep evidential regression to model the tensile stress response of a thermoplastic elastomer (TPE) considering uncertainty. Three Gaussian noise scenarios were added to a previous dataset of a TPE to simulate noise in the stress response. The trained ANN models were able to address stress-strain data that were not used for their training or validation, even in the presence of noise. The uncertainty in all tested ANN scenarios comprised, within ± 3 , the noisy data of the TPE stress response. The method was extended to other grades of Hytrel material with ANN architectures that obtained results with a coefficient of determination of about 0.9. These results suggest that shallow neural networks, equipped and trained using evidential output layers and an evidential regression loss, can predict, generalize, and simulate noisy tensile stress responses in TPE materials. © The Author(s), under exclusive licence to Springer-Verlag London Ltd., part of Springer Nature 2024.

Rodríguez-Sánchez, A. E. (2024). Evidential neural network for tensile stress uncertainty quantification in thermoplastic elastomers. *Neural Computing and Applications*, 36(33), 20687-20697. doi: 10.1007/s00521-024-10320-0. Article.

**Alejandro Esteban
Rodríguez Sánchez**

SNII Level I

Mario Acevedo Alvarado

Senior Researcher D, SNII Level I

**MODELING OF COMPRESSIVE STRESS
IN ALSi10MG ALLOYS USING FEED-
FORWARD NEURAL NETWORKS**

ABSTRACT. This study addresses the challenge of modeling compressive stress in ALSi10Mg composites by introducing a method that employs feedforward artificial neural networks (ANNs) and their interpretability, which helps to simulate and analyze material behavior under various conditions. The main objective is to develop a predictive ANN model that can effectively simulate material responses under several factors, incorporating diverse testing parameters and material specifications related with its synthesis. An optimized ANN model, featuring eleven neurons in its hidden layer, was used and demonstrated high predictive accuracy, achieving R² values exceeding 0.94. Additionally, a SHAP interpretability analysis was conducted to assess the influence of key factors such as strain and material conditions on the stress response. The results highlight the significant role of material synthesis processes, compared to the strain rate, in the stress response. In conclusion, this method presents a comprehensive tool for studying complex stress behaviors in ALSi10Mg-based composites, offering insights that could guide future material development and research. © 2024 IOP Publishing Ltd.

Rodríguez-Sánchez, A. E., & Acevedo-Alvarado, M. (2024). Modeling of compressive stress in ALSi10Mg alloys using feed-forward neural networks. *Engineering Research Express*, 6(1), Article 15508. doi: 10.1088/2631-8695/ad2ab7. Article.

Alejandro Esteban
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SNII Level I

NEURAL NETWORKS-BASED MODELING OF COMPRESSIVE STRESS IN EXPANDED POLYSTYRENE FOAMS: A FOCUS ON BEAD SIZE PARAMETERS

ABSTRACT. Expanded polystyrene is used in diverse applications, notably for protective and structural purposes. Its cushioning and mechanical strength excel under compressive loads, especially when optimally designed. A key factor influencing its compressive stress is the initial density, which plays a significant role in determining the material's mechanical properties. This aspect is primarily determined by the bead size distribution. Although there is a vast body of literature on modeling the stress response of expanded polystyrene, there is limited emphasis on predictions that account for this factor, which is also relevant for the manufacturing of the material. Recent literature has emphasized the capability of artificial neural networks in predicting the compressive behaviors of expanded polystyrene, incorporating various factors. In this study, artificial neural network models were used to predict the compressive stress responses of polystyrene foams, with a focus on bead size distribution parameters. Specimens of two distinct initial densities were examined using micrographs to identify bead diameters and distributions, which were then used as model inputs. Compression tests on these specimens were conducted at two different rates. The collected data facilitated the development of predictive models for the material's compressive behavior. The model predictions closely match experimental findings, with error metrics showing deviations <3% compared to the experimental data. This highlights the utility of artificial neural networks in modeling the compressive behavior of polystyrene foams, particularly when bead size and related parameters are considered. © IMechE 2024.

Pech-Mendoza, M. I., Rodríguez-Sánchez, A. E., & Plascencia-Mora, H. (2024). Neural networks-based modeling of compressive stress in expanded polystyrene foams: A focus on bead size parameters. *Proceedings of the Institution of Mechanical Engineers, Part L: Journal of Materials: Design and Applications*, 238(7), 1331-1341. doi: 10.1177/14644207231224172. Article.

Alejandro Esteban
Rodríguez Sánchez

SNII Level I

Mario Acevedo Alvarado

Senior Researcher D, SNII Level I

NEURAL NETWORK-DRIVEN INTERPRETABILITY ANALYSIS FOR EVALUATING COMPRESSIVE STRESS IN POLYMER FOAMS

ABSTRACT. This research presents a method to analyze how neural network models, applied to Expanded Polypropylene and Expanded Polystyrene foams, predict their compressive stress responses. By using SHAP values and Partial Dependence Plots, the study elucidates the models' decision-making processes. It focuses on three main features for both materials: density, loading rate, and strain, with an additional feature concerning loading and unloading for Expanded Polystyrene foam. The findings highlight that increased density and loading rate are closely correlated with higher compressive responses, and strain emerges as the most influential factor for the response of both materials. Partial Dependence Plots reveal a linear relationship with density, whereas other variables demonstrate non-linear relationships. These results validate the use of neural networks in analyzing material behavior, showing that the models' outputs are in line with empirical observations. In conclusion, as presented, the integration of interpretability tools with neural network models offers a robust method for material response analysis, contributing to a deeper understanding of material science. © The Author(s) 2024.

Rodríguez-Sánchez, A. E., Plascencia-Mora, H., & Acevedo-Alvarado, M. (2024). Neural network-driven interpretability analysis for evaluating compressive stress in polymer foams. *Journal of Cellular Plastics*, 60(4), 237-258. doi: 10.1177/0021955X241255102. Article.

Alejandro Esteban
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SNII Level I

NEURAL NETWORKS MODELING OF STRAIN ENERGY DENSITY AND TSAI-WU INDEX IN LAMINATED COMPOSITES

ABSTRACT. In laminated composite materials design, optimization mainly targets the stacking sequence configuration, which is defined by the lamina thickness and fiber orientations within each layer. Recent studies emphasize the increasing role of Machine Learning in promoting innovative composite designs by facilitating the accurate modeling of essential properties such as strength and stiffness. This study introduces two meta-models that utilize feed-forward artificial neural networks, taking laminate thickness and fiber steering angles as input parameters. The output variables, including strain energy density and the Tsai-Wu failure index, enable the prediction of stacking sequence configurations for laminated materials, a capability confirmed in a case study. The results showcase neural network models with the ability to predict these variables, achieving coefficients of determination above 0.90 for testing data. Consequently, this modeling approach has the potential to be a tool for designers, aiding in decision-making processes for the subsequent optimization of stiffness and strength in structural components made of laminated composite materials. © The Author(s) 2024.

Ledesma-Orozco, E., Galvis-Chacón, J. C., Rodríguez-Sánchez, A. E. (2024). Neural networks modeling of strain energy density and Tsai-Wu index in laminated composites. *Journal of Composite Materials*, 58(10), 1217-1232. doi: 10.1177/00219983241235856. Article.

REMARKS ON SHD SPACES AND MORE DIVERGENCE PROPERTIES

ABSTRACT. The class of SHD spaces was recently introduced in [12]. The first part of this paper focuses on answering most of the questions presented in that article. For instance, we exhibit an example of a non-SHD Tychonoff space X such that $F[X]$, the Pixley-Roy hyperspace of X , X , the Stone-Čech compactification of X , and $Cp(X)$, the ring of continuous functions over X equipped with the topology of pointwise convergence, are SHD. In the second part of this work we will present some variations of the SHD notion, namely, the WSHD property and the OHD property. Furthermore, we will pay special attention to the relationships between X and $F[X]$ regarding these new concepts. © 2024 Elsevier B.V.

Jiménez-Flores, C.D.; Ríos-Herrejón, A., Rojas-Sánchez, A. D., Tomita, A. H., & Tovar-Acosta, E. E. (2024). Remarks on SHD spaces and more divergence properties. *Topology and its Applications*, 357, 109055. doi: 10.1016/j.topol.2024.109055. Article.

THE UNIFORM CONVERGENCE TOPOLOGY ON SEPARABLE SUBSETS

ABSTRACT. For a topological space X , let (RX) $s:=(RX,T_s)$ be the cartesian product of $|X|$ copies of the real line R with the topology of the uniform convergence on separable subsets of X . In this article we analyze the subspace $C(X)$ of (RX) s of all real-valued continuous functions on X , denoted by $Cs(X)$. We determine when $Cs(X)$ is dense and when is closed in (RX) s, and we obtain some results about the Baire property in $Cs(X)$. Finally, we determine the cellularity of $Cs([0, 1])$ where $[0, 1]$ is the space of ordinal numbers belonging to ω_1+1 with its usual order topology. © 2024 Elsevier B.V.

Cruz-Chapital, J. A., Rojas-Sánchez, A. D., Tamariz-Mascarúa, Á.; Villegas-Rodríguez, H. (2025). The uniform convergence topology on separable subsets. *Topology and its Applications*, 359, Article 109135. doi: 10.1016/j.topol.2024.109135. Article.

A CONCEPTUAL FRAMEWORK OF THE APPLICABILITY OF PRODUCTION SCHEDULING FROM A CONTINGENCY THEORY APPROACH: ADDRESSING THE THEORY-PRACTICE GAP

ABSTRACT. In the last century, there was a general perception that scheduling theory was highly irrelevant to scheduling practice. Many recent studies, however, have suggested that the applicability of scheduling approaches is highly intertwined with the manufacturing environment in which the scheduling task is carried out. In this paper we used the constructs of Contingency Theory to suggest specific fits between scheduling approaches and manufacturing environments, after suggesting that the theory-practice gap in production scheduling research has been caused by three issues: (a) simplification of scheduling problems, (b) simplification of the practical scheduling task as a decision process, and (c) lack of relevance of the traditional scheduling approach to all manufacturing environments. Furthermore, we suggest that the dynamism of the state of the system and the complexity of the scheduling problem are the two constituting vectors that define the complexity of the scheduling task. We use both vectors to identify different types of manufacturing environments and propose specific fits with scheduling approaches. Finally, we hypothesize that the fit between scheduling approaches and manufacturing environments is only relevant in environments with high resource utilization where the scheduling task could have a bigger impact on a firm's performance, and present three case studies to better exemplify the relevance of the conceptual framework. © 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Romero-Silva, R., Santos, J., & Hurtado-Hernández, M. (2022). A conceptual framework of the applicability of production scheduling from a contingency theory approach: addressing the theory-practice gap. *Production Planning and Control*, 35(3), 262-282. doi: 10.1080/09537287.2022.2076627. Article.

HUMAN-OBJECT INTERACTION: DEVELOPMENT OF A USABILITY INDEX FOR PRODUCT DESIGN USING A HIERARCHICAL FUZZY AXIOMATIC DESIGN

ABSTRACT. Consumer product usability has been addressed using tools that evaluate objects to improve user interaction. However, such diversity in approach makes it challenging to select a method for the type of product being assessed. This article compiles the concepts used since the origin of usability in product design. It groups them by attributes to formulate a usability index proposal. Due to the nature of the data, fuzzy, hierarchical, and axiomatic tools were applied to a trial group of experts and users. Three questionnaires were designed and administered throughout a five-stage process to collect and select attributes, rank them in importance, assign fuzzy values, obtain their numerical representation of use, and assign a qualitative category. By analyzing a case study, this research demonstrates the value of the index by comparing the use of computer mice. Unlike other approaches to evaluating usability, the proposed index incorporates the hierarchical importance of attributes. It allows for participants to express their opinions, transforming subjective responses into linguistic values represented in triangular areas, resulting in a more accurate representation of reality. Additionally, the complexity of the human-object interaction is treated by an information axiom to compute the usability index on a scale from 0 to 1, which reflects the probability of the product meeting the desired usability attributes. © 2024 by the authors.

Peña-Ontiveros, M. I., Balderrama-Armendariz, C. O., Rosa-Sierra, A., Maldonado-Macias, A.A., Cortés Sáenz, D., & Hernández Arellano, J. L. (2024). Human-Object Interaction: Development of a Usability Index for Product Design Using a Hierarchical Fuzzy Axiomatic Design. *Computation*, 12(6), Article 130. doi: 10.3390/computation12060130. Article.

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A SYMMETRIC SIXTH-ORDER STEP-UP CONVERTER WITH ASYMMETRIC PWM ACHIEVED WITH SMALL ENERGY STORAGE COMPONENTS

ABSTRACT. This research explores an improved operation of a recently studied converter, the so-called two-phase sixth-order boost converter (2P6OBC). The converter consists of a symmetric design of power stations followed by an LC filter; its improved operation incorporates an asymmetric pulse width modulation (PWM) scheme for transistor switching, sometimes known as an interleaved PWM approach. The new operation leads to improved performance for the 2P6OBC. Along with studying the 2P6OBC, one of the contributions of this research is providing design equations for the converter and comparing it versus the interleaved (or multiphase) boost converter, known for its competitiveness and advantages; the single-phase boost topology was also included in the comparison. The comparison consisted of a design scenario where all converters must achieve the same power conversion with an established maximum switching ripple, and then the stored energy in passive components is compared. Although the 2P6OBC requires a greater number of components, the total amount of stored energy is smaller. It is known that the stored energy is related to the size of the passive components. Still, the article includes a discussion of this topic. The new operation of the converter offers more streamlined, cost-effective, and efficient alternatives for a range of applications within power electronics. The final design of the 2P6OBC required only 68% of the stored energy in inductors compared to the multiphase boost converter, and 60% of the stored energy in capacitors. This result is outstanding, considering that the multiphase boost converter is a very competitive topology. Experimental results are provided

to validate the proposed concept. © 2024 by the authors.

Dueñas-García, I., Rosas-Caro, J. C., Robles-Campos, H. R., Posada, J., Valdez-Resendiz, J. E., Valderrábano-Gonzalez, A., Gabbar, H.A., & Babaiahgari, B. (2024). A Symmetric Sixth-Order Step-Up Converter with Asymmetric PWM Achieved with Small Energy Storage Components. *Symmetry*, 16(4), Article 460. doi: 10.3390/sym16040460. Article.

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DATA-DRIVEN MODELING AND OPEN-CIRCUIT VOLTAGE ESTIMATION OF LITHIUM-ION BATTERIES

ABSTRACT. This article presents a data-driven methodology for modeling lithium-ion batteries, which includes the estimation of the open-circuit voltage and state of charge. Using the proposed methodology, the dynamics of a battery cell can be captured without the need for explicit theoretical models. This approach only requires the acquisition of two easily measurable variables: the discharge current and the terminal voltage. The acquired data are used to build a linear differential system, which is algebraically manipulated to form a space-state representation of the battery cell. The resulting model was tested and compared against real discharging curves. Preliminary results showed that the battery's state of charge can be computed with limited precision using a model that considers a constant open-circuit voltage. To improve the accuracy of the identified model, a modified recursive least-squares algorithm is implemented inside the data-driven method to estimate the battery's open-circuit voltage. These last results showed a very precise tracking of the real battery discharging dynamics, including the terminal voltage and state of charge. The proposed data-driven methodology could simplify the implementation of adaptive control strategies in larger-scale solutions and battery management systems with the interconnection of multiple battery cells. © 2024 by the authors.

Silva-Vera, E. D., Valdez-Resendiz, J. E., Escobar, G., Guillen, D., Rosas-Caro, J. C., Sosa, J. M. (2024). Data-Driven Modeling and Open-Circuit Voltage Estimation of Lithium-Ion Batteries. *Mathematics*, 12(18), Article 2880. doi: 10.3390/math12182880. Article.

Julio César Rosas Caro

Senior Researcher D, SNII Level I

DATA-DRIVEN MODELING OF DC-DC POWER CONVERTERS

ABSTRACT. This article presents a data-driven methodology for modeling DC-DC power electronic converters. Using the proposed methodology, the dynamics of a converter can be captured, thereby eliminating the need for explicit theoretical modeling methods. This approach only requires the acquisition of fundamental measurements: currents through inductors and voltages across capacitors. The acquired data are used to construct a linear difference system, which is algebraically manipulated to form a state-space representation of the converter under analysis. Three DC-DC converter topologies were analyzed, and their resulting models were tested and compared with simulation data, yielding an average error deviation of approximately (Formula presented.) for current signals and (Formula presented.) for voltage signals, demonstrating precise tracking of the actual dynamics. The proposed data-driven methodology could simplify the implementation of adaptive control strategies in larger-scale solutions or in the interconnection of multiple converters. © 2024 by the authors.

Silva-Vera, E. D., Valdez-Resendiz, J. E., Escobar, G., Guillen, D., Rosas-Caro, J. C., & Sosa, J. M. (2024). Data-Driven Modeling of DC-DC Power Converters. *Electronics (Switzerland)*, 13(19), Article 3890. doi: 10.3390/electronics13193890. Article.

FLYING CAPACITOR DOUBLE DUAL BOOST DC-DC CONVERTER

ABSTRACT. This article presents a detailed analysis of a previously introduced boost converter based on cascaded capacitor connections. The analyzed converter maintains the same voltage gain as its conventional double-boost converter counterpart. The main advantage of the redesigned converter is that it requires smaller capacitors, rated to a lower voltage, due to the cascaded connection. This makes it suitable for various applications, including distributed generation and microgrids. This paper conducts the mathematical modeling of the converter with large signal models and the equilibrium operation in continuous conduction mode, employed to implement a control scheme. Even though the individual capacitor voltage ripple reaches high values, for voltage gains above five, the output voltage ripple is lower compared with that of other converters. The analysis also includes a comparative study with the conventional double dual boost converter. Simulations assess the proposed topology's ability to effectively minimize the switching ripple in the output voltage, even with smaller capacitors. Finally, experimental results are also provided to confirm the functionality of the proposed converters under various operational conditions, which confirm its suitability for low-voltage generator applications. © 2024 by the authors.

García-Vite, P. M., Rosas-Caro, J. C., Rebullosa-Castillo, J. F., García-Perales, M. A., Pedraza-Barón, J. E., & Reyes-García, B. L. (2024). Flying Capacitor Double Dual Boost DC-DC Converter. *Electronics* (Switzerland), 13(17), Article 3451. doi: 10.3390/electronics13173451. Article.

HARDWARE-IN-THE-LOOP EMULATION OF A SEPIC MULTIPLIER CONVERTER IN A PHOTOVOLTAIC SYSTEM

ABSTRACT. This article presents the development and execution of a Single-Ended Primary-Inductor Converter (SEPIC) multiplier within a Hardware-in-the-Loop (HIL) emulation environment tailored for photovoltaic (PV) applications. Utilizing the advanced capabilities of the dSPACE 1104 platform, this work establishes a dynamic data exchange mechanism between a variable voltage power supply and the SEPIC multiplier converter, enhancing the efficiency of solar energy harnessing. The proposed emulation model was crafted to simulate real-world solar energy capture, facilitating the evaluation of control strategies under laboratory conditions. By emulating realistic operational scenarios, this approach significantly accelerates the innovation cycle for PV system technologies, enabling faster validation and refinement of emerging solutions. The SEPIC multiplier converter is a new topology based on the traditional SEPIC with the capability of producing a larger output voltage in a scalable manner. This initiative sets a new benchmark for conducting PV system research, offering a blend of precision and flexibility in testing supervisory strategies, thereby streamlining the path toward technological advancements in solar energy utilization. © 2024 by the authors.

Posada Contreras, J., & Rosas-Caro, J. C. (2024). Hardware-in-the-Loop Emulation of a SEPIC Multiplier Converter in a Photovoltaic System. *Electricity*, 5(3), 426-448. doi: 10.3390/electricity5030022. Article.

MSC CONVERTER WITH OPTIMIZED INPUT CURRENT RIPPLE FOR FUEL CELLS APPLICATIONS

ABSTRACT. This article focuses on the analysis of a newly introduced DC-DC converter structure suitable for applications in fuel cell generation systems, the Modified Series Capacitor (MSC) converter. An interleaved-type converter with high voltage gain. The converter was proposed with a particular PWM scheme in which their two transistors operate with equal duty cycle, but the switching signals are 180° out of phase, and it uses two equal inductors. This article suggests a different way to design and operate the MSC converter with unequal inductors and unequal duty cycles. The primary benefit of the proposed approach with independent duty cycles and inductances is that it allows for the application of a numerical optimization algorithm to minimize the converter's input current ripple without the need to increase the stored energy in inductors. For example, it was possible to reduce one of the two inductors while maintaining (or even improving) the power quality of the input current. To prove the concept, an experiment was set up, executed, and confirmed.

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Ibarra-Nuño, C., Rosas-Caro, J. C., Valdez-Resendiz, J. E., Alejo-Reyes, A., Ramírez, J. M., Sánchez, V. M., & Rodríguez, A. (2023). MSC converter with optimized input current ripple for fuel cells applications. *International Journal of Hydrogen Energy*, 5(3), 426-448. doi: 10.1016/j.ijhydene.2023.11.205. Article.

SLIDING MODE SPEED CONTROL IN SYNCHRONOUS MOTORS FOR AGRICULTURE MACHINERY: A CHATTERING SUPPRESSION APPROACH

ABSTRACT. Synchronous motors have extended their presence in different applications, specifically in high-demand environments such as agronomy. These uses need advanced and better control strategies to improve energy efficiency. Within this context, sliding mode control has demonstrated effectiveness in electric machine control due to its advantages in robustness and quick adaptation to uncertain dynamic system disturbances. Nevertheless, this control technique presents the undesirable chattering phenomenon due to the discontinuous control action. This paper introduces a novel speed integral control scheme based on sliding modes for synchronous motors. This approach is designed to track smooth speed profiles and is evaluated through several numeric simulations to verify its robustness against variable torque loads. This approach addresses using electric motors for different applications such as irrigation systems, greenhouses, pumps, and others. Moreover, to address the chattering problem, different sign function approximations are evaluated in the control scheme. Then, the most effective functions for suppressing the chattering phenomenon through extensive comparative analysis are identified. Integral compensation in this technique demonstrates improvement in motor performance, while sign function approximations show a chattering reduction. Different study cases prove the robustness of this control scheme for large-scale synchronous motors. The simulation results validate the proposed control scheme based on sliding modes with integral compensation, by achieving chattering reduction and obtaining an efficient control scheme against uncertain disturbances in synchronous motors for agronomy applications. © 2024 by the authors.

Marcos-Andrade, D., Beltran-Carbajal, F., Rivas-Cambero, I., Yáñez-Badillo, H., Favela-Contreras, A., & Rosas-Caro, J. C. (2024). Sliding Mode Speed Control in Synchronous Motors for Agriculture Machinery: A Chattering Suppression Approach. *Agriculture (Switzerland)*, 14(5), Article 737. doi: 10.3390/agriculture14050737. Article.

STABILITY ANALYSIS OF INTERCONNECTED POWER SYSTEMS USING THE LYAPUNOV CRITERION

ABSTRACT. This paper presents the stability analysis of an interconnected power system made up of a photovoltaic solar panel and a DC-DC converter. Stability is demonstrated through the use of the Lyapunov criterion for two types of systems. The first consists of the panel interconnected to a Boost converter and the second uses a Buck converter. The dynamic equation of the panel's behavior is obtained through the connection of a capacitor to its output. The resulting system is analyzed by means of a candidate Lyapunov function to demonstrate stability in some sense. The dynamic behavior of the considered states in the face of variations in the control input is graphed to visualize their convergence to an equilibrium point. The methodology presented through the development of the paper can be extended to systems that include higher order converters. © 2024 IEEE.

Ruiz-Martínez, O. F., & López-Cruz, J. M. (2024). Stability Analysis of Interconnected Power Systems using the Lyapunov Criterion. In *16th Seminar on Power Electronics and Control, SEP-OC 2024; Santa Maria; Brazil; 20 October 2024 through 23 October 2024, 2024 16th Seminar on Power Electronics and Control, SEPOC 2024*. IEEE. doi: 10.1109/SEPOC63090.2024.10747448. Conference paper.

STABILITY OF CONFORMABLE LINEAR DIFFERENTIAL SYSTEMS: A BEHAVIOURAL FRAMEWORK WITH APPLICATIONS IN FRACTIONAL-ORDER CONTROL

ABSTRACT. The authors study the stability of linear systems whose dynamics are described by systems of conformable fractional differential equations. They provide a framework in terms of behavioural system theory to develop a general modelling specification as well as stability conditions for conformable linear systems with a fractional differential order. They also provide sufficient conditions and tests for stability based on linear matrix inequalities. To do so, they elaborate on the relationship between the conformable derivative and the traditional integer derivative as well as on a conformable Laplace transform and the use of polynomial algebra as the pivotal figure for analysis. They demonstrate the advantages of the proposed approach by designing a stabilising fractional-order controller for a DC-DC converter feeding a constant power load. © The Institution of Engineering and Technology 2020

Mayo-Maldonado, J. C., Fernández-Anaya, G., & Ruíz-Martínez, O. F. (2020). Stability of conformable linear differential systems: A behavioural framework with applications in fractional-order control. *IET Control Theory and Applications*, 14(18), 2900-2913. doi: 10.1049/iet-cta.2019.0930. Article.

SWITCHED CONTROL DESIGN FOR A MODIFIED SEPIC CONVERTER APPLIED TO PEF GENERATION

ABSTRACT. This paper describes the modification of a DCDC converter and the controller design that allows generating a PEF (Pulsed Electric Field) for food treatment purposes. Recent literature focused on food processing mentions that the application of short-duration voltage pulses helps to better preserve food because it prevents the micro-organisms proliferation. Derived from the condition of generating high voltage pulses at a high frequency, a state-time dependent switching control law is designed. The simulation results of the modified converter imply that its implementation in a real application environment is feasible. The impedance used to apply the PEF considers the electrical characteristic conductivity of a liquid medium such as milk, which can have a value between 4.0 and 5.0 mS at 25 mathrm. © 2024 IEEE.

Ruiz-Martínez, O. F. (2024). Switched Control Design for a Modified SEPIC Converter Applied to PEF Generation.. In *16th Seminar on Power Electronics and Control, SEPOC 2024; Santa Maria; Brazil; 20 October 2024 through 23 October 2024, 2024 16th Seminar on Power Electronics and Control, SEPOC 2024*. IEEE. doi: 10.1109/SEPOC63090.2024.10747417. Conference paper.

INTEGRATING CIRCULAR SUPPLY CHAINS INTO EXPERIENTIAL LEARNING: ENHANCING LEARNING EXPERIENCES IN HIGHER EDUCATION

ABSTRACT. This work integrates the circular economy (CE) into experiential learning in higher education, focusing on industrial and systems engineering. It addresses the need for suitable learning experiences and pedagogical strategies to enhance CE and sustainability education in active learning research. Accordingly, this study proposes integrating Kolb's experiential learning cycle with the ADDIE model into an instructional design framework for reflective and active engagement in learning activities within realistic circular supply chain scenarios. The methodology demonstrates this framework through a case study of an undergraduate module for CE problem-solving, focusing on waste reduction within small and medium enterprises in Mexico City. Based on student surveys and achievement metrics, results show positive student feedback and evaluation results, meeting module targets. This work's main contribution offers a framework for creating novel experiential learning cases and cultivating sustainability-related and disciplinary learning outcomes. It also recognises valuable links for citizenship commitment, problem-solving, community engagement, and CE education. However, this work acknowledges limitations in complex problem-solving difficulties, a resource-demanding nature, restricted transferability, and the limited evaluation of learning effectiveness. Future research will explore this work's relevance across Kolb's learning styles and diverse industries, focusing on student interest and motivation, and evaluating its impact on student outcomes in various educational contexts. © 2024 by the authors.

Salinas-Navarro, D. E., Palma-Mendoza, J. A., & Vilalta-Perdomo, E. (2024). Integrating Circular Supply Chains into Experiential Learning: Enhancing Learning Experiences in Higher Education. *Sustainability* (Switzerland), 16(23), Article 10789. doi: 10.3390/su162310789. Article.

THE RESONANCE OF MIKE JACKSON'S WORK WITH THE USE OF SYSTEMS IDEAS IN COMMUNITY OPERATIONAL RESEARCH

ABSTRACT. The body of work of Mike Jackson covers several major themes in OR/Systems Thinking and articulates key aspects of Critical Systems Thinking; with an interest throughout in applications to complex social challenges. In this paper, as a direct response to this Festschrift, and acknowledging his contribution to Community OR, five active UK-based researchers have engaged in their own process of community-based learning in order to articulate the ways Jackson's work resonates with their contemporary research and practice. The researchers used a variation of the Delphi method to reflect first on the ways that the body of work of Jackson resonated with their practice and research agendas. This produced a framework of ideas. Examples from the UK and overseas are then provided to illustrate these points. Ultimately, the researchers used these experiences and reflections to produce a series of statements for developing Community OR practice (and theory)—reflecting and extending Jackson's work. © 2024 John Wiley & Sons Ltd.

Herron, R. J. M., Mendiaweso Bendek, Z., Salinas Navarro, D. E., Vilalta-Perdomo, E., & Weaver, M. W. (2024). The resonance of Mike Jackson's work with the use of systems ideas in community operational research. *Systems Research and Behavioral Science*, 2024. doi: 10.1002/sres.3100. Article.

DAMAGE IMPORTANCE ANALYSIS FOR PAVEMENT CONDITION INDEX USING MACHINE-LEARNING SENSITIVITY ANALYSIS

ABSTRACT. The Pavement Condition Index (PCI) is a prevalent metric for assessing the condition of rigid pavements. The PCI calculation involves evaluating 19 types of damage. This study aims to analyze how different types of damage impact the PCI calculation and the impact of the performance of prediction models of PCI by reducing the number of evaluated damages. The Municipality of León, Gto., Mexico, provided a dataset of 5271 records. We evaluated five different decision-tree models to predict the PCI value. The Extra Trees model, which exhibited the best performance, was used to assess the feature importance of each type of damage, revealing their relative impacts on PCI predictions. To explore the potential for reducing the complexity of the PCI evaluation, we applied Sequential Forward Search and Brute Force Search techniques to analyze the performance of models with various feature combinations. Our findings indicate no significant statistical difference in terms of Mean Absolute Error (MAE) and the coefficient of determination (R^2) between models trained with 13 features compared to those trained with all 17 features. For instance, a model using only eight damages achieved an MAE of 4.35 and an R^2 of 0.89, comparable to the 3.56 MAE and 0.92 R^2 obtained with a model using all 17 features. These results suggest that omitting some damages from the PCI calculation has a minimal impact on prediction accuracy but can substantially reduce the evaluation's time and cost. In addition, knowing the most significant damages opens up the possibility of automating the evaluation of PCI using artificial intelligence. © 2024 by the authors.

Pérez, A., Sánchez, C. N., & Velasco, J. (2024). Damage Importance Analysis for Pavement Condition Index Using Machine-Learning Sensitivity Analysis. *Infrastructures*, 9(9), Article 157. doi: 10.3390/infrastructures9090157. Article.

EVALUATION OF THE MECHANICAL BEHAVIOR OF FUSED DEPOSITION MODELING (FDM)-PRINTED VIRGIN AND RECYCLED PLA PARTS USING FACTORIAL DESIGN

ABSTRACT. This work evaluated the mechanical behavior of FDM-printed parts of virgin (v-PLA) and recycled PLA (r-PLA) based on a factorial design, with ultimate tensile strength (UTS) as the response variable and PLA type, geometric pattern (linear, tridimensional, and hexagonal), and infill percentage (33%, 66%, and 100%) as factors. The v-PLA results showed that the strength increased as the infill was greater or with the geometric pattern change from tridimensional (25–37 MPa) to linear (31–44 MPa) and hexagonal (35–46 MPa); however, r-PLA showed minimal variation in UTS regardless of the factors and levels evaluated (1723 MPa). The optimal UTS (46 MPa) was achieved with v-PLA, hexagonal pattern and 100% infill, while fracture analysis indicated high concentration of air bubbles in r-PLA. Understanding the mechanical behavior of r-PLA based on statistical reliability contributes to the advancement of efficient design and sustainable manufacturing technologies. Graphical abstract: (Figure presented.). © The Author(s), under exclusive licence to The Materials Research Society 2024.

Rodríguez-Reyna, S. L., Díaz-Aguilera, J. H., García-Contreras, J. P., & Tapia, F. (2024). Evaluation of the mechanical behavior of fused deposition modeling (FDM)-printed virgin and recycled PLA parts using factorial design. *MRS Advances*, 9(3), 187–192. doi: 10.1557/s43580-023-00743-7. Article.

A NEUROADAPTIVE POSITION-SENSORLESS ROBUST CONTROL FOR PERMANENT MAGNET SYNCHRONOUS MOTOR DRIVE SYSTEM WITH UNCERTAIN DISTURBANCE

ABSTRACT. The Permanent Magnet Synchronous Motor (PMSM) drive system is extensively utilized in high-precision positioning applications that demand superior dynamic performance across various operating conditions. Given the non-linear characteristics of the PMSM, a neuroadaptive sensorless controller based on B-spline neural networks is proposed to determine the control signals necessary for achieving the desired performance. The proposed control technique considers the system's non-linearities and can be adapted to varying operating conditions, all while maintaining a low computational cost suitable for real-time operation. The introduced neuroadaptive controller is evaluated under conditions of uncertainty, and its performance is compared to that of a conventional PI controller optimized using the Whale Optimization Algorithm (WOA). The results demonstrate the viability of the proposed approach. © 2024 by the authors.

Aguilar-Mejía, O., Valderrábano-González, A., Hernández-Romero, N., Seck-Tuoh-Mora, J. C., Hernández-Ochoa, J. C., & Minor-Popocatl, H. (2024). A Neuroadaptive Position-Sensorless Robust Control for Permanent Magnet Synchronous Motor Drive System with Uncertain Disturbance. *Energies*, 17(21), Article 5477. doi: 10.3390/en17215477. Article.

Antonio
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SNII Level I

EFFICIENT ADAPTIVE REGULATION STRATEGY FOR CONTROL POSITION OF INDUCTION MOTORS

ABSTRACT. In this paper, we introduce an efficient adaptive algorithm based on B-spline neural networks for trajectory tracking of angular position for industrial induction motors. This strategy is developed in a two-axis reference frame and the regulation algorithm is based on four main stages: a) flux observer; b) internal control loop; c) determination of required electrical currents and; d) calculation of the three-phase input voltages. The strategy considers an algebraic regulation scheme based on the model. The control parameters are tuning online to attain the best dynamic behavior, besides, the proposed adaptive controller is subject to non-modeled components as an 84-pulse voltage source converter included in this study. These two aspects make the main contribution of this article. The proposed high-performance strategy for trajectory tracking of angular position is demonstrated by simulation results using the parameters of two induction motors of 500 hp and 50 hp, respectively. © 2013 IEEE.

Tapia-Olvera, R., Valderrábano-González, A., & Beltrán-Carbajal, F. (2024). Efficient Adaptive Regulation Strategy for Control Position of Induction Motors. *IEEE Access*, 12, 38512-38524. doi: 10.1109/ACCESS.2024.3375346. Article.

Leonardo Jesús Valdivia Parga

SNII Level I

DETECTION OF DEPRESSIVE COMMENTS ON SOCIAL MEDIA USING RNN, LSTM, AND RANDOM FOREST: COMPARISON AND OPTIMIZATION

ABSTRACT. Depression is a prevalent mental health condition, and social media platforms have become valuable sources for understanding individuals' emotional well-being. In this study, we aimed to develop an accurate classification model for detecting depressive comments in social media data using different methods. Three different models were evaluated: Recurrent neural network (RNN) with Long short-term memory (LSTM), RNN with bidirectional LSTM, and Random Forest. Additionally, the performance was evaluated in terms of accuracy, precision, recall, F1-score, specificity, and sensitivity. The results showed that the optimized model achieved a precision of 83.32%; furthermore, the accuracy of the tuned model improved from 75.41 to 80.07%, demonstrating its potential for real-world applications in monitoring mental health trends and providing support to individuals experiencing depression. © The Author(s), under exclusive licence to Springer-Verlag GmbH Austria, part of Springer Nature 2024.

Kanahuati-Ceballos, M., & Valdivia, L. J. (2024). Detection of depressive comments on social media using RNN, LSTM, and random forest: comparison and optimization. *Social Network Analysis and Mining*, 14(1), Article 44. doi: 10.1007/s13278-024-01206-z. Article.

Carolina del Valle Soto

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Juan Carlos López Pimentel

Senior Researcher B, SNII Level I

Ramiro Velázquez Guerrero

SNII Level I

A COMPREHENSIVE REVIEW OF BEHAVIOR CHANGE TECHNIQUES IN WEARABLES AND IOT: IMPLICATIONS FOR HEALTH AND WELL-BEING

ABSTRACT. This research paper delves into the effectiveness and impact of behavior change techniques fostered by information technologies, particularly wearables and Internet of Things (IoT) devices, within the realms of engineering and computer science. By conducting a comprehensive review of the relevant literature sourced from the Scopus database, this study aims to elucidate the mechanisms and strategies employed by these technologies to facilitate behavior change and their potential benefits to individuals and society. Through statistical measurements and related works, our work explores the trends over a span of two decades, from 2000 to 2023, to understand the evolving landscape of behavior change techniques in wearable and IoT technologies. A specific focus is placed on a case study examining the application of behavior change techniques (BCTs) for monitoring vital signs using wearables, underscoring the relevance and urgency of further investigation in this critical intersection of technology and human behavior. The findings shed light on the promising role of wearables and IoT devices for promoting positive behavior modifications and improving individuals' overall well-being and highlighting the need for continued research and development in this area to harness the full potential of technology for societal benefit. © 2024 by the authors.

Del-Valle-Soto, C., López-Pimentel, J. C., Vázquez-Castillo, J., Nolasco-Flores, J. A., Velázquez, R., Varela-Aldás, J., & Visconti, P. (2024). A Comprehensive Review of Behavior Change Techniques in Wearables and IoT: Implications for Health and Well-Being. *Sensors*, 24(8), Article 2429. doi: 10.3390/s24082429. Article.

A SMART GLOVE TO EVALUATE PARKINSON'S DISEASE BY FLEXIBLE PIEZOELECTRIC AND INERTIAL SENSORS

ABSTRACT. Parkinson's disease (PD), to date, is widespread. It is a neurodegenerative disease that impairs the quality of life of the affected, as it is a slowly but progressively evolving disease. This paper presents a smart glove for evaluating PD patients by monitoring hand tremors and evaluating specific exercises involved by the MDS-UPDRS (Movement Disorder Society - Unified Parkinson Disease Rating Scale), enabling disease evolution assessment. The smart glove consists of a TPU flexible support, integrating two flexible MEMS piezoelectric sensors based on Aluminum Nitride and an inertial sensor to detect finger and arm movements. The smart glove integrates an electronic conditioning section for piezoelectric signals to make them suitable for the following acquisition by a microcontroller section based on nRF52840 SoC, which jointly processes the piezoelectric and inertial signals related to standard patient's hand and arm exercises (i.e., finger tapping, fist opening/closing of the hand, resting hand tremor), assigning them scores according to the MDS-UPDRS. Three embedded Machine Learning (ML) algorithms based on Neural Networks (NN) were deployed to classify piezoelectric and inertial signals. Seven individuals, six of them with diagnosed PD, were involved in developing ML models. Datasets were gathered to train and test the ML algorithms, constituted by signal samples related to three tests involved in the UPDRS scale according to PD severity. The tests demonstrated the proper operation of the proposed smart glove in tracking the movement changes induced by PD; also, the developed embedded ML algorithms showed performance in classifying hand/arm movements, reaching 95.12 %, 98.39 %, and 96.62 % for finger-tapping, hand-fist closure, and resting tremor, respectively. © 2024 The Authors

De Fazio R., Del-Valle-Soto, C., Mastronardi, V. M., De Vittorio, M., & Visconti, P. (2025). A smart glove to evaluate Parkinson's disease by flexible piezoelectric and inertial sensors. *Sensors International*, 6, Article 100324. doi: 10.1016/j.sintl.2024.100324. Article.

ACCEPTANCE OF AN IOT SYSTEM FOR STRAWBERRY CULTIVATION: A CASE STUDY OF DIFFERENT USERS

ABSTRACT. The Internet of Things (IoT) has been impacting multiple industries worldwide for over a decade. However, less developed countries have yet to make the transition to these technologies. South America is among the regions with the least IoT influence in all sectors, indicating a need for studies to explore IoT acceptance among various users in this region. This study analyzes two different users of a monitoring and irrigation system for strawberry (*Fragaria × ananassa*) farming. Monitored variables include soil moisture, and ambient temperature and humidity, with irrigation performed via water pumping from a reservoir. The system is based on the M5Core2 development kit for the local station and the IoT platform ThingSpeak for remote access. It features a web user interface consisting of an application developed in HTML using a plugin on ThingSpeak. Thus, the system can be used locally via a touchscreen and remotely through a web browser. Measurements are cross-verified with commercial meters to ensure their reliability, and users are asked to fill out a Technology Acceptance Model (TAM) for IoT to gauge their acceptance level. Additionally, an interview is conducted that explores four critical factors, aimed at understanding their experience and interaction with the system after a period of usage. The findings confirm the validity of the monitored variables and demonstrate a global acceptance rate of slightly over 80%, albeit with varying user acceptance perspectives. Specifically, the technical user exhibits greater acceptance than the crop administrator, evidenced by a mean discrepancy of 1.85 points on the TAM scale. © 2024 by the authors.

Varela-Aldás, J., Gavilanes, A., Velasco, N., Del-Valle-Soto, C., & Bran, C. (2024). Acceptance of an IoT System for Strawberry Cultivation: A Case Study of Different Users. *Sustainability* (Switzerland), 16(16), Article 7221. doi: 10.3390/su16167221. Article.

EFFECTS OF A DUAL INTERVENTION (MOTOR AND VIRTUAL REALITY-BASED COGNITIVE) ON COGNITION IN PATIENTS WITH MILD COGNITIVE IMPAIRMENT: A SINGLE-BLIND, RANDOMIZED CONTROLLED TRIAL

ABSTRACT. Background: The increase in cases of mild cognitive impairment (MCI) underlines the urgency of finding effective methods to slow its progression. Given the limited effectiveness of current pharmacological options to prevent or treat the early stages of this deterioration, non-pharmacological alternatives are especially relevant. Objective: To assess the effectiveness of a cognitive-motor intervention based on immersive virtual reality (VR) that simulates an activity of daily living (ADL) on cognitive functions and its impact on depression and the ability to perform such activities in patients with MCI. Methods: Thirty-four older adults (men, women) with MCI were randomized to the experimental group (n = 17; 75.41 ± 5.76) or control (n = 17; 77.35 ± 6.75) group. Both groups received motor training, through aerobic, balance and resistance activities in group. Subsequently, the experimental group received cognitive training based on VR, while the control group received traditional cognitive training. Cognitive functions, depression, and the ability to perform activities of daily living (ADLs) were assessed using the Spanish versions of the Montreal Cognitive Assessment (MoCA-S), the Short Geriatric Depression Scale (SGDS-S), and the of Instrumental Activities of Daily Living (IADL-S) before and after 6-week intervention (a total of twelve 40-minutes sessions). Results: Between groups comparison did not reveal significant differences in either cognitive function or geriatric depression. The intragroup effect of cognitive function and geriatric depression was significant in both groups (p < 0.001), with large effect sizes. There was no statistically significant improvement in any of the groups when evaluating their performance in ADLs (control, p = 0.28; experimental, p = 0.46) as expected. The completion rate in the experimental group was higher (82.35%) compared to the control group (70.59%). Likewise, participants in the experimental

group reached a higher level of difficulty in the application and needed less time to complete the task at each level. Conclusions: The application of a dual intervention, through motor training prior to a cognitive task based on Immersive VR was shown to be a beneficial non-pharmacological strategy to improve cognitive functions and reduce depression in patients with MCI. Similarly, the control group benefited from such dual intervention with statistically significant improvements. Trial registration: ClinicalTrials.gov NCT06313931; <https://clinicaltrials.gov/study/NCT06313931>. © The Author(s) 2024.

Buele, J., Avilés-Castillo, F., Del-Valle-Soto, C. D., Varela-Aldás, J., Palacios-Navarro, G. (2024). Effects of a dual intervention (motor and virtual reality-based cognitive) on cognition in patients with mild cognitive impairment: a single-blind, randomized controlled trial. *Journal of Neuroengineering and Rehabilitation*, 21(1), Article 130. doi: 10.1186/s12984-024-01422-w. Article.

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Ramiro Velázquez Guerrero

SNII Level I

ENHANCING ELDERLY CARE THROUGH LOW-COST WIRELESS SENSOR NETWORKS AND ARTIFICIAL INTELLIGENCE: A STUDY ON VITAL SIGN MONITORING AND SLEEP IMPROVEMENT

ABSTRACT. This research explores the application of wireless sensor networks for the non-invasive monitoring of sleep quality and vital signs in elderly individuals, addressing significant challenges faced by the aging population. The study implemented and evaluated WSNs in home environments, focusing on variables such as breathing frequency, deep sleep, snoring, heart rate, heart rate variability (HRV), oxygen saturation, Rapid Eye Movement (REM sleep), and temperature. The results demonstrated substantial improvements in key metrics: 68% in breathing frequency, 68% in deep sleep, 70% in snoring reduction, 91% in HRV, and 85% in REM sleep. Additionally, temperature control was identified as a critical factor, with higher temperatures negatively impacting sleep quality. By integrating AI with WSN data, this study provided personalized health recommendations, enhancing sleep quality and overall health. This approach also offered significant support to caregivers, reducing their burden. This research highlights the cost-effectiveness and scalability of WSN technology, suggesting its feasibility for widespread adoption. The findings represent a significant advancement in geriatric health monitoring, paving the way for more comprehensive and integrated care solutions. © 2024 by the authors.

Del-Valle-Soto, C., Briseño, R. A., Velázquez, R., Guerra-Rosales, G., Perez-Ochoa, S., Preciado-Bazavilvazo, I. H., Visconti, P., & Varela-Aldás, J. (2024). Enhancing Elderly Care through Low-Cost Wireless Sensor Networks and Artificial Intelligence: A Study on Vital Sign Monitoring and Sleep Improvement. *Future Internet*, 16(9), Article 323. doi: 10.3390/fi16090323. Article.

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Ramiro Velázquez Guerrero

SNII Level I

MACHINE LEARNING AND IOT-BASED SOLUTIONS IN INDUSTRIAL APPLICATIONS FOR SMART MANUFACTURING: A CRITICAL REVIEW

ABSTRACT. The Internet of Things (IoT) has radically changed the industrial world, enabling the integration of numerous systems and devices into the industrial ecosystem. There are many areas of the manufacturing industry in which IoT has contributed, including plants' remote monitoring and control, energy efficiency, more efficient resources management, and cost reduction, paving the way for smart manufacturing in the framework of Industry 4.0. This review article provides an up-to-date overview of IoT systems and machine learning (ML) algorithms applied to smart manufacturing (SM), analyzing four main application fields: security, predictive maintenance, process control, and additive manufacturing. In addition, the paper presents a descriptive and comparative overview of ML algorithms mainly used in smart manufacturing. Furthermore, for each discussed topic, a deep comparative analysis of the recent IoT solutions reported in the scientific literature is introduced, dwelling on the architectural aspects, sensing solutions, implemented data analysis strategies, communication tools, performance, and other characteristic parameters. This comparison highlights the strengths and weaknesses of each discussed solution. Finally, the presented work outlines the features and functionalities of future IoT-based systems for smart industry applications. © 2024 by the authors.

Visconti, P., Rausa, G., Del-Valle-Soto, C., Velázquez, R., Cafagna, D., & De Fazio, R. (2024). Machine Learning and IoT-Based Solutions in Industrial Applications for Smart Manufacturing: A Critical Review. *Future Internet*, 16(11), Review 394. doi: 10.3390/fi16110394. Review.

Carolina del Valle Soto*Senior Researcher D, SNII Level I***José Alberto del Puerto Flores***SNII Level I***Jesús Alberto Gómez Romero Bórquez***Research Professor***NEUROGAMING IN VIRTUAL REALITY: A REVIEW OF VIDEO GAME GENRES AND COGNITIVE IMPACT**

ABSTRACT. This work marks a significant advancement in the field of cognitive science and gaming technology. It offers an in-depth analysis of the effects of various video game genres on brainwave patterns and concentration levels in virtual reality (VR) settings. The study is groundbreaking in its approach, employing electroencephalograms (EEGs) to explore the neural correlates of gaming, thus bridging the gap between technology, psychology, and neuroscience. This review enriches the dialogue on the potential of video games as a therapeutic tool in mental health. The study's findings illuminate the capacity of different game genres to elicit varied brainwave responses, paving the way for tailored video game therapies. This review contributes meaningfully to the state of the art by offering empirical insights into the interaction between gaming environments and brain activity, highlighting the potential applications in therapeutic settings, cognitive training, and educational tools. The findings are especially relevant for developing VR gaming content and therapeutic games, enhancing the understanding of cognitive processes, and aiding in mental healthcare strategies. © 2024 by the authors.

GomezRomero-Borquez, J., Del-Valle-Soto, C., Del-Puerto-Flores, J. A., Briseño, R. A., Varela-Al-dás, J. (2024). Neurogaming in Virtual Reality: A Review of Video Game Genres and Cognitive Impact. *Electronics* (Switzerland), 13(9), Review 1683. doi: 10.3390/electronics13091683. Review.

Carolina del Valle Soto*Senior Researcher D, SNII Level I***UNCOVERING THE LIMITATIONS AND INSIGHTS OF PACKET STATUS PREDICTION MODELS IN IEEE 802.15.4-BASED WIRELESS NETWORKS AND INSIGHTS FROM DATA SCIENCE**

ABSTRACT. Wireless networks play a pivotal role in various domains, including industrial automation, autonomous vehicles, robotics, and mobile sensor networks. This research investigates the critical issue of packet loss in modern wireless networks and aims to identify the conditions within a network's environment that lead to such losses. We propose a packet status prediction model for data packets that travel through a wireless network based on the IEEE 802.15.4 standard and are exposed to five different types of interference in a controlled experimentation environment. The proposed model focuses on the packetization process and its impact on network robustness. This study explores the challenges posed by packet loss, particularly in the context of interference, and puts forth the hypothesis that specific environmental conditions are linked to packet loss occurrences. The contribution of this work lies in advancing our understanding of the conditions leading to packet loss in wireless networks. Data are retrieved with a single CC2531 USB Dongle Packet Sniffer, whose pieces of information on packets become the features of each packet from which the classifier model will gather the training data with the aim of predicting whether a packet will unsuccessfully arrive at its destination. We found that interference causes more packet loss than that caused by various devices using a WiFi communication protocol simultaneously. In addition, we found that the most important predictors are network strength and packet size; low network strength tends to lead to more packet loss, especially for larger packets. This study contributes to the ongoing efforts to predict and mitigate packet loss, emphasizing the need for adaptive models in dynamic wireless environments. © 2024 by the authors.

Ávalos-Arce, M., Pérez-Díaz, H., Del-Valle-Soto, C., Briseño, R. A. (2024). Uncovering the Limitations and Insights of Packet Status Prediction Models in IEEE 802.15.4-Based Wireless Networks and Insights from Data Science. *Informatics*, 11(1), Article 7. doi: 10.3390/informatics11010007. Article.

Carolina del Valle Soto*Senior Researcher D, SNII Level I***Leonardo Jesús Valdivia Parga***SNII Level I***UNVEILING WEARABLES: EXPLORING THE GLOBAL LANDSCAPE OF BIOMETRIC APPLICATIONS AND VITAL SIGNS AND BEHAVIORAL IMPACT**

ABSTRACT. The development of neuroscientific techniques enabling the recording of brain and peripheral nervous system activity has fueled research in cognitive science. Recent technological advancements offer new possibilities for inducing behavioral change, particularly through cost-effective Internet-based interventions. However, limitations in laboratory equipment volume have hindered the generalization of results to real-life contexts. The advent of Internet of Things (IoT) devices, such as wearables, equipped with sensors and microchips, has ushered in a new era in behavior change techniques. Wearables, including smartwatches, electronic tattoos, and more, are poised for massive adoption, with an expected annual growth rate of 55% over the next five years. These devices enable personalized instructions, leading to increased productivity and efficiency, particularly in industrial production. Additionally, the healthcare sector has seen a significant demand for wearables, with over 80% of global consumers willing to use them for health monitoring. This research explores the primary biometric applications of wearables and their impact on users' well-being, focusing on the integration of behavior change techniques facilitated by IoT devices. Wearables have revolutionized health monitoring by providing real-time feedback, personalized interventions, and gamification. They encourage positive behavior changes by delivering immediate feedback, tailored recommendations, and gamified experiences, leading to sustained improvements in health. Furthermore, wearables seamlessly integrate with digital platforms, enhancing their impact through social support and connectivity. However, privacy and data security concerns must be addressed to maintain users' trust. As technology continues to advance, the refinement of IoT devices' design and functionality is crucial for promoting behavior change and improving health outcomes.

This study aims to investigate the effects of behavior change techniques facilitated by wearables on individuals' health outcomes and the role of wearables in promoting a healthier lifestyle. © The Author(s) 2024.

Del-Valle-Soto, C., Briseño, R. A., Valdivia, L. J., & Nolasco-Flores, J. A. (2024). Unveiling wearables: exploring the global landscape of biometric applications and vital signs and behavioral impact. *BioData Mining*, 17(1), Article 15. doi: 10.1186/s13040-024-00368-y. Article.

Carolina del Valle Soto

Senior Researcher D, SNII Level I

VISUAL SERVOING USING SLIDING-MODE CONTROL WITH DYNAMIC COMPENSATION FOR UAVS' TRACKING OF MOVING TARGETS

ABSTRACT. An Image-Based Visual Servoing Control (IBVS) structure for target tracking by Unmanned Aerial Vehicles (UAVs) is presented. The scheme contains two stages. The first one is a sliding-model controller (SMC) that allows one to track a target with a UAV; the control strategy is designed in the function of the image. The proposed SMC control strategy is commonly used in control systems that present high non-linearities and that are always exposed to external disturbances; these disturbances can be caused by environmental conditions or induced by the estimation of the position and/or velocity of the target to be tracked. In the second instance, a controller is placed to compensate the UAV dynamics; this is a controller that allows one to compensate the velocity errors that are produced by the dynamic effects of the UAV. In addition, the corresponding stability analysis of the sliding mode-based visual servo controller and the sliding mode dynamic compensation control is presented. The proposed control scheme employs the kinematics and dynamics of the robot by presenting a cascade control based on the same control strategy. In order to evaluate the proposed scheme for tracking moving targets, experimental tests are carried out in a semi-structured working environment with the hexarotor-type aerial robot. For detection and image processing, the OpenCV C++ library is used; the data are published in an ROS topic at a frequency of 50 Hz. The robot controller is implemented in the mathematical software Matlab. © 2024 by the authors.

Carvajal, C. P., Andaluz, V. H., Varela-Aldás, J., Roberti, F., Del-Valle-Soto, C., & Carelli R. (2024). Visual Servoing Using Sliding-Mode Control with Dynamic Compensation for UAVs' Tracking of Moving Targets. *Drones*, 8(12), Article 730. doi: 10.3390/drones8120730. Article.

Ramiro Velázquez Guerrero

SNII Level I

OPTIMIZATION OF VIBRATION CONTROL USING A HYBRID SCHEME WITH SLIDING-MODE AND POSITIVE POSITION FEEDBACK

ABSTRACT. This article presents the design of a nonlinear hybrid controller for an under-actuated Duffing oscillator with 2 degrees of freedom. The main control purpose is to reduce the frequency-response to specific resonant-frequencies while maintaining its robustness to external disturbances. The resulting hybrid controller uses sliding mode control (SMC) with a positive position feedback (PPF) scheme. This is structured such that the SMC provides system robustness and tracking, while the PPF allows damping specific resonant frequencies. The system was evaluated using frequency sweeps in terms of acceleration in the second degree of freedom. In this case, the control input is applied through the first degree of freedom. Moreover, multi-objective optimization is implemented to tune of the control parameters. Simulation results show that the system response to external vibrations can be reduced up to 83.88% by using the proposed PPF + SMC scheme. © 2023 John Wiley & Sons Ltd.

Enríquez-Zárate, J., Gómez-Peñate, S., Hernández, C., Villarreal-Valderrama, F., Velázquez, R., & Trujillo, L. (2023). Optimization of vibration control using a hybrid scheme with sliding-mode and positive position feedback. *Optimal Control Applications and Methods*, 45(3), 1030-1044. doi: 10.1002/oca.3086. Article.

SCHOOL OF FOOD BUSINESS MANAGEMENT

Mayeli Peralta Contreras

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Senior Researcher A, SNII Level I

SUSTAINABILITY OF THE AGRICULTURAL SECTOR IN MEXICO – COMPLIANCE OR NOT- WITH KEY UNITED NATIONS’ 17 SUSTAINABLE DEVELOPMENT GOALS: AGUASCALIENTES AS A CASE STUDY

ABSTRACT. Mexico is considered one of the most critical countries contributing to food production worldwide. However, Mexico needs help in agricultural practices and the pressure to optimize water usage. Considering that food production worldwide, directly and indirectly, relates to Goals 2, 4, 6, 7, 11, 12, and 15 of the United Nations’ 17 Sustainable Development Goals (SDGs) adopted in 2015, it is essential to address the challenges and pressure Mexico faces in its agricultural practices to optimize technical irrigation, access to land extension, and crop rotation usage. Some productive zones within central Mexico are called the Bajío Region, where Aguascalientes is located and the main focus of the current case study. This study aims to collect information to understand the main factors and challenges in the primary sector in this region. This study used a survey instrument to assess the actions of 54 farmers during the pandemic, to detect farmers’ technical needs, level of preparedness, water conservation knowledge, technology adaptability, and knowledge of the current public policy in Aguascalientes State. The data analyzed included; socioeconomic aspects, water and energy conservation, food processing awareness, and public policy perception. The results showed that participants could adjust public policies and use more technical training to build sustainable agricultural growth to the SDGs, and look for increased productivity within the representative crops in the

region. The significant challenges Aguascalientes face are, limited water resources, the incentive production mindset, and a more technology-intensive approach, as is needed in Northern Mexico as a region. The primary goal is to develop a more resilient agricultural system, and to find characteristics for small and medium-sized producers. The first step is to increase knowledge among the main actors in the primary sector regarding the potential technical barriers to increasing productivity. The study concluded that the socioeconomic background of agricultural entrepreneurs and their education level is essential to adopting technology for production to increase and strengthen food security for Aguascalientes. © (2024), (African Journal of Food). All rights reserved.

Domínguez-Soberanes, J., Mendoza-Moreno, M. A., De Feis, G. L., & Peralta-Contreras, M. (2024). Sustainability of the Agricultural Sector in Mexico – Compliance or not- with Key United Nations’ 17 Sustainable Development Goals: Aguascalientes As A Case Study. *African Journal of Food, Agriculture, Nutrition and Development*, 24(7), 26876-26884. doi: 10.18697/ajfand.132.24770. Article.

SCHOOL OF GOVERNMENT AND ECONOMICS

Abraham Martínez Hernández

Research Professor

HOPING FOR MORE: TOCQUEVILLE AND THE INSUFFICIENCY OF 'SELF-INTEREST WELL UNDERSTOOD'

ABSTRACT. Alexis de Tocqueville (1805–1859) was convinced that without a new possibility for transcendence, democracies would be ill-prepared to allow for actual freedom. In *Democracy in America*, his study of the United States, he explained that when self-interest was enlightened, individuals would tend to identify their personal benefits with the well-being of the community. By transcending their individualistic tendency to self-enclose, they would contribute to forming and maintaining a real sovereignty of the people. However, unless the “doctrine of self-interest well understood” was aided by a higher ideal, by itself it would eventually fall short, thus paving the way for new forms of despotism. Religion, and more specifically, reformed versions of Christianity, seemed to effectively elevate the outlook of the early Americans. As I will argue, however, Tocqueville ultimately held that those versions lacked the profundity and stability required to resist the strong materialistic and individualistic tendencies of people living in a democracy. Tocqueville’s apparent, if anxious-ridden, preference for Catholicism as the more adequate civil religion resonates with important aspects of Augustine’s theory of the Two Cities, the earthly and the heavenly city. For both Tocqueville and Augustine, the Roman Church’s stable doctrine was what could more successfully teach mankind the truth about their limited condition, hence making them more capable of learning the “art of being free.”. © 2023 International Society for the Study of European Ideas.

Martínez Hernández, A. (2023). Hoping for More: Tocqueville and the Insufficiency of 'Self-Interest Well Understood'. *European Legacy*, 29(1), 22-36. doi: 10.1080/10848770.2023.2259702. Article.

SCHOOL OF HEALTH SCIENCES

Vania Rocío Aldrete Cortez

SNII Level I

CARDIAC AUTONOMIC REGULATION AS A PROXY OF EARLY NEURODEVELOPMENT: A SYSTEMATIC REVIEW

ABSTRACT. Background: Cardiac autonomic regulation and early neurodevelopment are linked, but research has focused largely on specific domains, such as attention and memory, neglecting broad neurodevelopmental outcomes. The use of diverse study populations and methodologies further hinders interpretation, highlighting the need for more consistent, integrative research in this area. Therefore, the aim of this study was to clarify how cardiac autonomic regulation (as quantified by heart rate indices) is associated with global neurodevelopment in infancy through a systematic literature review. Method: A systematic literature search was carried out in the Scopus, PubMed, Web of Science, and ProQuest databases for studies published between January 1980 and December 2022. The search terms were a combination of words that included elements from three categories: 1) cardiac vagal regulation, 2) neurodevelopment indicators, and 3) population (neonate/infant). Results: Five studies involving 933 infants (48 % of whom were girls) and baseline evaluations from birth to 26 weeks of age were included. The findings were mixed: while some studies identified positive associations between parasympathetic activity and neurodevelopmental outcomes, others reported nonsignificant or inconsistent associations. The variability in study designs, measurement methods, and population characteristics likely contributed to these discrepancies. However, respiratory sinus arrhythmia (RSA) was the most commonly used indicator, and the highest percentage of studies reported significant associations between neurodevelopment and autonomous functioning (RSA

= 83 %, heart rate variability = 69 %), particularly when controlling for factors such as age and birthweight. Conclusions: Although autonomic regulation during the first years of life appears to be associated with neurodevelopment, the evidence is not entirely consistent across all heart rate indices or developmental domains. Further research is needed to better understand these relationships, particularly in light of the methodological differences and potential confounding factors. Recognizing individual differences in autonomic nervous system regulation could provide valuable insights into neurodevelopmental trajectories. © 2024.

Aldrete-Cortez, V., & Tafoya, S. A. (2024). Cardiac autonomic regulation as a proxy of early neurodevelopment: A systematic review. *Early Human Development*, 199, Review 106148. doi: 10.1016/j.earlhumdev.2024.106148. Review.

Mariana Estefanía Azcárraga Quiza

Research Professor

Stephanie Derive

Research Professor

IMPLEMENTATION OF AN ETHICS COMMITTEE IN A UNIVERSITY MENTAL HEALTH CLINIC

ABSTRACT. Mental disorders in university students are very frequent, therefore higher education institutions have established in-campus mental healthcare centres. These clinics have particular characteristics that differ from other mental health centres, as they report to and represent an educational institution, while at the same time looking after the interests and well-being of patients requesting assistance, thus generating unique bioethical conflicts. Ethics Committees are useful tools to offer support to mental health professionals in making ethical decisions. In order to respond to these issues, it was decided that an Ethics Committee would be created in the mental health clinic of a private university in Mexico City. This article describes the implementation process for this Committee, its duties and scope, as well as the case work and review methodology. A list of the most frequent ethical conflicts is attached, jointly with the ethical analysis of the cases treated throughout the year and a half or work by the Committee. © Journal of Bioethical Inquiry Pty Ltd. 2023.

Azcárraga, M., & Derive, S. (2023). Implementation of an Ethics Committee in a University Mental Health Clinic. *Journal of Bioethical Inquiry*, 27(1), 177-184. doi: 10.1007/s11673-023-10301-3. Article.

PHARMACOLOGICAL TREATMENTS AND THERAPEUTIC TARGETS IN MUSCLE DYSTROPHIES GENERATED BY ALTERATIONS IN DYSTROPHIN-ASSOCIATED PROTEINS

ABSTRACT. Muscular dystrophies (MDs) are a heterogeneous group of diseases of genetic origin characterized by progressive skeletal muscle degeneration and weakness. There are several types of MDs, varying in terms of age of onset, severity, and pattern of the affected muscles. However, all of them worsen over time, and many patients will eventually lose their ability to walk. In addition to skeletal muscle effects, patients with MDs may present cardiac and respiratory disorders, generating complications that could lead to death. Interdisciplinary management is required to improve the surveillance and quality of life of patients with an MD. At present, pharmacological therapy is only available for Duchene muscular dystrophy (DMD)—the most common type of MD—and is mainly based on the use of corticosteroids. Other MDs caused by alterations in dystrophin-associated proteins (DAPs) are less frequent but represent an important group within these diseases. Pharmacological alternatives with clinical potential in patients with MDs and other proteins associated with dystrophin have been scarcely explored. This review focuses on drugs and molecules that have shown beneficial effects, mainly in experimental models involving alterations in DAPs. The mechanisms associated with the effects leading to promising results regarding the recovery or maintenance of muscle strength and reduction in fibrosis in the less-common MDs (i.e., with respect to DMD) are explored, and other therapeutic targets that could contribute to maintaining the homeostasis of muscle fibers, involving different pathways, such as calcium regulation, hypertrophy, and maintenance of satellite cell function, are also examined. It is possible that some of the drugs explored here could be used to affordably improve the muscular function of patients until a definitive treatment for MDs is developed. © 2024 by the authors.

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Francisco Javier Estrada Mena

SNII Level II

Esmeralda Lira Romero

Research Professor

EVALUATION OF A PROTEOMICS-GUIDED PROTEIN SIGNATURE FOR BREAST CANCER DETECTION IN BREAST TISSUE

ABSTRACT. The distinction between noncancerous and cancerous breast tissues is challenging in clinical settings, and discovering new proteomics-based biomarkers remains underexplored. Through a pilot proteomic study (discovery cohort), we aimed to identify a protein signature indicative of breast cancer for subsequent validation using six published proteomics/transcriptomics data sets (validation cohorts). Sequential window acquisition of all theoretical (SWATH)-based mass spectrometry revealed 370 differentially abundant proteins between noncancerous tissue and breast cancer. Protein-protein interaction-based networks and enrichment analyses revealed dysregulation in pathways associated with extracellular matrix organization, platelet degranulation, the innate immune system, and RNA metabolism in breast cancer. Through multivariate unsupervised analysis, we identified a four-protein signature (OGN, LUM, DCN, and COL14A1) capable of distinguishing breast cancer. This dysregulation pattern was consistently verified across diverse proteomics and transcriptomics data sets. Dysregulation magnitude was notably higher in poor-prognosis breast cancer subtypes like Basal-Like and HER2 compared to Luminal A. Diagnostic evaluation (receiver operating characteristic (ROC) curves) of the signature in distinguishing breast cancer from noncancerous tissue revealed area under the curve (AUC) ranging from 0.87 to 0.9 with predictive accuracy of 80% to 82%. Upon stratifying, to solely include the Basal-Like/Triple-Negative subtype, the ROC AUC increased to 0.922-0.959 with predic-

tive accuracy of 84.2%-89%. These findings suggest a potential role for the identified signature in distinguishing cancerous from noncancerous breast tissue, offering insights into enhancing diagnostic accuracy. © 2024 American Chemical Society.

Moreno-Ulloa, A., Zárate-Córdova, V. L., Ramírez-Sánchez, I., Cruz-López, J. C., Pérez-Ortiz, A., Villarreal-Garza, C., Díaz-Chávez, J., Estrada-Mena, B., Antonio-Aguirre, B., López-Almanza, P. X., Lira-Romero, E., & Estrada-Mena, F. J. (2024). Evaluation of a Proteomics-Guided Protein Signature for Breast Cancer Detection in Breast Tissue. *Journal of Proteome Research*, 23(11), 4907-4923. doi: 10.1021/acs.jproteome.4c00295. Article.

Francisco Javier Estrada Mena

SNII Level II

NEUROLOGICAL RESTORATIVE EFFECTS OF (-)-EPICATECHIN IN A MODEL OF GULF WAR ILLNESS

ABSTRACT. Gulf War Illness (GWI) afflicts US military personnel who served in the Persian Gulf War. Suspect causal agents include exposure to pyridostigmine (PB), permethrin (PM) and N,N-diethyl-m-toluamide (DEET). Prominent symptoms include cognitive deficits, such as memory impairment. In aging animal models, we have documented the beneficial effect of the flavanol (-)-epicatechin (Epi) on hippocampus structure and related function. Using a rat model of GWI, we examined the effects of Epi on hippocampus inflammation, oxidative stress, mitochondrial dysfunction, cell death/survival pathways, and memory endpoints. Male Wistar rats underwent 3 weeks of exposure to either vehicles or DEET, PM, PB, and stress. Subgroups of GWI rats were then allocated to receive orally 15 days of either water (vehicle) or 1 mg/kg/day of Epi treatment. Object recognition tasks were performed to assess memory. Hippocampus samples were analyzed. Epi treatment yields significant improvements in short- and long-term memory versus GWI rats. Hippocampus oxidative stress and pro-inflammatory cytokine levels showed significant increases with GWI that were largely normalized with Epi becoming comparable to controls. Significant increases in markers of hippocampus neuroinflammation and cell death were noted with GWI and were also largely reduced with Epi. Neuronal survival

signaling pathways were adversely impacted by GWI and were partially or fully restored by Epi. Markers of mitochondrial function were adversely impacted by GWI and were fully restored by Epi. In conclusion, in an animal model of GWI, Epi beneficially impacts recognized markers of hippocampus neuroinflammation, oxidative stress, cell survival, neurotoxicity and mitochondrial function leading to improved memory. © Mary Ann Liebert, Inc., and Korean Society of Food Science and Nutrition.

Ramírez-Sánchez, I., Navarrete-Yáñez, V., Espinoza-Raya, J., Rubio-Gayosso, I.; Palma-Flores, C., Mendoza-Lorenzo, P., Ordoñez-Razo, R., Estrada-Mena, F. J., Ceballos, G., & Villarreal, F. (2024). Neurological Restorative Effects of (-)-Epicatechin in a Model of Gulf War Illness. *Journal of Medicinal Food*, 27(11), 1070-1079. doi: 10.1089/jmf.2023.0200. Article.

Guadalupe Janette Furuzawa Carballada

Research Professor

AUTOANTIGEN CHARACTERIZATION IN THE LOWER ESOPHAGEAL SPHINCTER MUSCLE OF PATIENTS WITH ACHALASIA

ABSTRACT. Background: Serum anti-myeenteric autoantibodies define autoimmune achalasia and tissue MMP-9 activity may locally process autoantigenic proteins in the muscle of the lower esophageal sphincter (LES) of achalasia patients. Methods: Biopsies of the LES muscle from 36 achalasia patients, 6 esophagogastric junction outflow obstruction (EGJO) patients, and 16 transplant donors (TD) were compared in a blind cross-sectional study. Histological characteristics such as inflammation, fibrosis, presence of ganglion cells, cells of Cajal, GAD65, PNMA2, S-100, P substance, and MMP-9 proteoforms in tissue were assessed by H&E and Picrosirius Red staining and immunohistochemistry analysis. Anti-neuronal antibodies, onconeural antigens, recoverin, SOX-1, titin, zic4, GAD65, and Tr were evaluated by immunoblot/line assay. Key Results: Tissue of achalasia patients had heterogeneous inflammatory infiltrates with fibrosis and contrasting higher levels of activated MMP-9, as compared with EGJO and TD. Moreover, lower ganglion cell percentages and cell of Cajal percentages were determined in esophageal tissues of achalasia patients versus TD. The tissues of achalasia versus EGJO patients had higher GAD65 and PNMA2 protein expression. Unexpectedly, these proteins were absent in TD tissue. S-100 and P substance had similar expression levels in tissues of achalasia patients versus TD and EGJO. Most of the achalasia sera had anti-GAD65 (83%) and anti-PNMA2 (90%) autoantibodies versus EGJO (17% and 33%, respectively) and healthy volunteers (10% and 0%, respectively). Conclusions and Inferences: Tissue-specific ectopic expression of GAD65 and PNMA2 and active MMP-9, associated with the presence of specific autoantibodies directed against these proteins, might participate in the pathophysiology of achalasia triggering and/or perpetuating autoimmune disease. © 2022 John Wiley & Sons Ltd.

Priego-Ranero, Á, Opendakker, G., Uribe-Uribe, N., Aguilar-León, D., Nuñez-Álvarez, C. A., Hernández-Ramírez, D. F., Olivares-Martínez,

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Víctor Hugo Gálvez Zúñiga

Research Professor

RESTING-STATE NETWORKS AND THEIR RELATIONSHIP WITH MOCA PERFORMANCE IN PD PATIENTS

ABSTRACT. Although mild cognitive impairment is a common non-motor symptom experienced by individuals with Parkinson's Disease, the changes in intrinsic resting-state networks associated with its onset in Parkinson's remain underexamined. To address the issue, our study sought to examine resting-state network alterations and their association with total performance in the Montreal Cognitive Assessment and its cognitive domains in Parkinson's by means of functional magnetic resonance imaging of 29 Parkinson's patients with normal cognition, 25 Parkinson's patients with mild cognitive impairment, and 13 healthy controls. To contrast the Parkinson's groups with each other and the controls, the images were used to estimate the Z-score coefficient between the regions of interest from the default mode network, the salience network and the central executive network. Our first finding was that default mode and salience network connectivity decreased significantly in Parkinson's patients regardless of their cognitive status. Additionally, default mode network nodes had a negative and salience network nodes a positive correlation with the global assessment in Parkinson's with normal cognition; this inverse relationship of both networks to total score was not found in the group with cognitive impairment. Finally, a positive correlation was found between executive scores and anterior and posterior cortical network connectivity and, in the group with cognitive impairment, between language scores and salience network connectivity. Our results suggest that specific resting-state networks of Parkinson's patients with cognitive impairment differ from those of Parkinson's patients with normal cognition, supporting the evidence that cognitive

impairment in Parkinson's Disease displays a differentiated neurodegenerative pattern. © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2024.

Gálvez, V., Romero-Rebollar, C., Estudillo-Guerra, M. A., & Fernandez-Ruiz, J. (2024). Resting-State Networks and their Relationship with MoCA Performance in PD Patients. *Brain Imaging and Behavior*, 18(13), 612-621. doi: 10.1007/s11682-024-00860-3. Article.

Víctor Hugo Gálvez Zúñiga

Research Professor

WHAT DOES IT MEAN TO MEASURE MIND PERCEPTION TOWARD ROBOTS? A CRITICAL REVIEW OF THE MAIN SELF-REPORT INSTRUMENTS

ABSTRACT. Although most studies that seek to measure participants' judgments and attitudes regarding humanoid robots' possessing (or appearing to possess) a mind or mental capacities have been based on verbal measures, there is yet no standard psychometric instrument for this end. Using a COSMIN approach, this critical review seeks to summarize the most valid and reliable self-report instruments that aim to measure mental state attribution to humanoid robots. 501 papers were reviewed, but only 11 were included, finding that: (1) The instruments do not usually measure mental state attribution toward robots as an exclusive phenomenon but as a factor associated with the tendency to anthropomorphize non-human entities; (2) There is a lack of consensus regarding a definition of mental state attribution and the psychometric dimensions that underlie it; (3) The tendency to anthropomorphize does not by itself imply the attribution of mind to robots. In our discussion, we delve into the general problem of mind perception/attribution and speculate on the possible theoretical basis for a multifactorial model for measuring mind perception as part of a broader phenomenon we term "psychedolia." © The Author(s), under exclusive licence to Springer Nature B.V. 2024.

Gálvez, V., & Hanono, E. (2024). What Does it Mean to Measure Mind Perception toward Robots? A Critical Review of the Main Self-Report Instruments. *International Journal of Social Robotics*, 16(3), 501-511. doi: 10.1007/s12369-024-01113-5. Article.

Desiderio Salomón Hernández Gutiérrez

SNII Level I

NF-κB SIGNALING BLOCKADE BY BAY 11-7085 DURING EARLY CARDIAC MORPHOGENESIS INDUCES ALTERATIONS OF THE OUTFLOW TRACT IN CHICKEN HEART

ABSTRACT. Nuclear factor κB (NF-κB) is a pleiotropic transcription factor implicated in the regulation of diverse morphologic cardiac alterations, for which the p50 and p65 subunits form the most prevalent dimeric form in the heart. NF-κB is inactivated by proteins of the IκB family, which trap it in the cytoplasm. It is not known whether NF-κB influences cardiac development. Objective: Here we investigated the role of NF-κB in regulating transcription in chicken heart morphogenesis. Specifically, we tested whether NF-κB activation is required for normal formation of the outflow tract (OFT) during a critical stage of heart development. Methods and results: We designed a reporter vector with κB binding sites for Rel family members in the promoter, upstream from the cDNA of Green Fluorescent Protein (GFP). This construct was injected directly into the developing heart of chicken embryos. NF-κB activation was subsequently inhibited by administration of the specific pharmacological agent Bay 11-7085. We found that forced NF-κB expression was associated with multiple congenital cardiac alterations of the OFT (mainly IVC, DORV and great arteries stenosis). Conclusion: These findings indicate that blockade of NF-κB induces apoptosis and is an important factor in the development of OFT during cardiogenesis. However, it remains unknown which members of the Rel family are relevant in this process. © Springer Science + Business Media, LLC 2006.

Hernández-Gutiérrez, S., García-Peláez, I., Zentella-Dehesa, A., Ramos-Kuri, M., Hernández-Franco, P., Hernández-Sánchez, F., & Rojas, E. (2006). NF-κB Signaling Blockade by Bay 11-7085 During Early Cardiac Morphogenesis Induces Alterations of the Outflow Tract in Chicken Heart. *Apoptosis*, 11(7), 1101-1109. doi: 10.1007/s10495-006-6984-z. Article.

Irina Elizabeth Juárez Muñóz

Research Professor

SEX/GENDER ANALYSIS IN THE LEARNING/TEACHING OF MEDICINE. THE CASE OF CARDIOVASCULAR DISEASE

ABSTRACT. Objective: To analyze on the relevance of incorporating sex/gender analysis in the teaching/learning of medicine in Mexico. Development: Cardiovascular diseases are used as a referent because of the persistence of gender biases in medical attention three decades after the first reports. We performed a narrative review to identify teaching institutions that have incorporated gender perspective in college curricula. Results: We found recent reports that show that gender biases are still reproduced in the health care of cardiovascular diseases. Based on this narrative review, efforts by institutions from around the world to incorporate sex/ gender analysis in professional education are highlighted, classifying them in: 1) advantages, recommendations and obstacles, 2) interventions and programs. Discussion: Challenges that need to be overcome to incorporate gender perspective in health education are related to organizational and personal aspects. The different initiatives and successful programs center around the advantages of educating professionals who are conscious of gender and capable of establishing effective communication with the diverse social actors when taking into account the interaction between sex/gender and other Social Determinants of Health. Conclusion: In Mexico, it is necessary to work towards including sex/gender analysis in medical education, because it provides a broader perspective, better science and results in adequate and effective health care for every person. © 2021, Universidad Nacional Autónoma de Mexico. All rights reserved.

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Mario Isaac
Lumbreras Márquez
Research Professor

CUMULATIVE SUM LEARNING CURVE FOR CORDOCENTESIS AMONG MATERNAL-FETAL MEDICINE FELLOWS IN A LOW-COST SIMULATION MODEL

ABSTRACT. Objective: To determine the individual learning curves for cordocentesis in a low-cost simulator for maternal-fetal medicine (MFM) fellows. Methods: This observational, descriptive, educational, and prospective study was performed from July through November 2022. After an introductory course based on a standardized technique for cordocentesis, each second-year MFM fellow who accepted to participate in the study performed this procedure using a low-cost simulation model, and experienced operators supervised the cordocenteses. Learning curves were then created using cumulative sum analysis (CUSUM). Results: Seven second-year MFM fellows with no previous experience in cordocentesis accepted to participate in the study. A total of 2676 procedures were assessed. On average, residents performed 382 ± 70 procedures. The mean number of procedures to achieve proficiency was 369 ± 70 , the overall success rate was 84.16%, and the corresponding failure rate was 15.84%. At the end of the study, all fellows were considered competent in cordocentesis. One fellow required 466 attempts to achieve competency, performing a total of 478 procedures, but the resident with the fewest attempts to reach competency required 219 procedures, completing 232 procedures. Some of the most frequent reasons for failed attempts included not reaching the indicated point for vascular access (20.99%) and being unable to retrieve the sample (69.10%). Conclusion: CUSUM analysis to assess learning curves, in addition to using low-cost simulation models, helped to appraise individualized learning, allowing an objective demonstration of competency for cordocentesis among MFM fellows. © 2024 International Federation of Gynecology and Obstetrics.

Pérez-Estrada, B. A., Acevedo-Gallegos, S., Lumbreras-Márquez, M. I., Gardner, R., Gallardo-Gaona, J. M. (2024). Cumulative Sum Learning Curve for Cordocentesis Among Maternal-Fetal Medicine Fellows in a Low-Cost Simulation Model. *International Journal of Gynecology and Obstetrics*, 167(2), 625-630. doi: 10.1002/ijgo.15611. Article.

Mario Isaac
Lumbreras Márquez
Research Professor

LABOR ANALGESIA INITIATION WITH DURAL PUNCTURE EPIDURAL VERSUS CONVENTIONAL EPIDURAL TECHNIQUES: A RANDOMIZED BIASED-COIN SEQUENTIAL ALLOCATION TRIAL TO DETERMINE THE EFFECTIVE DOSE FOR 90% OF PATIENTS OF BUPIVACAINE

ABSTRACT. Background: The dural puncture epidural (DPE) technique has a faster onset, better sacral spread, and improved bilateral coverage when compared to the conventional epidural (EPL) technique. Whether these qualities translate into a lower bupivacaine dose to provide initial analgesia is unknown. We sought to determine the effective dose of bupivacaine to achieve initial (first 30 minutes) labor analgesia in 90% of patients (ED90) with the DPE and EPL techniques, using a biased-coin, sequential allocation method. Methods: A total of 100 women of mixed parity with term, singleton gestation at ≤ 5 cm dilation with no major comorbidities were randomized to receive a DPE or an EPL technique. An experienced anesthesiologist performed these techniques and administered an allocated dose of plain bupivacaine diluted with isotonic sterile 0.9% saline to a total volume of 20 mL via the EPL catheter. Bupivacaine doses for each subject were determined by the response of the previous subject, using a biased-coin sequential allocation method, with success defined by a numeric rating scale (NRS) < 3 at 30 minutes. Outcome assessments were performed by an investigator blinded to the technique and bupivacaine dose. Sensory and motor blockade and maternal or fetal side effects were recorded every 5 minutes for the first 30 minutes. The ED90 of bupivacaine with each technique was estimated using centered isotonic regression. Results: A total of 95 women were included in the final analysis. The ED90 of bupivacaine was estimated at 29.30 mg (90% confidence interval [CI], 28.55-31.56) with a DPE technique and 45.25 mg (90% CI, 42.80-52.03) with an EPL technique. Conclusions: Using a biased-coin, sequential allocation method, the DPE technique requires less bupivacaine to achieve effective initial analgesia (ED90) when compared to the EPL

technique. © 2024 Lippincott Williams and Wilkins. All rights reserved.

Maeda, A., Villela-Franyutti, D., Lumbreras-Márquez, M. I., Murthy, A., Fields, K. G., Justice, S., & Tsen, L. C. (2024). Labor Analgesia Initiation with Dural Puncture Epidural Versus Conventional Epidural Techniques: A Randomized Biased-Coin Sequential Allocation Trial to Determine the Effective Dose for 90% of Patients of Bupivacaine. *Anesthesia and Analgesia*, 138(6), 1205-1214. doi: 10.1213/ANE.0000000000006691. Article

Mario Isaac
Lumbreras Márquez
Research Professor

PLACENTAL PATHOLOGY LESIONS: INTERNATIONAL SOCIETY FOR ULTRASOUND IN OBSTETRICS AND GYNECOLOGY VS SOCIETY FOR MATERNAL-FETAL MEDICINE FETAL GROWTH RESTRICTION DEFINITIONS

ABSTRACT. Background: Research on the definition of fetal growth restriction (FGR) has focused on predicting adverse perinatal outcomes. A significant limitation of this approach is that the individual outcomes of interest could be related to the condition and the treatment. Evaluation of outcomes that reflect the pathophysiology of FGR may overcome this limitation. Objective: To compare the diagnostic performance of the FGR definitions established by the International Society for Ultrasound in Obstetrics and Gynecology (ISUOG) and the Society for Maternal-Fetal Medicine (SMFM) to predict placental histopathological findings associated with placental insufficiency and a composite adverse neonatal outcome (ANeO). Study Design: In this retrospective cohort study of singleton pregnancies, the ISUOG and the SMFM guidelines were used to identify pregnancies with FGR and a corresponding control group. The primary outcome was the prediction of placental histopathological findings associated with placental insufficiency, defined as lesions associated with maternal vascular malperfusion (MVM). A composite ANeO (ie, umbilical artery pH ≤ 7.1 , Apgar score at 5 minutes ≤ 4 , neonatal intensive care unit admission, hypoglycemia, respiratory distress syndrome requiring mechanical ventilation, intrapartum fetal distress requiring expedited delivery, and perinatal death) was investigated as a secondary outcome.

Sensitivity, specificity, positive and negative predictive values, and the areas under the receiver-operating-characteristics curves were determined for each FGR definition. Logistic regression models were used to assess the association between each definition and the studied outcomes. A subgroup analysis of the diagnostic performance of both definitions stratifying the population in early and late FGR was also performed. Results: Both societies' definitions showed a similar diagnostic performance as well as a significant association with the primary (ISUOG adjusted odds ratio 3.01 [95% confidence interval 2.42, 3.75]; SMFM adjusted odds ratio 2.85 [95% confidence interval 2.31, 3.51]) and secondary outcomes (ISUOG adjusted odds ratio 1.95 [95% confidence interval 1.56, 2.43]; SMFM adjusted odds ratio 2.12 [95% confidence interval 1.70, 2.65]). Furthermore, both FGR definitions had a limited discriminatory capacity for placental histopathological findings of MVM and the composite ANeO (area under the receiver-operating-characteristics curve ISUOG 0.63 [95% confidence interval 0.61, 0.65], 0.59 [95% confidence interval 0.56, 0.61]; area under the receiver-operating-characteristics SMFM 0.63 [95% confidence interval 0.61, 0.66], 0.60 [95% confidence interval 0.57, 0.62]). Conclusion: The ISUOG and the SMFM FGR definitions have limited discriminatory capacity for placental histopathological findings associated with placental insufficiency and a composite ANeO. © 2024 The Author(s).

Rodríguez-Sibaja, M. J., López-Díaz, A. J., Valdespino-Vazquez, M.Y., Acevedo-Gallegos, S., Amaya-Guel, Y., Camarena-Cabrera, D. M., & Lumberras-Márquez, M. I. (2024). Placental Pathology Lesions: International Society for Ultrasound in Obstetrics and Gynecology vs Society for Maternal-Fetal Medicine fetal growth restriction definitions. *American Journal of Obstetrics and Gynecology MFM*, 6(8), Article 101422. doi: 10.1016/j.ajogmf.2024.101422. Article.

Mario Isaac
Lumberras Márquez
Research Professor

SECOND-LINE UTEROTONICS FOR UTERINE ATONY: A RANDOMIZED CONTROLLED TRIAL

ABSTRACT. Objective: To evaluate the comparative efficacy of two of the most commonly used second-line uterotonics - methylergonovine maleate and carboprost tromethamine. Methods: We conducted a double-blind randomized trial at two large academic perinatal centers in patients undergoing nonemergency cesarean delivery with uterine atony refractory to oxytocin, as diagnosed by the operating obstetrician. The intervention included administration of a single dose of intramuscular methylergonovine or carboprost intraoperatively at diagnosis. The primary outcome, uterine tone on a 0-10 numeric rating scale 10 minutes after study drug administration, was rated by operating obstetricians blinded to the drug administered. Secondary outcomes included uterine tone score at 5 minutes, administration of additional uterotonic agents, other interventions for uterine atony or hemorrhage, quantitative blood loss, urine output, postpartum change in serum hematocrit, transfusion, length of hospital stay, adverse drug or transfusion reactions, and postpartum hemorrhage complications. A sample size of 50 participants per group was planned to detect a 1-point difference (with estimated within-group SD of 1.5) in the mean primary outcome with 80% power at a two-sided α level of 0.05 while accounting for potential protocol violations. Results: A total of 1,040 participants were enrolled, with 100 randomized to receive one of the study interventions. Mean $\pm$ SD 10-minute uterine tone scores were 7.3 ± 1.7 after methylergonovine and 7.6 ± 2.1 after carboprost, with an adjusted difference in means of -0.1 (95% CI, -0.8 to 0.6, $P = .76$). Additional second-line uterotonics were required in 30.0% of the methylergonovine arm and 34.0% in the carboprost arm (adjusted odds ratio 0.72, 95% CI, 0.27-1.89, $P = .505$), and geometric mean quantitative blood loss was 756 mL (95% CI, 636-898) and 708 mL (95% CI, 619-810) (adjusted ratio of geometric means 1.06, 95% CI, 0.86-1.31, $P = .588$), respectively. No differences were detected in the

occurrence of other interventions for uterine atony or postpartum hemorrhage. Conclusion: No difference was detected in uterine tone scores 10 minutes after administration of either methylergonovine or carboprost for refractory uterine atony, indicating that either agent is acceptable. © 2024 by the American College of Obstetricians and Gynecologists. Published by Wolters Kluwer Health, Inc. All rights reserved.

Cole, N. M., Kim, J. J., Lumberras-Márquez, M. I., Fields, K. G., Mendez-Pino, L., Farber, M. K., Carusi, D. A., Toledo, P., & Bateman, B. T. (2024). Second-Line Uterotonics for Uterine Atony: A Randomized Controlled Trial. *Obstetrics and Gynecology*, 144(6), 832-841. doi: 10.1097/AOG.0000000000005744. Article.

Mario Isaac
Lumberras Márquez
Research Professor

UTERUS TRANSPLANTATION: A SCOPING REVIEW FOCUSED ON OBSTETRIC OUTCOMES

ABSTRACT. Background: Congenital uterine anomalies include a wide diversity of uterine malformations that can compromise reproductive potential. Uterus transplantation (UTx) proposes an innovative treatment for absolute uterine factor infertility; however, there is a lack of standardized protocols to guide clinical management among this population. Objectives: To describe recipient and donor characteristics and obstetric outcomes in patients undergoing UTx. Search Strategy: We performed a literature search using the PubMed database to retrieve available scientific articles. We analyzed the references of included articles to assess additional articles that could be eligible to be included in the review. Likewise, we identified further studies using other methods, including Google Scholar. Selection Criteria: Titles and abstracts were screened in duplicate to select original reports with information available for the outcomes of interest. Data Collection and Analysis: This review assessed the advantages and disadvantages of the techniques used, patient characteristics, obstetric and non-obstetric complications, functional duration of the organ, and neonatal outcomes. Main Results: Among the 36 reports included in this review we found 55 pregnancies and

38 live births following UTx and a higher success rate for in vivo uterine donations. The most common obstetric complications reported included miscarriage, pre-eclampsia, and gestational hypertension. The most common non-obstetric complications reported include episodes of rejection, acute kidney injury, anemia, and cholestasis. Living donors required a comprehensive preoperative workup, decreasing organ rejection, infection, and vascular complications. Conclusions: More studies are needed to standardize the UTx procedure and improve obstetric, fetal, and neonatal outcomes. Further understanding of which recipient and donor characteristics minimize complications will significantly decrease the risk of adverse outcomes. © 2024 International Federation of Gynecology and Obstetrics.

Barragan-Wolff, M., Espinosa-Cervantes M.S., Acevedo-Gallegos, S., Rodriguez-Sibaja, M. J., Lumberras-Márquez, M. I., & Ito-Esparza, M. J. (2024). Uterus Transplantation: A Scoping Review Focused on Obstetric Outcomes. *International Journal of Gynecology and Obstetrics*, 167(3), 921-933. doi: 10.1002/ijgo.15752. Article.

Mario Isaac Lumberras Márquez
Research Professor

WHOLE BLOOD VISCOELASTIC TESTING PROFILE AND MORTALITY IN PATIENTS HOSPITALIZED WITH ACUTE COVID-19 PNEUMONIA: A SYSTEMATIC REVIEW AND META-ANALYSIS

ABSTRACT. Background: Several studies have evaluated the possible association between whole blood viscoelastic testing (VET) parameters in patients hospitalized for acute Coronavirus disease 2019 (COVID-19) pneumonia and mortality. A few studies found no significant differences between survivors and non-survivors, though other studies identified potential predictors of COVID-19-related mortality. We conducted a systematic review and meta-analysis of the literature to evaluate the possible association between standard thromboelastometry/graphy parameters and mortality in patients hospitalized for acute COVID-19 pneumonia. Methods: Relevant studies were searched through MEDLINE, EMBASE, and Google Scholar from their inception until 15th June 2023. We aimed to identify

any study including: i) adults admitted to intensive care units (ICU) or medicine wards (MW) for acute COVID-19 pneumonia; ii) viscoelastic testing; iii) mortality. Results: We included 13 studies: nine prospective and four retrospective, 231 (30.4 %) non-survivors and 528 (69.6 %) survivors. Mortality rates ranged from 12.8 % to 67.5 %. The studies using the TEG apparatus found a significant difference in K time in the Kaolin test among survivors vs. non-survivors (mean difference [MD] 0.20, 95 % confidence interval [CI] 0.12, 0.28, I2 0%). The studies using the rotational thromboelastometry apparatus found a significant difference in CT-INTEM (MD -17.14, 95 % CI -29.23, -5.06, I2 0%) and LI60-EXTEM (MD -1.00, 95 % CI -1.00, -1.00, I2 0%) assays among survivors vs. non-survivors. Conclusion: We identified no specific hypercoagulable or hypocoagulable profile associated with mortality in patients with COVID-19-related pneumonia. Large prospective studies are needed to explore the possible prognostic role of VET in this subset of patients. © 2023 The Authors

Spiezia, L., Campello, E., Simioni, P., Lumberras-Márquez, M. I. (2024). Whole Blood Viscoelastic Testing Profile and Mortality in Patients Hospitalized With Acute COVID-19 Pneumonia: A Systematic Review and Meta-Analysis. *Thrombosis Research*, 234(21-31). doi: 10.1016/j.thromres.2023.12.009. Article.

Gregorio Tomás Obrador Vera

SNII Level III

CONSERVATIVE KIDNEY MANAGEMENT AND KIDNEY SUPPORTIVE CARE: CORE COMPONENTS OF INTEGRATED CARE FOR PEOPLE WITH KIDNEY FAILURE

ABSTRACT. Integrated kidney care requires synergistic linkage between preventative care for people at risk for chronic kidney disease and health services providing care for people with kidney disease, ensuring holistic and coordinated care as people transition between acute and chronic kidney disease and the 3 modalities of kidney failure management: conservative kidney management, transplantation, and dialysis. People with kidney failure have many supportive care needs throughout their illness, regardless of treatment modality. Kidney supportive care is therefore a vital part of this integrated framework, but is nonexistent, poorly developed, and/or poorly integrated with kidney care in many settings, especially in low- and middle-income countries. To address this, the International Society of Nephrology has (i) coordinated the development of consensus definitions of conservative kidney management and kidney supportive care to promote international understanding and awareness of these active treatments; and (ii) identified key considerations for the development and expansion of conservative kidney management and kidney supportive care programs, especially in low resource settings, where access to kidney replacement therapy is restricted or not available. This article presents the definitions for conservative kidney management and kidney supportive care; describes their core components with some illustrative examples to highlight key points; and describes some of the additional considerations for delivering conservative kidney management and kidney supportive care in low resource settings. © 2023 International Society of Nephrology

Davison, S. N., Pommer, W., Brown, M. A., Douglas, C. A., Gelfand, S. L., Gueco, I. P., Hole, B. D., Homma, S., Kazancioğlu, R. T., Kitamura, H., Koubar, S. H., Krause, R., Li, K. C., Lowney, A. C., Nagaraju, S. P., Niang, A., Obrador, G. T., Ohtake, Y., Schell, J. O., Scherer, J. S., Smyth, B., Tamba, K., Vallath, N., Wearne, N., Zakharova, E., Zúñiga, C., & Brennan, F.P. (2024). Conservative Kidney Management and Kidney Supportive Care: Core Components of Integrated Care for People With Kidney Failure. *Kidney International*, 105(1), 35-45. doi: 10.1016/j.kint.2023.10.001. Review.

TOTAL GESTATIONAL WEIGHT GAIN IS EXPLAINED BY LEPTIN AND BODY FAT, REGARDLESS OF PRE-PREGNANCY BODY MASS INDEX AND OTHER ADIPOKINES, IN MEXICAN ADOLESCENTS

ABSTRACT. Pre-pregnancy body mass index (pBMI) is a predictor of gestational weight gain (GWG). However, other factors, such as adipokines and inflammation markers, may also be associated with GWG. The aim of the study was to determine the association of leptin, adiponectin, irisin, and C-reactive protein, with GWG in adolescents. A longitudinal study was conducted from 2018 to 2023 in adolescents with a clinically healthy pregnancy. The assessments included socio-demographic and clinical data, pBMI, percent of body fat, serum concentrations of leptin, adiponectin, irisin, and high-sensitivity C-reactive protein (hsCRP), and total GWG adequacy. Cox regression models were performed, the outcome variables were inadequate and excessive GWG. In 198 participants, being overweight/obesity was marginally associated with a protective effect against inadequate GWG (HR = 0.44, 95%CI = 0.18-1.06), regardless of maternal characteristics and adipokines. Leptin (HR = 1.014, 95%CI = 1.008-1.021), and body fat percent (HR = 1.11, 95%CI = 1.05-1.17) were associated with a higher risk of excessive GWG, independent of other maternal variables such as pBMI, while adiponectin was associated with a lower risk. These findings suggest that, in Mexican adolescents, adipose tissue and its adipokines during pregnancy may play a more significant role in the final GWG than body weight. © 2024 by the authors.

Chico-Barba, G., Sámano R., Martínez-Rojano, H., Morales-Hernández, R. M., Barrientos-Galeana, E., Luna-Hidalgo, A., Kaufer-Horwitz, M., Obrador, G. T., Villa-Romero, A. R. (2024). Total Gestational Weight Gain Is Explained by Leptin and Body Fat, Regardless of Pre-Pregnancy Body Mass Index and Other Adipokines, in Mexican Adolescents. *Nutrients*, 16(13), Article 2147. doi: 10.3390/nu16132147. Article.

THE SECRETS OF THE TÜBINGEN CASTLE KITCHEN: FRIEDRICH MIESCHER AND THE DISCOVERY OF NUCLEIN, THE CORNERSTONE OF DNA

ABSTRACT. In 1869, Friedrich Miescher, born in Basel, Switzerland, discovered a previously unknown phosphorus-rich substance in the nuclei of pus cells. Conducting his research in a laboratory set up in the kitchen of Tübingen's medieval castle in Germany, and under the guidance by Professor Felix Hoppe-Seyler, Miescher primarily focused on the composition of cell nuclei. He obtained nuclear material by washing pus cells from surgical bandages provided by a nearby hospital. In 1869, Miescher described a completely new nuclear molecule that, unlike proteins, contained large amounts of phosphorus. He named this substance 'nuclein,' marking the first description of DNA. Miescher passed away long before Watson, Crick, Wilkins, and Franklin announced the precise role DNA played in cells in 1953. Through his discovery, Miescher laid the groundwork for all subsequent DNA research.

Ortiz-Hidalgo, C (2024). The Secrets of the Tübingen Castle Kitchen: Friedrich Miescher and the Discovery of Nuclein, the Cornerstone of DNA. *Gaceta Medica de México*, 160(3), 465-471. doi: 10.24875/GMM.24000213. Article.

COMPLEX THINKING IN MEDICAL EDUCATION: AN UNAVOIDABLE CHALLENGE IN THE FACE OF THE COVID-19 PANDEMIC

ABSTRACT. In the face of the COVID-19 pandemic crisis, the medical education must be transformed in order to help build an innovative clinical practice. On the way forward, is essential the development of the principles of complex thinking, which induce: look at the interactions of the elements underlying the emergency, practice interprofessional work, live authentic human relationships with the patient, investigate the multi-inter-dimensionality of phenomena, articulate the clinical care of the individual with the context of the health system. Therefore, medical schools have the in-escapable challenge of training students capable of think and act from perspective of complexity, integrating such principles. Faced with the disruption that the pandemic causes in teaching activities in universities and hospitals, technology and didactic basis are decisive to build virtual classrooms, however, the paradigm of complexity must permeate academic tasks. It is fundamental to implement complex thinking experiences, so that students learn to approach systemically to health - disease problems, to navigate amidst the uncertainty, and to be co-creators of a reality, in which the qualities of individual, local and global health and well-being are manifested. © 2020, Universidad Nacional Autonoma de Mexico. All rights reserved.

Servín Hernández, D. (2020). Complex Thinking in Medical Education: An Unavoidable Challenge in the Face of the COVID-19 Pandemic. *Investigación en Educación Médica*, 9(36), 87-95. doi: 10.22201/fm.20075057e.2020.36.20268. Article.

Lourdes Velázquez González

SNII Level II

Evandro Agazzi

SNII emeritus

A SYSTEMIC APPROACH TO BIOETHICS OF THE ENVIRONMENT AND COMPLEXITY

ABSTRACT. General system theory offers a conceptual and methodological framework for integrating bioethical considerations into environmental and ecological decision-making, clearly and effectively framing many problems and situations that are usually presented using ordinary language. A system is an internally structured entity characterised by certain specific properties and functions. This unit is related to several of its parts which are also systems and are therefore its subsystems. In turn, each system is part (i.e., subsystem) of higher-order systems. All these systems and subsystems are connected by relationships in such a way that each system is characterised by its specific properties, which, in addition, result from the correlations that link them to their subsystems and higher-order systems. Within this general architecture, concepts such as environment and complexity as well as emergence, with all the problems concerning the limits of predictive possibilities, are easily inscribed, showing that traditional deterministic approaches in science are insufficient to manage such complexity. The paper addresses the challenges posed by unpredictability in complex systems, critiquing fatalistic views that either optimistically or pessimistically accept the uncontrollable nature of technological and ecological developments. It is precisely the unpredictability of a complex system like the environment that necessitates a bioethical dimension to guide the values underlying our decision-making concerning life itself.

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Velázquez, L., & Agazzi, E. (2024). A Systemic Approach to Bioethics of the Environment and Complexity. *Revista Guillermo de Ockham*, 22(2), 135-145. doi: 10.21500/22563202.6972. Article.

CONSTITUTIONAL CONTROL IN THE "JUICIO DE AMPARO". CRITICAL STUDY OF THE CONTRADICTION OF THESIS 351/2014

ABSTRACT. In the contradiction of thesis 351/2014, the Mexican Supreme Court of Justice ruled that all the federal judges must perform constitutional review in the "juicio de amparo directo e indirecto", with respect to the laws applied in the claimed act and not only with respect to the procedural laws that are competent to apply. With this decision, constitutional control in the juicio de amparo has been expanded, raising the level of effectiveness of this constitutional process for the appropriate protection of human rights. © 2024 Universidad Nacional Autonoma de Mexico. All rights reserved.

Acuña, J. M. (2024). Constitutional control in the "juicio de amparo". Critical study of the Contradiction of Thesis 351/2014. *Cuestiones Constitucionales*, 25(51), Article e17505. doi: 10.22201/ijj.24484881e.2024.51.17505. Article.

THE IMPACT OF THE CONVENTIONALITY CONTROL DOCTRINE IN THE MEXICAN DECENTRALIZED SYSTEM OF JUDICIAL REVIEW

ABSTRACT. This article critically analyzes the transformation process of the Mexican system of judicial review of constitutionality and conventionality and its adaptation to the Inter American system of decentralized control of conventionality, after the internalization of the doctrine of conventionality control of the Inter American Court of Human Rights. Based on a conceptual analysis of the term decentralized, its correct meaning and the forms of judicial review required of the judges of a decentralized system are identified, in order to accurately evaluate the scope of the changes in the Mexican system of judicial review. It is postulated that the changes not only implied extending judicial review duties to local judges previously excluded from review activity, but also the need to adapt the constitutional processes at the federal level, specifically the juicio de amparo, to adapt it to the demands of the conventionality control doctrine to the extension to forms of incidental control with respect to new controllable objects. © 2024, Universidade Federal do Parana. All rights reserved.

Acuña, J. M. (2024). The impact of the conventionality control doctrine in the Mexican decentralized system of judicial review. *Revista de Investigações Constitucionais*, 11(3), Article e270. doi: 10.5380/rinc.v11i3.93254. Article.

INDIGENOUS PERSONS ON TELEVISION: THEIR NON-DISCRIMINATION AND SOCIETY'S RIGHT TO INFORMATION

ABSTRACT. Society's diversity must be present in the media in a democratic system. The importance for Indigenous people to have their own media has been highlighted, nonetheless, this article argues and holds that the absence or scarce participation of indigenous persons in non-indigenous media is a type of discrimination that also threatens society's right to information. Also, this article presents the results obtained in this research regarding the recording of the presence and participation of indigenous persons in news and current affairs debate programs in Mexican broadcast television which evidence that: no indigenous person is a presenter; only in 0.79% of the current affairs programs indigenous persons were invited and it was to talk about a subject of native people; no commercial advertisement included an indigenous; the governmental advertisements only included indigenous with a leading role in 0.66% and the TV station own advertisements did it on 0.23%. The existence of a legal framework in Mexico of constitutional, legal and international treaties provisions in connection with media and indigenous people has been insufficient for broadcasters to portray the Mexican nation's diversity and pluriculturality. Consequently, this article urges for indigenous voices to be heard in non-indigenous media and upon any subject, if not, society's right to information is infringed, it represents a discrimination for excluding indigenous and it has negative implications for democratic debate. © 2023, Universidad Nacional Autonoma de Mexico. All rights reserved.

Álvarez, C. L. (2023). Indigenous Persons on Television: Their Non-Discrimination and Society's Right to Information. *Revista de Estudios en Derecho a la Información*, 2023(16), 3-34. doi: 10.22201/ijj.25940082e.2023.16.18069. Article.

Clara Luz Álvarez
González de Castilla

Senior Researcher D, SNII Level III

STANDARD FOR TRIGGERING THE OBLIGATION TO COMMUNICATE UPON SIGNIFICANT CYBER INCIDENTS IN PUBLIC INSTITUTIONS

ABSTRACT. Public institutions are constantly affected by cyber incidents capable of affecting critical infrastructure and the exercise of citizens' rights. Informing the citizens of every cyber incident would be unfeasible, therefore a standard is proposed to decide in which cases a cyber incident in a public institution must be communicated to society, and how they should be made aware in order to comply with the right to information. For this reason, the Mexican legal framework regarding cybersecurity and the right to information is presented, and thus sustaining the argument against considering public attribution of cyberattacks as a substitute to the obligation to inform society. Finally, emblematic cyber incidents in Mexican public institutions are analyzed according to the proposed standard. © 2022 Universidad de Chile. All rights reserved.

Álvarez, C. L. (2022). Standard for triggering the obligation to communicate upon significant cyber incidents in public institutions. *Revista Chilena de Derecho y Tecnología*, 11(2), 183-210. doi: 10.5354/0719-2584.2022.65502. Article.

Clara Luz Álvarez
González de Castilla

Senior Researcher D, SNII Level III

José María Soberanes Díez

Senior Researcher B, SNII Level II

THE CONTENT OF THE RIGHT TO INTERNET ACCESS

ABSTRACT. The right to Internet access has an essential content that must be guaranteed, because its breach implies the non-compliance of other human rights. Determining the minimum content of the right to Internet access is fundamental to assess the degree of its compliance, even though it is an open and dynamic concept that depends on technological evolution and the country's content. First, we refer to broadband, Internet access and digital divides. Then, we delve into the essential content of the right to Internet access both as negative obligations and positive obligations. Regarding positive obligations, we analyze in depth the characteristics of availability, accessibility, acceptability and adaptability of the right to Internet access. © 2025 Universidad Nacional Autónoma de México. All rights reserved.

Álvarez, C. L., & Díez, J. M. S. (2025). The content of the right to Internet access. *Cuestiones Constitucionales*, 26(52), Article e19375. doi: 10.22201/ijj.24484881e.2025.52.19375. Article.

Fernando Batista Jiménez

SNII Level I

HUMAN DIGNITY: BETWEEN UNIVERSALITY AND CULTURAL DIVERSITY

ABSTRACT. The current multiculturalist phenomenon has raised a relevant debate in the field of study of human rights: their universality vis-a-vis cultural diversity. The main purpose of this paper is to reflect from an ius-philosophical perspective on how to reconcile these aspects in the light of human dignity. To this end, it analyzes the basis of the universality of human rights in order to determine that these are not mere cultural constructions. It delves into the study of human dignity and cultural identity in order to establish that the protection of identities is a human right stemming from it. Additionally, it dissects the various implications that derive from their reconciliation. Ultimately, it is concluded that it is not only feasible, but also indispensable to reconcile the universality of rights and cultural diversity to enable dialogue between cultures and increase the solidarity associated with human rights. © 2023, Universidad Nacional Autónoma de México. All rights reserved.

Batista, F. (2023). Human dignity: between universality and cultural diversity. *Boletín Mexicano de Derecho Comparado*, 56(167), 33-50. doi: 10.22201/ijj.24484873e.2023.167.18535. Article.

REFORM TO THE ARTICLE 80. OF THE FEDERAL CINEMATOGRAPHY LAW. A MATTER OF SOCIAL INCLUSION AND HUMAN RIGHTS

ABSTRACT. As of the entry into force of the reform to article 80. of the Federal Cinematography Law, published in the Official Gazette on march 22, 2021, all films that are shown to the public in Mexico must be subtitled in Spanish, including those originally spoken in such language, as well as those that are dubbed, such as children's movies or educational documentaries. The aforementioned legal modification has the objective of achieving the inclusion of deaf people or people with a hearing disability, so that they can have access to film materials that would otherwise be impossible for them, which constitutes a matter of human rights of people with disabilities. © 2024 Universidad Nacional Autonoma de Mexico. All rights reserved.

Casanovas Esquivel, J. A. (2024). Reform to the Article 80. of the Federal Cinematography Law. A Matter of Social Inclusion and Human Rights. *Cuestiones Constitucionales*, 25(50), 431-447. doi: 10.22201/ijj.24484881e.2024.50.18816. Article.

ABORTION FROM AN INTERNATIONAL PERSPECTIVE AFTER THE DOBBS CASE

ABSTRACT. The American Supreme Court of Justice recently overturned the precedents that legalized abortion in the Dobbs v. Jackson Women's Health Organization case. This article analyzes whether this decision is consistent with the current status of abortion as established in International Human Rights Law (IHRL), according to its classical sources (treaties and customary law). Since no treaty includes a right to abortion and there is no consistent practice among states to legalize abortion, various soft law instruments are discussed to clarify the consensus on this issue. These instruments include the agreements reached at the World Population Conferences, the Fourth World Conference on Women of 1995, and the pronouncements and case law of human rights mechanisms (treaty monitoring bodies and regional courts). This analysis shows that the arguments and conclusions in the Dobbs case are consistent with what states have agreed to internationally on the matter. © 2024, Universidad de La Sabana. All rights reserved.

García Escobar, G. (2024). Abortion from an International Perspective after the Dobbs case. *Dikaion*, 33(1), Article e3319. doi: 10.5294/dika.2024.33.1.9. Article.

PLURALITY AS THE CORE OF HUMAN RIGHTS UNIVERSALITY: REDISCOVERING THE SPIRIT OF THE UNIVERSAL DECLARATION OF HUMAN RIGHTS OF 1948 THROUGH THE RIGHT TO SELF- DETERMINATION

ABSTRACT. "Liberal universality" is the dominant framework of human rights in the literature. This paradigm asserts that human rights norms must be interpreted by prioritizing individualism, secularism, and autonomy in all spheres of life. According to this perspective, religiously grounded and duty-oriented visions should not be part of human rights standards, and in some cases, they must be excluded from international debates. This situation is due to a lack of academic scrutiny of the difference between human rights as internationally recognized norms and human rights standards or interpretations as developed by international mechanisms through this paradigm. The case study of the current development of sexual and reproductive health and rights reveals key problems with this interpretative framework: its questionable neutrality, its reduced notion of viewpoint diversity, and its top-down approach that disregards people's real concerns. This book proposes to go back to basics by rediscovering the notion of "pluralistic universality" of the Universal Declaration of Human Rights of 1948, which welcomes interdependent and religiously grounded worldviews that are more compatible with non-Western cultures and some Western traditions. In this sense, the book encourages a redefinition of the universality of human rights in the light of the right to self-determination, as a tool to foster bottom-up approaches, intercultural dialogue, and global consensus for the development of universally acceptable human rights standards. In this way, these standards will enjoy greater legitimacy because they will reflect an international agreement that is responsive to local realities and one that accepts reasonable disagreement in controversial issues. The increasing number of voices questioning the legitimacy of the implementation of human rights will lead to a widespread loss of faith in the concept of human right itself. Reverting this tendency is

an urgent task that reveals the gap between the norms ruling the monitoring bodies and their actual performance. In accepting this challenge, this book will be a necessary source of study for anyone concerned with the purpose and practice of human rights. © 2024 Peter Lang Group AG, Lausanne. All rights reserved.

García Escobar, G. (2024). *Plurality as the core of human rights universality: Rediscovering the spirit of the Universal Declaration of Human Rights of 1948 through the right to self-determination*. Peter Lang AG. doi: 10.3726/b21397. Book.

José Manuel Magaña Rufino

Senior Researcher B, SNII Level II

WIPO ARBITRATION AND MEDIATION CENTER

ABSTRACT. The World Intellectual Property Organization Arbitration and Mediation Center was established in 1994. It is an international resource dedicated to promote the resolution of international disputes between private parties, in particular between those of commercial nature, through Alternative Dispute Resolution options, especially through arbitration, mediation and expert determination procedures in order for the parties to reach an effective and fair solution to their conflicts. This paper analyzes the different services provided by the WIPO Arbitration and Mediation Center, detailing its regulation, procedure and finalization, as well as explaining the different variants of each procedure. © 2023, Austral University. All rights reserved.

Magaña-Rufino, J. M., & Sandoval, A. (2023). Wipo Arbitration and Mediation Center. *Revista Iberoamericana de la Propiedad Intelectual*, 2023(19), 63-94. doi: 10.26422/RIPI.2023.1900. mag. Article.

Jaime Olaiz González

SNII Level I

CAUGHT BETWEEN: ON THE DISTINCTIVE CHARACTER OF MEXICO'S MODEL OF AMENDMENT CODIFICATION

ABSTRACT. This innovative book blends constitutional theory with real-life political practice to explore the impact of codifying constitutional amendments on the operation of the constitution in relation to democracy, the rule of law, and the separation of powers.

It draws from comparative, historical, political and theoretical perspectives to answer questions all constitutional designers should ask themselves: - Should the constitution append amendments sequentially to the end of the text?; - Should it embed amendments directly into the existing text, with notations about what has been modified and how?; - Should it instead insert amendments into the text without indicating at all that any alteration has occurred?

The book examines the 3 major models of amendment codification – the appendative, the integrative, and the invisible models – and also shows how some jurisdictions have innovated alternative forms of amendment codification that combine elements of more than 1 model in a unique hybridisation driven by history, law, and politics.

Constitutional designers rarely consider where in the constitution to codify amendments once they are ratified. Yet this choice is pivotal to the operation of any constitution. This groundbreaking book shows why the placement of constitutional amendments goes well beyond mere aesthetics. It influences how and whether a people remembers its past, how the constitutional text will be interpreted and by whom, and whether the constitution will be easily accessible to the governed.

A global tour of the high stakes of constitution-making, this book features 18 diverse and outstanding scholars from around the world – across Africa, America, Asia and Oceania, and Europe – raising new questions, opening our eyes to new streams of research, and uncovering new possibilities for constitutional design.

Olaiz-González, J. (2023). Caught Between: On the Distinctive Character of Mexico's Model of Amendment Codification. In R. Albert (Ed.), *The Architecture of Constitutional Amendments: History, Law, Politics* (pp. 43-60). Book Chapter.

Jaime Olaiz González

SNII Level I

POLICY-ORIENTED JURISPRUDENCE AND CONSTITUTIVE PROCESS IN MEXICO: TOWARD A PUBLIC ORDER OF HUMAN DIGNITY IN TURBULENT TIMES

ABSTRACT. This chapter will embark on mapping and comparing the processes of authoritative decision in Mexico during the process of political liberalization between 1990 and 2018, and the ones that resulted from a radical shift in power after the presidential election of 2018. This study aims to define the content of pending constitutional changes aimed at approximating in more effective ways a public order of human dignity. This work is a tribute to the scholarship and intellectual legacy of our dear Professor Siegfried Wiessner, a champion of policy-oriented jurisprudence, continuing and developing the legacy of Professors Myres McDougal and Harold Lasswell, and, more saliently, the jurisprudential work of our dear mentor, Professor Michael Reisman. The Framework In a nutshell, development is the series of decision processes and decision outcomes that approximate a given society towards a public order of human dignity.³ These processes are articulated in continuous political transformations and predicated through constitutional change portraying a new grammar of legitimation based upon the shaping and sharing of the goal values of a world order of human dignity. This understanding equates development to human flourishing and condenses the goals that any contemporary liberal democracy should set to achieve. But not all political transformations and constitutional changes are considered development. Those transformations “incompatible with human dignity can be characterized as retrogressions or as ‘disdevelopmental.’” W. Michael Reisman, *Development and Nation Building: A Framework for a Policy-Oriented Inquiry*, 60 Maine L. Rev. 309, 310 (2008). © Brill.

Olaiz-González, J. (2023). Policy-oriented jurisprudence and constitutive process in Mexico: Toward a public order of human dignity in turbulent times. In W. M. Reisman, & R. Pati (Eds.), *Human Flourishing: The End of Law: Essays in Honor of Siegfried Wiessner* (pp. 1062-1106). Brill. doi: 10.1163/9789004524835_038. Book Chapter.

Juan Manuel Otero Varela

Senior Researcher B, SNII Level I

THE NATIONAL GUARD. A DEFINITION OF ITS INSTITUTIONAL ARCHITECTURE IN THE MEXICAN LEGAL ORDER BASED ON THE INTERPRETATION CRITERIA USED IN THE RULING OF THE PLENARY SESSION OF THE SUPREME COURT OF JUSTICE OF THE NATION ISSUED IN THE CONSTITUTIONAL CONTROVERSY 137/2022

ABSTRACT. Despite the constitutional design of the National Guard as a civil public security institution, attached to the Ministry of Security and Citizen Protection, in September 2022, a package of legal reforms was published that sought to transfer operational control and administrative of this body to the Secretariat of National Defense, with the objective of providing the armed forces with greater powers of intervention over said institution, disturbing its constitutional architecture. © 2025 Universidad Nacional Autonoma de Mexico. All rights reserved.

Otero Varela, J. M. (2025). The National Guard. A definition of its institutional architecture in the Mexican legal order based on the interpretation criteria used in the ruling of the Plenary Session of the Supreme Court of Justice of the Nation issued in the constitutional controversy 137/2022. *Cuestiones Constitucionales*, 26(52), Article e19172. doi: 10.22201/ijj.24484881e.2025.52.19172. Article.

Juan Manuel Otero Varela

Senior Researcher B, SNII Level I

THE TRANSFER OF POWERS TO THE SECRETARY OF NATIONAL DEFENSE FOR THE OPERATIONAL AND ADMINISTRATIVE CONTROL OF THE NATIONAL GUARD. AN ANALYSIS FROM THE CONSTITUTIONAL DESIGN OF THE CIVIL CHARACTER OF THE INSTITUTION

ABSTRACT. In the constitutional reform of March 2019, the National Guard was transformed into a federal public security-institution, of a civil nature, hierarchically-attached to the direction and command of the Ministry of Public Security and Citizen Protection, however, in September 2022, a package of legal reforms was published, by which the operational and administrative control of the National Guard is transferred to the Secretary of National Defense, disturbing the structural model of civil command designed in the constitutional text, due to an excess of control institution by the armedforces. © 2023 Universidad Nacional Autonoma de Mexico. All rights reserved.

Otero Varela, J. M. (2023). The Transfer of Powers to the Secretary of National Defense for the Operational and Administrative Control of the National Guard. An Analysis from the Constitutional Design of the Civil Character of the Institution. *Cuestiones Constitucionales*, 48, 497-519. doi: 10.22201/ijj.24484881e.2023.48.18055. Article.

José María Soberanes Díez

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THE CONSTITUTIONAL RIGHT TO EQUAL PAY

ABSTRACT. The purpose of this paper is to analyze the content and scope of the constitutional right to equal pay, and the rational procedure to be followed in order to determine when this right is violated. © 2019 Universidad Nacional Autonoma de Mexico, Instituto de Astronomia. All rights reserved.

Soberanes Díez, J. M. (2019). The constitutional right to equal pay. *Revista Latinoamericana de Derecho Social*, (29), 269-288. doi: 10.22201/ijj.24487899e.2019.29.13908. Article.

Carlos Alberto Soriano Cienfuegos

Research Professor

STRUCTURAL TRANSFORMATIONS OF POLITICAL RIGHTS: THE MEXICAN CASE

ABSTRACT. This note supports the hypothesis that democratization and openness to international human rights law in Mexico brought about a structural change in its constitutional principles. This was mainly the result of substantially transforming the meaning - and especially the scope - legally given to political rights. The change from prerogatives to rights is not only a matter of nomenclature, but also a 180-degree shift, at both practical and epistemological levels. In addition to this, the project to establish a *Ius Constitutionale Commune* in the region, based on human rights standards, has been an equally important change as it has placed the human person at the heart of the matter. © 2021 Mexican Law Review. All rights reserved.

Cienfuegos, C. S. (2019). Structural transformations of political rights: The Mexican case. *Mexican Law Review*, 12(1), 169-185. doi: 10.22201/ijj.24485306e.2019.2.13643. Review.

THE LEGISLATIVE PROCESS AND
THE “PLAN B”: THE RISK OF EMPTY
DEMOCRACY

ABSTRACT. “Democracy” must be understood constitutionally not only as a juridical structure and a political regime, but as a system of life founded on the constant economic, social and cultural improvement of the people. However, a century later, Modernity, «legal positivism» and the whole legal tradition of which we are heirs —often unreflective— have generated a democratic or consensus axiology, thus producing what today we can call “empty democracy”. Such circumstance becomes evident with the issuance of the Decree that contained the first part of the electoral “Plan B” and which was subject of analysis by the Mexican Supreme Court of Justice when resolving the action of unconstitutionality 29/2023 and its accumulated ones. © 2024 Universidad Nacional Autónoma de México. All rights reserved.

Gómez-Bisogno, F. V., & Bernal, G. H. (2024). The Legislative Process and the “Plan B”: the Risk of Empty Democracy. *Cuestiones Constitucionales*, 25(50), 489-492. doi: 10.22201/ijj.24484881e.2024.50.18818. Article.

SCHOOL OF PEDAGOGY

Javier Fernández
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SNII Candidate Level

ACTIVE METHODOLOGIES IN HIGHER EDUCATION: THE CASE OF A PRIVATE UNIVERSITY IN MEXICO

ABSTRACT. Introduction: Given the emergence of the educational approach focused on competencies, active methodologies begun to have relevance in Mexico and the world in the XXI century, positioning the student as the protagonist of the learning process, and the teacher as a strategic designer of didactic situations, counselor and learning outcomes analyst. The objective of this study is to describe the use of active methodologies by the teaching staff of a particular University in the State of Aguascalientes (Mexico). Methodology: A quantitative study was developed, with a non-experimental, cross-sectional design and exploratory and descriptive scope. Fifty-three teachers participated, who were administered an instrument alluding to the frequency of use of different teaching methodologies: the traditional one, as well as a repertoire of active methodologies. Results: The data analysis reveals that the traditional methodology is the most used, followed by problem-based learning and cooperative learning. For its part, the areas used were the flipped class, gamification, and service-based learning. Discussion: The results are discussed regarding their relevance within the framework of higher education trends and the fourth UN Sustainable Development Goal, aimed at quality education. © 2024, HISIN (History of Information Systems). All rights reserved.

Fernández de Castro de León, J., & Villegas Pantoja, R. A. (2024). Active Methodologies in Higher Education: the Case of a Private University in Mexico. *European Public and Social Innovation Review*, 9. doi: 10.31637/epsir-2024-631. Article.

Javier Fernández
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LEARNING SELF-REGULATION SCALE: VALIDATION OF AN INSTRUMENT FOR SECONDARY AND UPPER SECONDARY EDUCATION

ABSTRACT. Introduction: Learning Self-Regulation is the degree or level in which each student has an active and creative role in their learning process, including cognition, metacognition, motivation, behavior, and context. Its development is relevant to contemporary educational approaches, focused on the development of competencies, where students are protagonists of the learning process. In this study, an instrument designed to measure self-regulated learning in secondary and upper secondary education in Mexico is validated. Method: A study with instrumental design was developed, applying the Self-Regulated Learning Scale (ESAA-2) to 3,541 secondary and upper secondary students from 12 educational institutions in Mexico, whose choice was due to a non-probabilistic and convenience sampling. Results: The analysis of results evidenced content validity in the instrument, as well as internal consistency, and construct validity. Discussion: The contribution of this research lies in the design and validation of an instrument capable of measuring a relevant construct for the current educational approach, based on the development of competencies, constituting a means for the generation of strategies aimed at achieving educational quality. © 2024, Universidad Complutense Madrid. All rights reserved.

Fernández-de-Castro, J., Martínez-Bautista, H., Rojas-Muñoz, L. M., & Galindo-Muñoz, R. (2024). Learning Self-Regulation Scale: Validation of an Instrument for Secondary and Upper Secondary Education. *Revista Complutense de Educación*, 35(1), 33-43. doi: 10.5209/rced.82444. Article.

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IMPLEMENTATION AND EVALUATION OF THE ACADEMIC IMPROVEMENT PROGRAM IN A PRIVATE UNIVERSITY IN WESTERN MEXICO. REACTIVE MEASURE TO AVOID UNIVERSITY DESERTION

ABSTRACT. Introduction: This research aims to expose the results of the implementation of the Academic Improvement Programme (PMA) in a private university in western Mexico, designed to prevent student dropout. The study focused on students who entered for the first time on a face-to-face basis after the COVID-19 confinement. Methodology: A qualitative and interpretative approach was used, applying the Most Significant Change (MSC) technique. The study, with a case study perspective, involved 12 undergraduate law students who did not achieve the required academic performance and committed to participate in the LDC. Results: The results revealed five significant changes among the students: a) personal development and growth; b) emotional balance; c) application of study methods; d) recognition and gratitude for the personalised attention received; and e) recovery of motivation and self-confidence. Discussion: The results underline the effectiveness of PMA in improving students' well-being and academic performance, highlighting its potential to address post-confinement difficulties. Conclusions: Based on these results, it is proposed to continue applying PMA to all students in the different schools and faculties of the university, given its positive impact on student performance and well-being. © 2024, HISIN (History of Information Systems). All rights reserved.

Ochoa Cedeño, E. G., Rodríguez Magaña, A., & García Béjar, L. (2024). Implementation and Evaluation of the Academic Improvement Program in a Private University in Western Mexico. Reactive measure to avoid university desertion. *European Public and Social Innovation Review*, 9. doi: 10.31637/epsir-2024-555. Article.

Gabriel González Nares
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RESEÑA DE NUPCIAS DE FILOLOGÍA Y MERCURIO, DE MARCIANO MINEO FÉLIX CAPELA. INTRODUCCIÓN, TRADUCCIÓN Y NOTAS DE J. MOLINA AYALA Y B. REYES CORIA, INSTITUTO DE INVESTIGACIONES FILOLÓGICAS, UNAM, 2023, 74 PP

ABSTRACT. El final del Imperio Romano de occidente es pensado como una época de declive, incluso en un sentido literario. Sin embargo, la última de las manifestaciones de la literatura latina clásica y de religión antigua estuvo marcada por varias personalidades y obras notables, tanto de aristócratas eruditos como de retóricos profesionales. Entre el final del siglo IV y el siglo V destacaron las figuras de Vetio Agorio Pretextato, Quinto Aurelio Símaco, y Amiano Marcelino, entre los primeros, así como de Ambrosio Teodosio Macrobio, Aelio Donato, Fabio Planciades Fulgencio y Marciano Mineo Felix Capela, entre los segundos. Tanta fue la fama de estos autores y eruditos que los autores cristianos de la época los tomaron como referencia de estilo, de temática de antigüedades o como interlocutores de sus textos apologéticos. Testimonios de esto se pueden encontrar en Aurelio Agustín, Eusebio Jerónimo, Arnobio de Sicca, Mario Victorino, Calcidio, entre otros. Es de notar que varios de estos autores, ya fueran cristianos o paganos, anticuarios, retóricos o polemistas, estuvieron activos en el norte de África, región del Imperio que se preciaba de ser rica en autores de latín sofisticado, elegante, y con centros de estudios de la sabiduría clásica.

Nares, G. G. (2024). Reseña de Nupcias de Filología y Mercurio, de Marciano Mineo Félix Capela. Introducción, traducción y notas de J. Molina Ayala y B. Reyes Coria, Instituto de Investigaciones Filológicas, UNAM, 2023, 74 pp. *Open Insight*, 15(34), 211-218. doi: 10.23924/oi.v15i34.655. Review.

María Teresa Hernández Herrera
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RURAL YOUTH COMMUTING AND ASPIRATIONS IN MEXICAN RURAL TERRITORIES

ABSTRACT. Introduction: School transfers present a component for movement, which in this article is explored based on the aspirations of the participating students. Methodology: A qualitative approach is considered, with semi-structured interviews with three students and the principal of a rural secondary school. The analysis was done through selective coding. Results: School transfers influence educational trajectories and can represent risks for students. In its implementation, participating families, depending on their socioeconomic resources and working conditions, also intervene in school management to build transportation alternatives. Students' aspirations vary between continuing studies and working, influenced by family perceptions and school experiences. Discussion: The results show the need for policies that address risks in transfers. It is necessary to strengthen school involvement in school transfers and the construction of aspirations of rural students, in particular, identify the perceptions that can influence students' aspirations and decisions. Conclusions: The study documents the importance of family, school and community support in school transfers, and the risk that educational gaps can increase. Educational aspirations require support, through tutoring and contextualized vocational guidance. © 2024, HISIN (History of Information Systems). All rights reserved.

Hernández-Herrera, M. T., & Pérez Martínez, M. G. (2024). Rural Youth Commuting and Aspirations in Mexican Rural Territories. *European Public and Social Innovation Review*, 9. doi: 10.31637/epsir-2024-1412. Article.

Humberto Martínez Camacho
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SMART LIBRARIES AS PROMOTERS OF DEVELOPMENT IN THE SMART CITY CONTEXT: A SMART LIBRARY INFRASTRUCTURE MODEL PROPOSAL

ABSTRACT. Although library materials have largely migrated from physical to digital media, the library still sustains its buildings as spaces for recreation, interaction, learning, and knowledge seeking. Intelligent libraries emerge with the development of information technology, Internet, and human-computer interactions. In this way, the library space also becomes a laboratory where users can develop and test intelligent technologies. In the present study, the implication of the smart library in smart cities was analyzed through a systematic search of information, and the best practices of the institutions were identified. The "smart" environment is a broad topic that involves resources, people, and governance, among others, and is treated from different areas of knowledge. The multidisciplinary nature of the library can promote and encourage literacy and the development of new technologies that contribute to various infrastructures, such as sustainable development, improvement in the quality of life, optimization of available resources, and more active citizenship. © 2023 selection and editorial matter, Alex Khang, Sita Rani, and Arun Kumar Sivaraman. All rights reserved.

Martínez-Camacho, H. (2022). Smart Libraries as Promoters of Development in the Smart City Context: A Smart Library Infrastructure Model Proposal. In A. Khang, S. Rani, & A. K. Sivaraman (Eds.), *AI-Centric Smart City Ecosystems: Technologies, Design and Implementation* (pp. 209-230). CRC Press. doi: 10.1201/9781003252542-13. Book Chapter.

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REFLECTIONS ON THE IMPORTANCE OF ASSERTIVENESS IN THE EDUCATIONAL AND PEDAGOGICAL FIELD AND FUTURE PERSPECTIVES

ABSTRACT. This chapter addresses the importance of assertiveness in the educational and pedagogical field, highlighting its role in the comprehensive training of university students. It is emphasised that assertiveness is crucial for exercising citizenship and competent performance in active life. A comprehensive synthesis of the book's findings addresses the intersection between assertiveness and higher education. The studies include the relationship between assertiveness and well-being, the connection between assertiveness and empathy, the importance of assertiveness in personal life, the diagnosis of assertiveness in university students, an assertive skills development programme and assertiveness as an essential component in constructing moral character. The findings highlight the centrality of assertiveness in different aspects of higher education. Challenges and opportunities are identified in implementing educational strategies focused on assertiveness. It concludes with a call to action to promote research and the implementation of programmes that encourage assertiveness in educational institutions. The urgency of equipping students with skills beyond academic knowledge is highlighted, and assertiveness is recognised as fundamental to personal and professional success. It is proposed that educational institutions proactively implement programmes that promote assertiveness, thus contributing to a more equitable, communicative and resilient society. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Atristain-Suárez, C., & Meza-Mejía, M. C. (2024). Reflections on the Importance of Assertiveness in the Educational and Pedagogical Field and Future Perspectives. In C. Atristain-Suárez, & S. Castaños-Cervantes (Eds.), *Assertiveness in Educational and Pedagogical Strategies for Institutional Competitiveness* (pp. 273-282). Springer Nature. doi: 10.1007/978-3-031-58885-3_14. Book Chapter.

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**Mónica Adriana
Villarreal García**

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WOMEN IN THE GOVERNANCE OF PUBLIC HIGHER EDUCATION INSTITUTIONS IN MEXICO. COMPARATIVE STUDY

ABSTRACT. In the upward trajectory of women, equality in leadership positions within higher education institutions is still not evident, although there's a growing shift in university governance that's starting to break the historic barriers for women, it remains a reality that this level has been largely unattainable to them. Various international and national laws and policies have pushed for gender equality, but it is still a work in progress. Globally, women hold almost a quarter of the top university leadership roles, but in Latin America, progress is slower. Despite qualifications and merits, women face numerous obstacles in reaching top university leadership positions. This study aims to investigate the position of women in university governance in Mexico by comparing public institutions, based on the national gender equity policy. It seeks to pinpoint specific policies or actions being implemented. For this, a descriptive and transversal work was followed in multilevel analysis in comparative studies which allows multifaceted and holistic investigations of the phenomena to be studied. The findings show that while the government and other entities have established laws and policies for gender equality, there is still a noticeable gap in the governance of public universities. Even though some progress has been made in addressing gender-based violence and other equality initiatives, these efforts are not enough to fundamentally change the culture and provide women with full access to the governing level. © 2024 Universidad Nacional de Educación a Distancia (UNED). All rights reserved.

Del Carmen Meza Mejía, M., Ortega-Barba, C. F., & Villarreal-García, M.A. (2024). Women in the Governance of Public Higher Education Institutions in Mexico. Comparative Study. *Revista Española de Educación Comparada*, (45), 106-129. doi: 10.5944/reec.45.2024.39403. Article.

AN APPROACH TO ASSERTIVENESS IN UNIVERSITY STUDENTS

ABSTRACT. Incorporating character formation in the curriculum goes beyond the professional competence acquired through disciplinary studies. It refers to how people get involved in the world, which implies that students form attributes that allow them to assertively face an increasingly challenging world with personal integrity and social responsibility, in addition to motivating them to be active agents and contributors to the common good. Knowing university students' degree of assertiveness to propose training actions is fascinating as this research is the first phase of a significant project; an exploratory and descriptive study was conducted using the Multidimensional Assertiveness Scale on 461 students. The results showed that, according to assertiveness levels, 77.4% are in the medium range, 14% are in the high range, and 8.4% are in the low range. Additionally, a series of independent sample tests were conducted about the effect of gender and academic area on indirect assertiveness. In this regard, the female group is higher than the male group, and concerning the effect of academic area, there were no differences among them. It is recommended that different assertiveness training programmes be integrated into the university curriculum to help improve assertiveness levels. It is suggested that quasi-experimental research be continued to determine the impact of the actions. © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2024.

Meza-Mejía, M. C., Ortega-Barba, C. F., & Galbán-Lozano, S. E. (2024). An Approach to Assertiveness in University Students. In C. Atristain-Suárez, & S. Castaños-Cervantes (Eds.), *Assertiveness in Educational and Pedagogical Strategies for Institutional Competitiveness* (pp. 151-175). Springer Nature. doi: 10.1007/978-3-031-58885-3_8. Book Chapter.

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WHO ARE WE RECEIVING AT THE UNIVERSITY? THE IMPACT OF COVID-19 ON MATHEMATICS AND READING LEARNING IN HIGH SCHOOL

ABSTRACT. We researched how the transition to remote learning during the COVID-19 pandemic affected the development of mathematical thinking and reading comprehension skills of high school students based on the analysis of the results of a standardized test for higher education admission. The total number of participants was $N = 17,942$, out of which $N_1 = 10,611$ were pre-pandemic applicants and $N_2 = 7,331$ were post-pandemic applicants. The pre-pandemic group took into consideration the exam results from September 2016 to June 2020. The post-pandemic group took into consideration the exam results from September 2020 up to May 2023. We conclude that emergency remote teaching decreased the average mathematical competence of incoming university students by 12.8%. Similarly, emergency remote teaching decreased the average reading achievement of students entering university by 8%. Therefore, the impact of emergency remote teaching was greater on mathematics skills than on reading achievements. Copyright © 2024 Ortega-Barba, Ramírez-Pérez and Méndez-Padilla Andrade.

Ortega-Barba, C. F., Ramírez-Pérez, H. X., Méndez-Padilla Andrade, S. (2024). Who Are We Receiving at the University? The Impact of COVID-19 on Mathematics and Reading Learning in High School. *Frontiers in Education*, 9, Article 1356730. doi: 10.3389/feduc.2024.1356730. Article.

Daniela Salgado Gutiérrez

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Julián Ochoa García

Research Professor

Ana Fabiola Mora López

Research Professor

INSTRUCTIONAL DESIGN FOR VIRTUAL COURSES FOR UNIVERSITY TEACHERS AFFECTED BY COVID-19

ABSTRACT. Due to the 2020 scenario, the pandemic caused by the COVID-19 virus prompted a substantial change in the methods used by teachers when teaching and implementing their classes. As a support mechanism for teachers in the face of the radical change from physical presence to virtual presence, two courses were designed by the School of Pedagogy of the Universidad Panamericana: the first on Instructional Design and the second on didactic tools that enhance interaction and revitalization of classes. The summer of 2020 was the ideal time to train and prepare teachers in the instructional design of online classes because, although the educational model of the university is face-to-face, the circumstances and health limitations forced a strategic change to carry on with the quality that characterizes the institution. The preliminary results that we analyze with the SPSS software indicate that for 89.4% of the teachers the content of the course contributed to their professional development and that 87.9% have sufficient elements to redesign their subject for the following semester, which is executed in virtual mode. © 2020 IEEE.

Salgado-Gutiérrez, D., De La Serna-Tuya, A. S., Mora-Lopez, A. F., Ochoa-García, J., & García-Bejar, L. (2020). Instructional Design for virtual courses for university teachers affected by COVID-19. In *Proceedings - 10th International Conference on Virtual Campus, (JICV 2020)* (pp. 30-33). IEEE. doi: 10.1109/JICV51605.2020.9375676. Conference Paper.

Daniela Salgado Gutiérrez

Research Professor

REDESIGNING SCHOOLS FOR EFFECTIVE CHARACTER EDUCATION THROUGH LEADERSHIP: THE CASE OF PRIMED INSTITUTE AND VLACE

ABSTRACT. This paper presents two leadership training programs focused on redesigning schools to promote student character development and advocates for their suitability to promote character education in diverse cultural contexts. This is especially relevant for researchers, practitioners, and policy makers who are searching for replicable interventions to promote character development in schools, particularly in those countries where the character education movement has not arrived yet. It begins with the theoretical framework that lays the groundwork for these kinds of leadership programs. Second, it describes the PRIMED Institute in Character Education (PICE) and the virtual/video-based Leadership Academy in Character Education (vLACE) programs. Finally, it presents seven arguments in favor of these programs responding to the needs of schools in many different countries. © 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Dabdoub, J. P., Salgado, D., Bernal, A., Berkowitz, M. W., & Salaverría, A. R. (2023). Redesigning Schools for Effective Character Education through Leadership: The case of PRIMED Institute and vLACE. *Journal of Moral Education*, 53(3), 558-574. doi: 10.1080/03057240.2023.2254510. Article.

BEYOND BELONGINGNESS: RETHINKING INNATE BEHAVIORAL PREDISPOSITIONS, LEARNING CONSTRAINTS, AND COGNITIVE CAPACITIES

ABSTRACT. Learning is a major determinant of behavioral change for some organisms through their lifecycles. From an associative perspective, learning is assumed to occur whenever organisms experience particular statistical regularities in their environment; specifically, meaningful outcomes that follow certain cues or actions chiefly contribute to behavioral change. However, numerous empirical reports reveal that not all cue–outcome and action–outcome combinations are learned equally well, a phenomenon that is termed belongingness. Those reports are valuable as descriptive-level knowledge, but beg further considerations, like what is the origin, adaptive value of, and underlying mechanisms associated with the predisposition to couple particular events. Contrary to what is often assumed, the mere observation of learning predispositions says little as to whether they arise from genetics, are constrained by hardwired neural circuitries, or have been ecologically advantageous in an evolutionary timescale. The present paper aims to present a number of notions from different research fields outside the hard core of associative learning and, in so doing, provides elements for careful study and conceptualization of this issue. Thereafter, these notions are pooled to understand behavioral variation in a wide array of phenomena, thus, bringing a more informed approach to the nature versus nurture debate. © The Author(s) 2022.

Sosa, R. (2022). Beyond Belongingness: Rethinking Innate Behavioral Predispositions, Learning Constraints, and Cognitive Capacities. *Adaptive Behavior*, 32(1), 71-93. doi: 10.1177/10597123221097451. Article.

CONDITIONED INHIBITION, INHIBITORY LEARNING, RESPONSE INHIBITION, AND INHIBITORY CONTROL: OUTLINING A CONCEPTUAL CLARIFICATION

ABSTRACT. Inhibition can be defined as a phenomenon in which an agent prevents or suppresses a behavioral state that would otherwise occur. Associative learning studies have extensively examined how experiences shape the acquisition of inhibitory behavioral tendencies across many species and situations. Associative inhibitory phenomena can be studied at various levels of analysis. One could focus on the trajectory of behavioral change involved in learning from negative statistical associations between discrete events (inhibitory learning). Alternatively, one could be interested in the effects of accumulated experience with those negative associations (conditioned inhibition). One could rather be interested in how organisms implement what they learn through experiences involving negative associations (response inhibition). Yet, one could inquire into how the capacity of learning negative associations and performing accordingly varies between individuals and along time for the same individual (inhibitory control). This article presents a tentative taxonomy addressing different levels of analysis of associative inhibitory phenomena by using different terms for each. In addition, recent evidence and certain unresolved issues at each level are thoroughly scrutinized and contrasted with prior findings. The empirical and theoretical advances made by modeling inhibition as an associative learning phenomenon have provided scaffolds for the current knowledge and emerging accounts of the topic. Some of those emerging accounts have the potential to bridge different levels of analysis and foster “cross-pollination” of ideas among broad fields beyond associative learning. © 2022 American Psychological Association.

Sosa, R. (2022). Conditioned Inhibition, Inhibitory Learning, Response Inhibition, and Inhibitory Control: Outlining a Conceptual Clarification. *Psychological Review*, 131(2), 138-173. doi: 10.1037/rev0000405. Article.

SCHOOL OF PHILOSOPHY

Mario Salvador
Arroyo Martínez Fabre

SNII Candidate Level

SADA, A., ROWLAND, T., ALBINO DE ASSUNÇÃO, R. (2023). RATZINGER Y LOS FILÓSOFOS. DE PLATÓN A VATTIMO. ENCUESTRO. 523 PP.

ABSTRACT. Esta ambiciosa obra busca sintetizar el diálogo de Joseph Ratzinger —Benedito XVI— con los principales pensadores de la humanidad. A tal efecto, los editores tienen que hacer un doble recorrido transversal entre el abundante corpus de Ratzinger: la Opera omnia, publicada en alemán por Herder y en español por la BAC, por un lado; por otro, los más representativos filósofos de la historia, comenzando por Platón y terminando con Gianni Vattimo, recientemente fallecido. Para conseguirlo, se sirven de veinte plumas distintas (especialistas en Ratzinger o en el filósofo correspondiente) que se confrontan con el pensamiento del teólogo bávaro. Entre ellas destacan tres ganadores del Premio Ratzinger de Teología: Hanna-Barbara Gerl-Falkovitz, galardonada en el 2021; la editora Tracey Rowland, premiada en el 2020; y Pablo Blanco Sarto, ganador del 2023.

Arroyo-Martínez, M. S. (2024). Sada, A., Rowland, T., Albino de Assunção, R. (2023). Ratzinger y los filósofos. De Platón a Vattimo. Encuentro. 523 pp. *Tópicos* (México), (69), 493-496. doi: 10.21555/TOP.V690.2950. Review.

Eduardo Óscar
Charpenel Elorduy

Senior Researcher B, SNII Level II

GEORG WILHELM FRIEDRICH HEGEL:
REASON, HISTORICITY, AND COMMUNITY

ABSTRACT. This book extensively explores the various influences and connections between Joseph Ratzinger and a number of leading philosophers; engaging with his work by means of Spanish, Portuguese, German, and English schools of thought through the contributions of a global body of scholars.

Each chapter in this volume examines precisely how Ratzinger has dealt with the ideas of a particular philosopher, and how he has appropriated their ideas and thoughts. Moving from philosophers he has modified or critiqued – such as Kant, Comte or Wittgenstein – to those who have contributed to his philosophical theology, such as Guardini and Pieper, this truly international endeavour is an extraordinary journey into Ratzinger's engagement with his competing and congenial schools of thought.

Charpenel, E (2024). Georg Wilhelm Friedrich Hegel: Reason, Historicity, and Community. In T. Rowland, A. Sada, & R. Albino de Assunção (Eds.), *Joseph Ratzinger in Dialogue with Philosophical Traditions: From Plato to Vattimo* (pp. 94-117). Bloomsbury Publishing. Book Chapter.

Eduardo Óscar
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Senior Researcher B, SNII Level II

THE UNREST OF THE ENLIGHTENED
SELF: THE SCOPE OF HUMAN ACTION IN
SPINOZA

ABSTRACT. My aim in this paper is to examine some of the distinctive facets of human action in Spinoza's philosophy and show their intrinsic connection with each other. By analyzing in detail how Spinoza addresses different aspects of human action in his main work, the Ethics, it is possible to notice that for him free human agency implies two interrelated features: on the one hand, the adequate knowledge of the causes that determine it, and, on the other hand, a growing capacity to impact with greater power the scenarios in which it takes place. Thus, in contrast with quietist and passive readings, I show in the following that the two aforementioned characteristics are part of the Spinozian philosophical conception of agency as such. By pursuing this line of thought, it is also possible to establish a link—not always noticed in the secondary literature—with some of the central lines of thought contained in the Theological-Political Treatise. In discussing these theses, I advance the idea that the Spinozian conception of human agency involves a serious readjustment of the metaphysical vision of the agent, a change in her conduct and ethical practices, and an altogether different conception of politics and religion. © 2024 Universidad Panamericana. All rights reserved.

Charpenel, E. (2024). The Unrest of the Enlightened Self: The Scope of Human Action in Spinoza. *Tópicos* (México), (68), 319-343. doi: 10.21555/top.v680.2428. Article.

Eduardo Óscar
Charpenel Elorduy

Senior Researcher B, SNII Level II

THE USE OF THE POWER OF JUDGMENT IN KANT'S POLITICAL AND LEGAL PHILOSOPHY

ABSTRACT. In this article, I examine core aspects of Kant's political philosophy and law from the point of view of the power of judgment. In line with Wolfgang Wieland and Alejandro Vigo, I discuss aspects of this branch of Kantian philosophy in which different rules and criteria demand a particular application. In particular, I deal with aspects related to the critical exercise of citizenship, the implementation of republicanism and the making of law, and the application of law in the case of instances of legal punishment. Based on these analyses, I point out the relevance of interpreting Kant's legal philosophy as a criteriological one, where the reflection of the agent is fundamental in the application of general norms and principles. © 2023, Revista Interdisciplinaria de Filosofía y Psicología. All rights reserved.

Charpenel, E. (2023). The Use of the Power of Judgment in Kant's Political and Legal Philosophy. *Límite* (Chile), 18, Article 20. Article.

Eduardo Óscar
Charpenel Elorduy

Senior Researcher B, SNII Level II

UNSOCIAL SOCIABILITY AND THE PLOT OF THE KANTIAN PHILOSOPHY OF HISTORY

ABSTRACT. In this article I present a reconstruction of the Kantian notion of unsocial sociability with the aim of showing its relation with other key elements of Kant's philosophy such as radical evil, moral autonomy, and the history of mankind considered from a heuristic teleological viewpoint. Given the multiple connections and associations this notion can give rise to, I consider of utmost importance to elucidate how Kant understood our social and unsocial dimensions, and how these can have an impact upon the ways we develop our judicial and political institutions and our moral practices. Through the present analysis I believe, on the one hand, that certain interpretative mistakes such as those of Allen W. Wood and Jane Kneller can be corrected, and, on the other hand, that we can be in better conditions to appreciate the ongoing validity of Kant's historical and anthropological project. © 2019, Universidad de Tarapaca. All rights reserved.

Charpenel, E. (2019). Unsocial Sociability and the Plot of the Kantian Philosophy of History. *Límite* (Chile), 14, Article 7. Article.

María Elena García Peláez Cruz

Research Professor

THE RELEVANCE OF ENVIRONMENTAL CONDITIONS AS CAUSES FOR ANIMAL GENERATION IN ARISTOTLE

ABSTRACT. In this chapter, I argue against the misreading of Aristotle's explanations about the influence of external conditions on generation. I address the relationship between celestial movements and sublunary living beings, emphasizing the natural tendency to regularity in the generative processes. The sun's yearly cycle produces seasons that affect life and the generative predisposition of animals. The moon's monthly cycle has an even more direct impact on the readiness of females for pregnancy. In a restricted scope, local environmental conditions prove to affect animals' tempers, as well as some generative outcomes. Sex determination holds a notorious relation to the winds, which drives me to emphasize the influence of immediate environmental conditions along procreation. This last issue can only be thoroughly explained if there is a revision of the male's contribution to the embryo. Provided that the male transmits the sensitive soul, the material aspect of his seed should also be considered, since important features of an animal depend on it and are susceptible to being affected by climate immediate conditions. Throughout the chapter, I compare some Aristotelian thesis to the Hippocratic text *Airs, Waters, Places*, since Aristotle incorporates some of its main ideas into his own generative theory. This also shows that, according to the Aristotelian works, environmental conditions belong to the scientific realm., even if secondary compared to form. © 2024 selection and editorial matter, Alberto Ross and Daniel Vázquez; individual chapters, the contributors.

García-Peláez, M. E. (2023). The Relevance of Environmental Conditions as Causes for Animal Generation in Aristotle. In A. Ross, & D. Vázquez (Eds.), *Cause and Explanation in Ancient Philosophy* (pp. 147-169). Routledge. doi: 10.4324/9781003306450-9. Book Chapter.

AROUND A HINGE (PARMENIDES B8.50-61 DK = D8.55-66LM). A POSTHUMOUS DISCUSSION WITH JEAN BOLLACK

ABSTRACT. Around Parmenides' hinge (28B8.50-61 DK = 19D8.55-66 LM) must we read Parmenides without going through Plato, as Jean Bollack asserts in the very first sentence of his book *Parménide, de l'étant au monde* (2006)? While relying on a radically new interpretation of B8.53-54a put forward by Bollack as early as 1966, I argue, on the contrary, that it is only on the condition of having Plato in mind that one can read the poem as a whole. The Republic or the Symposium, the Sophist and the Timaeus, taken in conjunction (and not as witnesses of a development of Plato's thought), provide a key to grasp the meaning of the hinge between the two parts of the goddess' exposition, which is the real core of the poem. Radicalizing a line of interpretation opened by Jonathan Barnes (1979) and Patricia Curd (1997), I argue that there is a sense in which non-being is eliminated from the second part of the goddess' exposition, and multiplicity given a legitimate ontological status. If so, the parricide which the Sophist pretends to perpetrate concerns Parmenides' ancient interpreters rather than Parmenides himself. This is the only sense in which we could indeed say that we have to read Parmenides without going through Plato. © 2024 Dalhousie University Press, Ltd. All rights reserved.

Laks, A. (2024). Around a hinge (Parmenides B8.50-61 DK = D8.55-66LM). A posthumous discussion with Jean Bollack. *Dionysius*, 39, 1-35. Article.

PHILOSOPHIE CONTEMPORAINE

ABSTRACT. Flanqué des deux liminaires et d'un Post-scriptum, l'ouvrage, écrit « à deux mains, deux écoutes » (p. 7), comporte 8 chapitres d'inégale longueur, et plus ou moins reliés deux à deux: 1. « L'énigme Heidegger. À propos du Langage Heidegger de Meschonnic » (Villani) et 2. « Le poète contre le philosophe: primauté de la vie sur l'être » (Sauge) tournent autour de la langue, en général; 3. « Analyse de Logos. Introduction à une analyse sémantique de la famille legein/logos » (Sauge) et 4. « Les scrupules de la raison » (Villani) concernent la signification du terme logos chez les auteurs de l'époque archaïques, notamment chez Héraclite; 5. « À propos de Parménide. Les mots au rendez-vous des choses » (Sauge) et 6. « Vérité et 'centre des choses' » (Villani) sont respectivement consacrés à l'être et à la vérité, notamment chez Parménide; les chapitres 7 et 8 s'intitulent « Les fugues de la pensée. La parole d'Anaximandre » (Sauge) et « La première parole d'Anaximandre » (Villani). Le post-scriptum au titre programmatique (« Fondation symbolique vs Parole béante ») est dû à Sauge.

Laks, A., De Guillebon, B., Dravigny, É., Perrin, C., & Laurent, N. (2022). Philosophie contemporaine. *Revue Philosophique de Louvain*, 119(4), 653-668. doi: 10.2143/RPL.119.4.3291618. Review.

PLATO'S SECOND REPUBLIC: AN ESSAY ON THE LAWS

ABSTRACT. In Plato's Second Republic, André Laks argues that the Laws, Plato's last and longest dialogue, is also his most important political work, surpassing the Republic in historical relevance. Laks offers a thorough reappraisal of this less renowned text, and examines how it provides a critical foundation for the principles of lawmaking. In doing so, he makes clear the tremendous impact the Laws had not only on political philosophy, but also on modern political history. Laks shows how the four central ideas in the Laws—the corruptibility of unchecked power, the rule of law, a “middle” constitution, and the political necessity of legislative preambles—are articulated within an intricate and masterful literary architecture. He reveals how the work develops a theological conception of law anchored in political ideas about a god, divine reason, that is the measure of political order. Laks's reading opens a complex analysis of the relationships between rulers and citizens; their roles in a political system; the power of reason and persuasion, as opposed to force, in commanding obedience; and the place of freedom. Plato's Second Republic presents a sophisticated reevaluation of a philosophical work that has exerted an enormous if often hidden influence even into the present day. © 2022 by Princeton University Press.

Laks, A. (2022). *Plato's Second Republic: An Essay on the Laws*. Princeton University Press. Book.

André Laks
Senior Researcher D

THE CONCEPT OF PRESOCRATIC PHILOSOPHY: ITS ORIGIN, DEVELOPMENT, AND SIGNIFICANCE

ABSTRACT. When we talk about Presocratic philosophy, we are speaking about the origins of Greek philosophy and Western rationality itself. But what exactly does it mean to talk about “Presocratic philosophy” in the first place? How did early Greek thinkers come to be considered collectively as Presocratic philosophers? In this brief book, André Laks provides a history of the influential idea of Presocratic philosophy, tracing its historical and philosophical significance and consequences, from its ancient antecedents to its full crystallization in the modern period and its continuing effects today. Laks examines ancient Greek and Roman views about the birth of philosophy before turning to the eighteenth-century emergence of the term “Presocratics” and the debates about it that spanned the nineteenth and twentieth centuries. He analyzes the intellectual circumstances that led to the idea of Presocratic philosophy-and what was and is at stake in the construction of the notion. The book closes by comparing two models of the history of philosophy-the phenomenological, represented by Hans-Georg Gadamer, and the rationalist, represented by Ernst Cassirer-and their implications for Presocratic philosophy, as well as other categories of philosophical history. Other figures discussed include Plato, Aristotle, Cicero, Diogenes Laertius, Schleiermacher, Hegel, Nietzsche, Max Weber, and J.-P. Vernant. Challenging standard histories of Presocratic philosophy, the book calls for a reconsideration of the conventional story of early Greek philosophy and Western rationality. © Presses Universitaires de France, 2006.

Laks, A. (2018). *The Concept of Presocratic Philosophy: Its Origin, Development, and Significance*. Princeton University Press. Book.

Mauricio Lecón Rosales
Senior Researcher C, SNII Level II

LIBERTARIANISM OR COMPATIBILISM? THE PHILOSOPHICAL DILEMMA UNDERLYING THE CONTROVERSY BETWEEN EDUARDO GARCÍA MÁYNEZ AND CARLOS COSSIO

ABSTRACT. In this article I review the academic controversy on the concept of legal liberty between Eduardo García Máñez and Carlos Cossio. My aim is to argue that the discrepancy between the authors stems from structural differences that refer, ultimately, to two different accounts of human freedom. To this effect, I first analyze Máñez’s positive definition of juridical freedom and its main features. I then examine the main criticisms interposed by Carlos Cossio to García Máñez’s ideas, as well as the way in which García Máñez addressed these criticisms. Finally, I argue that the notion of legal liberty reveals García Máñez’s libertarian commitments, while Carlos Cossio’s ideas reflect his compatibilist account on human freedom. My goal is to interpret the dispute from a philosophical standpoint that has not yet been explored and that allows us to situate the authors in broader philosophical discussions, such as the existence or non-existence of causal determinism. © 2024 Universidad de Alicante. All rights reserved.

Lecón Rosales, M. (2024). Libertarianism or Compatibilism? The Philosophical Dilemma Underlying the Controversy between Eduardo García Máñez and Carlos Cossio. *Doxa. Cuadernos de Filosofía del Derecho*, (48), 563-580. doi: 10.14198/DOXA2024.48.21. Review.

David Xavier Levystone
Research Professor

DU RYTHME ET DES OPPOSÉS: NOTE SUR ARISTOTE MÉTAPHYSIQUE Λ 1075b12-13 : ἐὰν μὴ ῥυθμίσῃ τις

ABSTRACT. The paper argues that the usual contemporary understanding and translation of Aristotle’s affirmation in *Metaph. Λ, 1075b12-13* πάντες δ’ οἱ ταναντία λέγοντες ὡν χρωνται τοῖς ἐναντίοις, εἰ μὴ ρυθμίσῃ τις relies on a misconception of the signification of the verb ρυθμίζω. A short survey of the meaning and uses of the verb in *vth* and *ivthBC* texts, and a careful reading of its interpretations by the ancient commentators who paid attention to this specific passage of Aristotle (Ps.-Alexander, Aquinas, Averroes, Themistius), shows that ρυθμίζω may be taken in its technical, metaphysical sense (to ‘form’, ‘to add a form [on matter]’), as it was found also in Democritus or Antiphon. A correct understanding of the verb leads to a new interpretation of this passage of Aristotle, by revealing a more complete and accurate criticism of the theses that he intends here to denounce. © 2022 Librairie Philosophique J. Vrin. All rights reserved.

Levystone, D. (2022). Du Rythme et des Opposés: Note sur Aristote Métaphysique Λ 1075b12-13 : ἐὰν μὴ ῥυθμίσῃ τις. *Philosophie Antique*, (22), 213-233. doi: 10.4000/philosant.6268. Article.

NOTE ON THE ORIGINAL MEANING OF GREEK AITIOS

ABSTRACT. Greek poetical, judicial, philosophical, and medical texts of the classical period use the term, as well as several derivative terms, to indicate which persons, things, or facts are responsible for, or have caused, a state of affairs. The feminine substantive, 'responsibility', seems to have appeared only in the early fifth century, as does the neuter substantive. The full history of this word group is still to be written, though important overviews have already cleared the path for such a study. My contribution to this volume has a far more modest aim and can only constitute a first minor step to that end: to put forth a hypothesis on the archaic meaning of the word, which slightly modifies the usual understanding of it as referring to whom or what 'plays a part' or 'takes a part' in a situation. I will do so by focusing on the Homeric texts and most especially on the Iliad. © 2024 selection and editorial matter, Alberto Ross and Daniel Vázquez; individual chapters, the contributors

Levystone, D. (2023). Note on the Original Meaning of Greek Aitios. In A. Ross, & D. Vázquez (Eds.), *Cause and Explanation in Ancient Philosophy* (pp. 8-20). Routledge. doi: 10.4324/9781003306450-2. Book Chapter.

A HISTORICAL AND PHILOSOPHICAL APPROACH TO 'ABD AL-JABBĀR'S REFUTATION OF THE EASTERN CHRISTIAN CHRISTOLOGICAL AND TRINITARIAN DOCTRINES

ABSTRACT. Abd al-Jabbār (d. 1025), one of the most prominent Mū tazilites of the Bahshāmiyya branch of Bā' ra, refutes the Trinitarian and Christological doctrines in his most important work, *al-Muǧnī fī Abwāb al-Tawhīd wa al-ḥAdl* (*Summa of the Headings of God's Unity and Justice*). His refutation pro-vides relevant historical information – sometimes accurate and sometimes not – regarding the controversies among Eastern Christians. This information allows us to see the way in which a Muslim theologian understood and criticized two crucial Christian doctrines (the doctrine of the Trinity and the doctrine of the nature of Christ). His criticism also serves as a useful source for detecting philosophical concepts and vocabulary used by Eastern Christians but interpreted by a Muslim scholar, whose aim was, for apologetic reasons, to obtain a serious understanding of Christian vocabulary, and of course to refute their argumentation.

López-Farjeat, L. X. (2023). A Historical and Philosophical Approach to 'Abd al-jabbār's Refutation of the Eastern Christian Christological and Trinitarian Doctrines. *Parole de l'Orient*, 49, 399-430. Article.

NAṢR ḤĀMID ABŪ ZAYD'S USE OF CLASSICAL THEOLOGICAL AND PHILOSOPHICAL ISLAMIC SOURCES IN HIS QURĀNIC HERMENEUTICS

ABSTRACT. Naṣr Ḥāmid Abū Zayd (1943 - 2010) is one of the most controversial contemporary Egyptian scholars in the Islamic intellectual context. One of his main concerns was to apply textual criticism to the interpretations of the Qur' ān. This is not an easy task considering the divine status of the prophetic message. Abū Zayd's approach to the Arabic notion of interpretation (tá' wil) leads to an innovative and polemical approach to the Islamic prophetic message. Although Abū Zayd resorts to contemporary hermeneutics, I argue that he draws on three intellectual branches of classical Islam in which textual criticism was already being applied and, thus, made the bridge to hermeneutics and contemporary semiotic and semantic theories easier. These three branches are firstly, the Mū tazila, a rationalist theological school; secondly, the philosophical Sufism of Ibn' Arabī; and, finally, Shiite Qur' ānic exegesis. © 2024 Slovak Academy of Sciences. All rights reserved.

López-Farjeat, L. X. (2024). Ná' r' āmid Abū Zayd's Use of Classical Theological and Philosophical Islamic Sources in His Qur' ānic Hermeneutics. *Filozofia*, 79(8), 892-906. doi: 10.31577/filozofia.2024.79.8.4. Article.

RECOVERING CAUSALITY? IBN TAYMIYYA ON THE CREATION OF THE WORLD

ABSTRACT. Most philosophical and theological conceptions on causality (ta'līl) within the Islamic context are related to one of the subjects that has received most attention in scholarly literature, namely, the creation of the world. Given the enormous amount of literature that exists on causality, creation, and the nature of God as creator within the Islamic context, in this chapter I do not intend to reconstruct in detail the arguments of Avicenna (d. 1037), al-Ghazālī (d. 1111), Averroes (d. 1098), and Fakhr al-Dīn al-Rāzī (d. 1209). Nevertheless, I shall revisit some of their views to introduce the discussion I want to undertake, that is, the recovery of causality in the 14th-century religious controversial thinker Ibn Taymiyya (d. 1328). For Ibn Taymiyya, both philosophy (falsafa) and theology (kalām) were two innovative disciplines that encroached upon traditional views of religion. One would expect, from someone engaged to traditional Islam, that he would advocate creatio ex nihilo. However, Ibn Taymiyya was opposed to both the kalāmīc notion of creatio ex nihilo and Avicenna's conception of eternal emanation. While Ibn Taymiyya had plenty of disagreements with the philosophers, he endorsed perpetual creation, an idea already found in Avicenna and Averroes. Several works have recently been published pointing out the influence of Averroes on Ibn Taymiyya. It is well-known that Averroes refuted al-Ghazālī's denial of natural causality. In addition to Averroes, Ibn Taymiyya, an 'anti-philosophical' thinker, also recovered the notion of causality. Here I discuss to what extent Ibn Taymiyya takes up causality as understood by Averroes and to what extent he breaks away from him. © 2024 selection and editorial matter, Alberto Ross and Daniel Vázquez; individual chapters, the contributors.

López-Farjeat, L. X. (2023). Recovering Causality? Ibn Taymiyya on the Creation of the World. In A. Ross, & D. Vázquez (Eds.), *Cause and Explanation in Ancient Philosophy* (pp. 224-252). Routledge. doi: 10.4324/9781003306450-13. Book Chapter.



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RESEARCH ECOSYSTEM

2024

IS A PUBLICATION EDITED BY CENTROS CULTURALES DE MÉXICO, A.C.
AND BONA TERRA, A.C. (KNOWN AS UNIVERSIDAD PANAMERICANA)

Edited by
CENTROS CULTURALES DE MÉXICO, A.C.
in July 2025.

www.up.edu.mx



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