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2017

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Hecho en México

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PRESENTACIÓN

A sus cincuenta años la Universidad Panamericana está atravesando por un proceso de transformación profunda. De haber sido fundada como una institución enfocada a formar profesionistas de excelencia cuidando la inteligencia, la voluntad y el carácter, evoluciona también a ser una universidad de influencia e investigación.

El prestigio adquirido a lo largo de la historia de la universidad debe ser ahora puesto de manera especial al servicio de la sociedad con afán de transformarla, mejorarla con base en su visión cristiana. En palabras de san Josemaría Escrivá, fundador del Opus Dei e impulsor de la Universidad Panamericana:

[...] La universidad –os decía en otra ocasión solemne como la que hoy celebramos– no vive de espaldas a ninguna incertidumbre, a ninguna inquietud, a ninguna necesidad de los hombres. Y su corazón vibra, apasionado, cuando las investigaciones teológicas, jurídicas, biológicas o médicas– alcanzan la realidad sagrada de la vida. La universidad sabe que la necesaria objetividad científica rechaza justamente toda neutralidad ideológica, toda ambigüedad, todo conformismo, toda cobardía: el amor a la verdad compromete la vida y el trabajo entero del científico, y sostiene su temple de honradez ante posibles situaciones incómodas, porque a esa rectitud comprometida no corresponde siempre una imagen favorable en la opinión pública [...].

La universidad debe ser un factor eficaz de respuesta a las necesidades del mundo actual, convencida de que el entorno social sí se puede cambiar por tratarse de hechos humanos, no de la realidad en sí. Contrario al pesimismo antropológico, signo de la modernidad, desde la universidad se puede construir una visión esperanzadora del mundo.

Para cambiar el entorno social existen distintas vías, una –socorrida en el momento actual– pasa por el activismo y las respuestas inmediatas, muchas veces carentes de reflexión y profundidad, otra, parte de la idea de influir en la cultura a partir de la construcción de alternativas serias, de largo aliento construidas desde sede auctoritas, un prestigio socialmente reconocido.

Nosotros apostamos por la segunda vía, de allí la necesidad de que nuestra universidad crezca de forma importante en investigación científica (auctoritas) y construya mecanismos de mayor impacto en la cultura (influencia).

San Josemaría añadía la frase –bien escogida– que se encuentra grabada a los pies de su escultura en el campus México:

[...] Salvarán este mundo nuestro –permitid que lo recuerde–, no los que pretenden narcotizar la vida del espíritu, reduciendo todo a cuestiones económicas o de bienestar material, sino los que tienen fe en Dios y en el destino eterno del hombre, y saben recibir la verdad de Cristo como luz orientadora para la acción y la conducta [...].

De ello el enfoque propuesto con prioridad en lograr un mayor nivel de influencia basada en una investigación académica creciente.

En los últimos años hemos podido proponer a nuestros profesores metas ambiciosas de publicaciones científicas indexadas y las hemos alcanzado. Esto ha sido posible por el logro previo de otras metas institucionales o personales: estudio de un doctorado, publicación de tesis, textos, artículos en revistas indexadas o participación en congresos.

Este anuario es la suma del esfuerzo de muchas personas: profesores, secretarios de investigación, vicerrectores y rectores, por convertir a nuestra institución en aquello que vieron nuestros fundadores desde el inicio.

Sirva esto para documentar lo que se ha hecho hasta ahora y agradecer el empeño puesto en la calidad de publicaciones y mejoramiento del prestigio.



Dr. José Antonio Lozano Díez
Rector General
Universidad Panamericana e IPADE

PRÓLOGO

El mundo actual no adolece de información sino de conocimiento. Un conocimiento confiable y un saber comprometido que oriente a las personas y sirva de faro en sus decisiones. Una tarea no fácil para las instituciones que han tomado con seriedad su papel de influir positivamente en el siglo XXI.

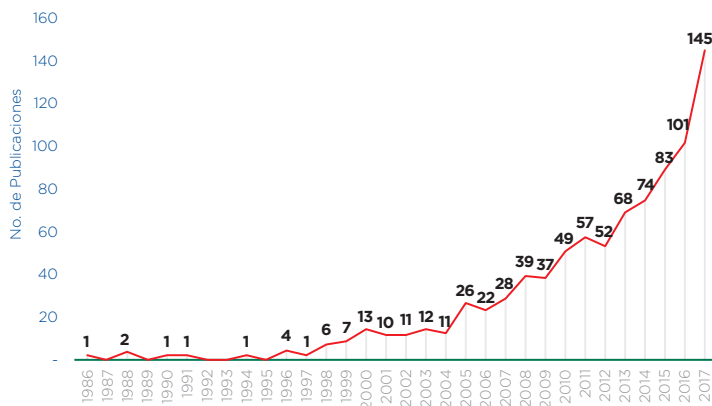
En el caso de las instituciones educativas, este compromiso se materializa tanto en la docencia como en la investigación y trasciende a las personas, en el afán de formar ciudadanos libres y solidarios.

Desde su fundación, la Universidad Panamericana ha estado preocupada por cumplir los tres objetivos de cualquier universidad: transmitir el conocimiento, conservarlo y generarlo. Pero es desde el año 2014, de acuerdo a los lineamientos estratégicos definidos por la Rectoría General, que la Universidad Panamericana ha decidido transitar hacia una universidad de investigación e influencia.

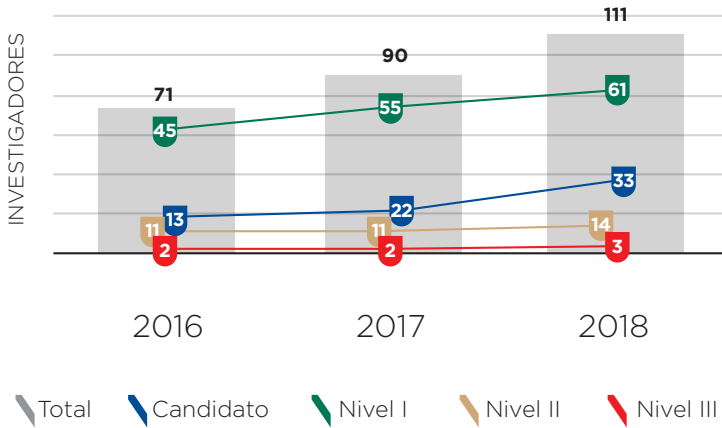
No es posible seguirse llamando Universidad si no se hace investigación y si esa tarea no está vinculada al desarrollo social en sus múltiples dimensiones. Asociada, sin duda, al crecimiento tecnológico, pero también a todas las otras necesidades humanas: educación, familia, salud, empresa, etc.

Para lograrlo, los primeros objetivos se enfocaron en elevar el nivel de producción científica con visibilidad internacional, así como incrementar el número de profesores miembros del Sistema Nacional de Investigadores.

Para la producción científica, desde el primer momento se trazaron unas metas concretas y, al mismo tiempo, se comenzó con el establecimiento de políticas y bases institucionales que permitieran un crecimiento sostenido. Para el 2016 logramos superar el umbral de las 100 publicaciones científicas, lo que nos permitió por primera vez ser incluidos en el Scimago Institutions Ranking. El avance logrado hasta el año pasado (2014 al 2017), refleja un crecimiento del 96 % –un anual compuesto del 25 %– como se observa en el gráfico.



En el caso de profesores miembros del Sistema Nacional de Investigadores, se ha logrado un crecimiento del 56 % de 2016 a la fecha, con un incremento anual compuesto del 25 %.



Seguimos en una primera etapa dedicada a sentar las bases, proponiendo políticas y creando los primeros servicios para la investigación: traducciones y correcciones, fondos para publicaciones en acceso abierto (*open access*) y petición de recursos bajo demanda (*on-demand*), por mencionar algunos; pero es un buen momento para hacer el recuento de los hechos y comunicar los logros.

Desde el Consejo Institucional de Investigación se vio conveniente publicar un primer anuario de investigación que recopila las publicaciones científicas de 2017, un año histórico en nuestras propias dimensiones, por el número de publicaciones científicas.

Detrás de estas cifras hay algo más importante, el trabajo de cada profesor investigador, cuyo esfuerzo se puede ver plasmado en este anuario. Nuestro reconocimiento a todos y cada uno de ellos y un agradecimiento especial a toda la comunidad académica y directiva que han incentivado y acompañado el logro de los objetivos trazados en materia de investigación.

Dr. Abraham Mendoza Andrade
 Director Institucional de Investigación
 Universidad Panamericana

DEPARTAMENTO DE HUMANIDADES

Anuario Institucional de Investigación 2017



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Dr. Claudio César Calabrese
SNI Nivel I

AGUSTÍN DE HIPONA Y SU RECEPCIÓN DEL MITO MANIQUEO

ABSTRACT. In this article, we follow the reception made by Augustine of Hippo of the Manichean myth; in this, we see his visceral reaction against the doctrine of Mani, since-in addition to the apologetic elements properly-there is a clear attempt to take psychological distance from a religious experience that marked it in depth, in every way. In this controversial context, we can also discern central aspects of a text that had liturgical value and which, as such, was of capital importance to the Manichaean communities. This Augustinian reading has as horizon the near collapse of the Roman Empire of the West and the ever-increasing confrontation of Constantinople with Persian Empire, the mobility of its borders and the partly political and partly religious persecutions that Manichaeism underwent. © 2018 Universidad Complutense de Madrid.

Calabrese C. C. (2017), Augustine of Hippo and his reception of the Manichaean myth. *Contra epistulam manichaei quam vocant fundamenti* [Augustin de Hipona y su recepción del mito maniqueo. *Contra Epistulam Manichaei quam vocant Fundamenti*], *Ilu. Revista de Ciencia de las Religiones* 22: 53-70, doi: 10.5209/ILUR.57408, Article.



Dr. Claudio César Calabrese
SNI Nivel I

LITERATURA Y TEOLOGÍA EN EL LIBRO X DE LA CIUDAD DE DIOS

ABSTRACT. This paper articulates literature and theology under the following hypothesis: a text of Virgil uprooted from the classical culture and placed in the historical and intellectual scope of Late Antiquity enables the theological articulation of the two cities in Augustine. According to the quote and comment in the City of God X, 27, the literary testimony gives ground to a theological assertion. The demonstration of the hypothesis is organized in four steps: a) Virgil is a key interpretation of Western Tradition; b) the presentation of Virgil's Eclogue IV in its context is always in relation with the subject of the article; c) the identification of Roman political history with the Sibylline Books; d) the description of Book X of the City of God and the core of the dispute with the neoplatonic demonology; e) conclusions. The conclusion of the article is the Augustinian conception that sees in Virgil a transit from myth to religion.

Calabrese, C. C. (2017), Literature and theology in the book X of the city of God = Literatura y teología en el libro X de La Ciudad De Dios, *Classica et Christiana* 12: 69-88, Review.



Dr. Claudio César Calabrese
SNI Nivel I

TRÁNSITO DE LA FENOMENOLOGÍA A LA HERMENÉUTICA. HEIDEGGER LECTOR DE CONFESIONES X, 1-23

ABSTRACT. In this paper, we track the young Heidegger's reading on Book X (chapters 1-23) of Confessions; it shows, on the one hand, the refutation of those positions that seek to achieve a synthesis of different epochs and that, therefore, necessarily draw out of reality Augustine's "now" and his "self" in this case. Then, we follow closely the various steps of Heidegger's process of reading and its results.

Calabrese, C. C. (2017), Transit from phenomenology to hermeneutics. Heidegger reader of St. Augustine's Confessions X, 1-23 [Tránsito de la fenomenología a la hermenéutica. Heidegger lector de Confesiones X, 1-23], *Open Insight* 8(13): 189-215, Article.

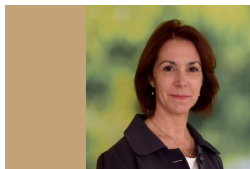


Dra. María Teresa Enríquez Gómez
Profesor Investigador

IDENTIFICACIÓN E IDENTIDAD EN HARRY FRANKFURT

ABSTRACT. What is personal identity? Frankfurt's thought and the modifications it undergoes following objections by Velleman, Penelhum, Watson and Korsgaard are instructive because they highlight the scope and limitations of a gradual radicalization of a strictly individual self-constitution of one's own volitional identity. This article traces that intellectual trajectory, which goes from those acts most amenable to immediate voluntary control (identification with a second-order desire and decisive and wholehearted identification) to those that are least amenable to it, but nonetheless self-imposed (volitional necessities, and necessities of love). In the end, Frankfurt admits there is a certain innate love. D. R. © Ángel Enrique Garrido Maturano, Ciudad de México, julio-diciembre.

Enríquez Gómez, M. T. (2017), Harry Frankfurt on identification and identity [Identificación e identidad en Harry Frankfurt1], *Signos Filosóficos* 19(38): 90-117, Article.



Dra. Ethel Beatriz Junco de Calabrese
Profesor Investigador

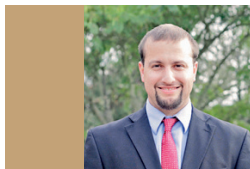
LA BELLEZA EN EL CUENTO MARAVILLOSO

ABSTRACT. The artistic-literary manifestation is a privileged space where to know and like the tradition. The oldest and subtle expressions of wisdom take shape are transmitted over the centuries in poetry, and in the folk tales; through them, transits a fundamental way of education, which awakens the meaning and fills the memory of men.

In this presentation, we will consider the story as an object of analysis wonderful, also known as “fairy”, by the interaction of elements natural / supernatural, or “folkloric”, by its anonymous origin and its oral transmission. Within this narrative both stories are recognized of popular origin in general, where the German Märchen are expression privileged (the case of the Kinder und Hausmärchen of the Jacob brothers and Wilhelm Grimm²) as the author stories that mimic the narrations originals or generate their own creations (such as Hoffmann, Hauff, Perrault or Andersen).

All these stories confirm similarities in structure, themes and characters that do not threaten variety and fantasy, but suggest origin and similar functions.

Junco de Calabrese, E. (2017), La belleza en el cuento maravilloso, *Espíritu* 66(153): 185-203, Article.

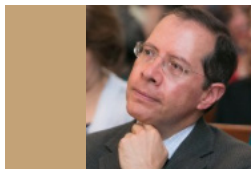


Dr. Francisco José Romero Carrasquillo
SNI Nivel I

LA SACRA DOCTRINA COMO CIENCIA IMPERFECTA QUOAD NOS EN TOMÁS DE AQUINO: NUEVAS REFLEXIONES A PARTIR DE ALGUNAS EDICIONES CRÍTICAS RECIENTES

ABSTRACT. As is well known, in his *Summa Theologiae* Thomas Aquinas defends from an Aristotelian perspective the scientific nature of sacra doctrina, arguing that it is a science that is subaltern to the knowledge that God has of Himself. Thomas' interpretation of the Aristotelian doctrine on science allows him to argue that the conclusions of sacra doctrina are reducible to the articles of the faith as to its first principles. What is not well known, however, is that St. Thomas in other texts modifies his view on the way in which sacra doctrina fulfills the requirements for a science? This has been made evident in part by certain recent critical editions, such as Boyle's edition of the *Lecture Romana*, and especially by Oliva's edition of the prologue to the *Commentary on the Sentences*. Although the articles of the faith are evident in themselves (*per se*), these texts, seen chronologically, show that throughout his career Aquinas hesitates in acknowledging that from our perspective (*quoad nos*) the articles of the faith are neither evident nor demonstrable, but are objects of religious faith. Throughout these texts Aquinas progressively admits that there exists an imperfection in the mode in which we know sacra doctrina in this life (*in via*); therefore, sacra doctrina in a certain way falls short of the perfect ratio of science, at least *quoad nos*.

Romero Carrasquillo, F. J. (2017), *Sacra doctrina as imperfect science quoad nos in Thomas Aquinas: New reflections on the basis of recent critical editions* [La sacra doctrina como ciencia imperfecta quoad nos en Tomás de Aquino: nuevas reflexiones a partir de algunas ediciones críticas recientes], *Tópicos* 52: 67-87, Article.

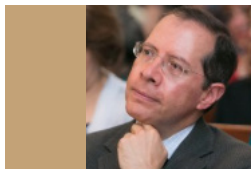


Dr. David Ezequiel Téllez Maqueo
SNI Nivel I

LA RELACIÓN DE LA VOLUNTAD CON LAS PASIONES SEGÚN BUENAVENTURA DE BAGNOREGIO Y TOMÁS DE AQUINO

ABSTRACT. Both Aquinas and Bonaventure have dedicated some passages of their commentary on Peter Lombard's Sentences to address the role of passions vis-à-vis the self-mastery performed by the will. In order to underscore the differences between both proposals, some authors (v.gr. N. LOMBARDO, *The Logic of Desire*) have posed the existence of a better capability of will in Aquinas to rule the passions of the concupiscible and irascible appetites, as opposed to a less availability of the passions to be manageable in Bonaventure, seemingly due to a supposed autonomy of the passions before the will and as if they were an inherent 'threat' to virtue according to the latter. This article discusses to what extent that comparison portrays Bonaventure's opinion on the matter. © 2017 Vita e Pensiero/Pubblicazioni dell'Università Cattolica del Sacro Cuore.

Téllez Maqueo D. E. (2017), La relación de la voluntad con las pasiones según Buenaventura de Bagnoregio y Tomás de Aquino, *Rivista di Filosofia Neo-Scolastica* 4: 909-921, Review.



Dr. David Ezequiel Téllez Maqueo
SNI Nivel I

LA RESPONSABILIDAD DE LA VOLUNTAD ANTE LAS EMOCIONES, SEGÚN LA ANTROPOLOGÍA AGUSTINIANA

ABSTRACT. In this article, I would like to examine various representative passages by Augustine of Hippo about the relationship between will and emotions, to define the limits of responsibility of human action under the influence of the most intense passion, according to the author. Simultaneously, I will endeavor to determine the impact of stoic philosophy on in Augustine's approach to the subject.

Téllez Maqueo, D. E. (2017), The responsibility of will before emotions, according Augustinian anthropology [La responsabilidad de la voluntad ante las emociones, según la antropología agustiniana], *Open Insight* 8(13): 71-99, Article.

ESDAI

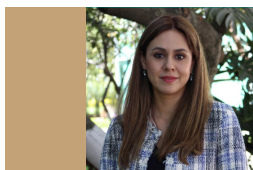
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M. en C. Nelsy Margarita García Caldera
Profesor Investigador



M. en C. Friné Velázquez Contreras
Profesor Investigador

AMARANTH PASTA IN MEXICO: A CELIAC OVERVIEW

ABSTRACT. Amaranth is one of the most representative crops in Mexico and could represent an alternative for consumers with celiac disease. Since it possesses no gluten, it can be included in the production of non-conventional starchy foods. This work was focused on the evaluation of process conditions and adequacy of a gluten-free lasagna. Four amaranth formulations containing corn and tapioca starches at different concentrations were analyzed. Ready-to-cook samples were obtained after drying (80 °C for 45 min). Pasta containing 8 % corn starch reported the highest stability during blending (1.5 min) and a firmness value of 16.060 kg. This formulation was subjected to sensory analysis by 10 celiac consumers. Overall acceptability received an average score of 4.7 on a 9-point hedonic scale with a possible intention of buying.

García-Caldera, N. & Velázquez-Contreras, F. (2017), Amaranth Pasta in Mexico: A Celiac Overview, *Journal of Culinary Science & Technology*, 1-9, doi: 10.1080/15428052.2017.1405862, Article in Press.

ESCUELA DE CIENCIAS ECONÓMICAS Y EMPRESARIALES

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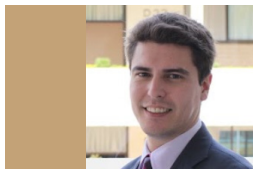


Dr. Santiago González Gómez
Profesor Investigador

BENCHMARKING CORPORATE SOCIAL RESPONSIBILITY AGAINST PRINCIPLES FOR RESPONSIBLE MANAGEMENT EDUCATION

ABSTRACT. Universities are educating students to become future leaders, managers and entrepreneurs. The need to incorporate and develop corporate social responsibility within university programs is necessary for future decision makers. We benchmark corporate social responsibility curriculum against the Principles for Responsible Management Education in two different contexts: A Mexican University and a Canadian University. Through a comparative case study process, we find that both programs have similarities and differences with PRME on issues of perceiving corporate social responsibility as a strategic management tool that adds value to the organization, the role of entrepreneurs and the responsibility they have towards the different stakeholders, as well as the globalization phenomena and the foundations of social responsibility. The paper contributes insight into how higher education institutes play a role in developing and preparing students as stakeholders who can not only ensure standards of corporate social responsibility but also how social responsibility is maintained. Copyright © 2017 Inderscience Enterprises Ltd.

González, S., Eroglu, M. S. & Barragan, S. (2017), Benchmarking corporate social responsibility against principles for responsible management education, *International Journal of Management in Education* 11(3): 330-346, doi: 10.1504/IJMIE.2017.084945, Article.

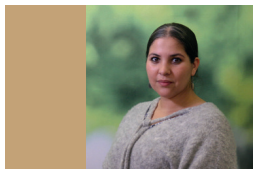


Mtro. José Domingo Lázaro Álvarez
Profesor Investigador

ASSESSING THE OPPORTUNITIES FOR VIRTUAL, AUGMENTED, AND DIMINISHED REALITY IN THE HEALTHCARE SECTOR

ABSTRACT. The use of new technologies in the health-care sector has increased considerably in recent years, especially in terms of developing the potential benefits of Virtual Reality (VR), Augmented Reality (AR), and Diminished Reality (DR). These technologies allow for the diffusion of information and specified knowledge to aid in making critical and complex decisions. This chapter explores the adoption and absorption of VR, AR, and DR in the health-care field. It analyzes the evolution, the advantages and disadvantages, as well as providing perspectives on the future growth and impact of these innovations.

Cacho-Elizondo, S., Álvarez, J.-D. L. & Garcia, V.-E. (2017), Assessing the opportunities for virtual, augmented, and diminished reality in the health-care sector, In *The Digitization of Healthcare: New Challenges and Opportunities*, 323-344, doi: 10.1057/978-1-349-95173-4_18, Book Chapter.



Dra. Andrée Marie López Fernández
Profesor Investigador

CORPORATE SOCIAL RESPONSIBILITY AND CORPORATE GOVERNANCE: ANALYSIS ACROSS INDUSTRIES IN MEXICO

ABSTRACT. Corporate Social Responsibility (CSR) and corporate governance are two distinct concepts that may seem to be isolated in practice. However, there are many parallels to the extent that the latter may define the engagement of the former. As such, it may be argued that corporate governance is essential to the implementation of CSR. Thus, a question arises, are firms' governance policies conducive to the engagement in corporate social responsibility? This study aims to evaluate the dynamics between corporate social responsibility and corporate governance of multinational firms operating in Mexico. Findings indicate that the practice of disclosing corporate social responsibility is more common than the transparent communication of corporate governance; however, the compliance with corporate governance is consistent with that of corporate social responsibility within the analysed firms. © 2018 by IGI Global. All rights reserved.

López Fernández, A. M. (2017), Corporate social responsibility and corporate governance: Analysis across industries in Mexico, In *Operations and Service Management: Concepts, Methodologies, Tools, and Applications*, 1673-1692, doi:10.4018/978-1-5225-3909-4.ch076, Book Chapter.



Dr. Francisco Ortiz Arango
SNI Nivel I

COMPETITION BETWEEN AGRICULTURAL FOODS AND BIOFUELS: REFEREES' RESPONSE TO "THE NONLINEAR RELATION BETWEEN BIOFUELS AND FOOD PRICES"

ABSTRACT. In reviewing the paper "The nonlinear relation between biofuels and food prices", written by Cruz Ake (2017), several issues were left out by the author: 1) a comparison of the paper's results with traditional non-linear econometric analysis, as Markov switching regime models; 2) a comparative analysis of the long-run relationship between biofuels (bioethanol and biodiesel) consumption and its demand determinants, namely, competitive goods, their prices, world's GDP (economic activity) and climate phenomena, and 3) an explanation for the volatility regarding non-linearities in the biofuels consumption and its determinants. Under this framework to complement Cruz Ake's (2017) work, we perform a traditional cointegration analysis to assess the impact of the long-run components of the biofuel demand. We find a significative statistical consistency in the three cointegration equations from a six-equation system. Moreover, we find two volatility regimes of the biofuel consumption, which is also consistent with the empirical evidence from Cruz Ake's (2017) paper. Although Cruz Ake (2017) contributes to the current discussion on the subject matter, it remains to consider, more carefully, other essential issues that invited us to a deeper academic debate: 1) the distribution of innovations that drives the biofuel consumption and its price may not be Student's *t* nor a Generalized Extreme Value (GEV) distribution; 2) the stochastic process that guides the biofuels consumption and its price may not be stable over time, and 3) the cointegration analysis may be done by assuming fractional cointegration. Finally, it is worth noticing that Cruz Ake's (2017) paper may be extended in different ways such as: 1) the long-run sustainability of the biofuels consumption; 2) the effect of the agricultural foods and fuel prices volatilities on the economic welfare, and 3) the effect of changes in agricultural foods and energy prices on poor people. Needless to say, all the above stated points encourage to a wider and deeper debate.

Ortiz Arango, (2017), Competition between agricultural foods and biofuels: Referees' response to "The nonlinear relation between biofuels and food prices", *Investigación Económica* 76(299): 26-50, Article.



Dr. Francisco Ortiz Arango
SNI Nivel I

LEVERAGED EXCHANGE TRATED FUNDS'S EMERGING MARKETS: A PRACTICAL APPLICATION OF STATISTICAL ARBITRAGE BASED ON COINTEGRATION

ABSTRACT. Pair Trading is a Neutral Market Strategy descendant of Statistical Arbitrage. Its objective is to identify pairs of assets whose historical prices or variations have high correlation between them. To attain this, pairs trading takes advantage of overvalued assets sales and purchases undervalued assets. To identify the goal pair, we performed back-testing using historical log returns (from December 31, 2008 through April 16, 2013). With the goal pair identified, we run the daily strategy using historical adjusted at closed price data and historical log returns (from December 31, 2010 through September 11, 2015). Herein, we consider two inverse Exchange Trade Funds versus benchmark EEM (iShares MSCI Emerging Markets ETF) index. The objective of this work is to demonstrate that automated trading strategy built under the co-integration approach in moving windows of 60 and 180 days is able to beat a buy and hold strategy on the EEM benchmark. © 2017, ASERS Publishing House. All rights reserved.

Ortiz-Arango, F., Urrutia-Martínez, D. U. & Flores-Méndez, A. (2017), Leveraged exchange trated funds' emerging markets: A practical application of statistical arbitrage based on cointegration, *Journal of Applied Economic Sciences* 12(1): 9-24, Article.



Dr. Francisco Ortiz Arango
SNI Nivel I

PRONÓSTICO DE PRECIOS DE PETRÓLEO: UNA COMPARACIÓN ENTRE MODELOS GARCH Y REDES NEURONALES DIFERENCIALES

ABSTRACT. The aim of this paper is to show the advantages of the use of neural networks differentials (RND) as an efficient alternative method in calculating the forecasts of future prices of financial assets, for which a comparison is made with models of the GARCH family, to carry out the forecast of future closing price of crude oil barrels, types West Texas International and Brent. The results shows that the use of RND has essentially the same accuracy as the values obtained with the TGARCH (1, 1) model and are superior to those obtained by the GARCH (1, 1) model to calculate price forecasts barrels of crudes Brent and WTI respectively during the period of description, from January 2, 2013 to February 24, 2015 and the forecast period from February 25 to March 10, 2015. However, the effort made to obtain such results with the family of GARCH models is significantly higher than when using the RND, this supports the proposal to use the RND as a reliable alternative method in the analysis of time series. © 2017 Universidad Nacional Autónoma de México, Facultad de Economía.

Ortiz Arango, F. (2017), Pronóstico de precios de petróleo: una comparación entre modelos GARCH y redes neuronales diferenciales, *Investigación Económica* 76(300): 105-126, doi: 10.1016/j.inveco.2017.06.002, Article.

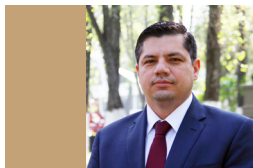


Dr. Francisco Ortiz Arango
SNI Nivel I

TRANSMISSION OF FUTURE PRICES OF CORN OF THE CHICAGO BOARD OF TRADE TO THE MEXICAN SPOT MARKET

ABSTRACT. In Mexico, the use of the coverage program of the Bureau of Market Services and Agricultural Market Development (ASERCA for its acronym in Spanish) is a tool that has been used by corn producers (mainly for white corn) for the acquisition of derived products in the CBOT (Chicago Board of Trade), the underlying element of which is US#2 grade yellow corn. In a high volatility environment regarding the prices of corn, the prices of CBOT should be adjusted with the spot domestic prices to incentivize Mexican producers to participate in the program. However, through a multivariate stochastic volatility analysis during the period of 2007–2012, it was shown that the future price of corn is not strongly related to the prices registered in some states of the country, therefore, it can be inferred that the coverage through the ASERCA program does not properly comply with its objective of protecting the national farmers that grow white corn, despite the fact that its use has increased. © 2017 Universidad Nacional Autónoma de México, Facultad de Contaduría y Administración.

Ortiz Arango, F. & Montiel Guzmán, A. N., (2017), Transmission of future prices of corn of the Chicago Board of Trade to the Mexican spot market [Transmisión de precios futuros de maíz del Chicago Board of Trade al mercado spot mexicano], *Contaduría y Administración* 62(3): 924-940, Article.

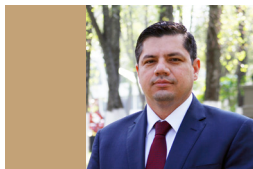


Dr. Omar Guillermo Rojas Altamirano
SNI Nivel C

ADAPTIVE MARKET HYPOTHESIS: EVIDENCE FROM THE MEXICAN STOCK EXCHANGE INDEX

ABSTRACT. This paper is aimed at studying the Adaptive Market Hypothesis (AMH) of the Mexican Stock Exchange Index (IPC, for its acronym in Spanish). To do this, we apply: 1) unit-root tests, 2) nonlinear tests, and 3) episodic nonlinearity tests. The main empirical finding is that the IPC goes through plenty of periods where the market behaves in an efficient way. That is, as a random walk, followed by some periods of adaptability where non-linearity in the series of the IPC returns is found. © 2017, ASERS Publishing House.

Rojas, O., Coronado, S. & Venegas-Martínez, F. (2017), Adaptive market hypothesis: Evidence from the Mexican stock exchange index, *Journal of Applied Economic Sciences* 12(3): 687-697, Article.

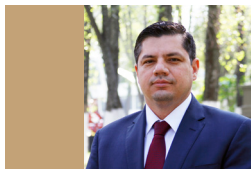


Dr. Omar Guillermo Rojas Altamirano
SNI Nivel C

CAUSALITY PATTERNS FOR BRENT, WTI, AND ARGUS OIL PRICES

ABSTRACT. Causality patterns are analysed for daily Brent, West Texas Intermediate (WTI), and Argus Sour Crude Index (Argus) oil prices, Argus is the reference price for exports from Saudi Arabia, Kuwait and Iraq. Nonparametric Granger causality testing uncovers bi-directional causal links between Brent and WTI prices at multiple lags. Unidirectional causality from both Brent to Argus and WTI to Argus is also documented. If the current Saudi Arabia attempt to increase market share is successful, variations in Argus prices may start preceding movements in Brent and WTI, also. © 2016 Informa UK Limited, trading as Taylor & Francis Group.

Coronado, S., Fullerton, T. M., & Rojas, O. (2017), Causality patterns for Brent, WTI, and Argus oil prices, *Applied Economics Letters*, 1-5, doi: 10.1080/13504851.2016.1245830, Article.

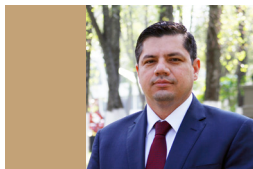


Dr. Omar Guillermo Rojas Altamirano
SNI Nivel C

DYNAMICS OF PROJECT-DRIVEN PRODUCTION SYSTEMS IN CONSTRUCTION: PRODUCTIVITY FUNCTION

ABSTRACT. Mathematical models have historically enabled a thorough understanding of production mechanisms in manufacturing supporting actions and laws to improve fabrication and building performance. Although much work has been done to date on modeling of production processes, more studies need to be conducted to understand the dynamics of these processes and develop mathematical relationships and laws that can reliably predict and manage project-driven production systems in construction. The purpose of this research is to explore the hypothesis that production processes in construction can be represented as dynamic systems in which a productivity function describes the time dependence of the systems' output-input relation. By considering the transient state, productivity function models were more accurate in describing the process dynamics than first-degree polynomials and the arithmetic mean, confirming the hypothesis. The contribution of this research to the body of knowledge is a new model that considers different states of project-driven processes. © 2017 American Society of Civil Engineers.

Antunes, R., González, V. A., Walsh, K. & Rojas, O. (2017), Dynamics of Project-Driven Production Systems in Construction: Productivity Function, *Journal of Computing in Civil Engineering* 31(5), Art. No: 4017053, doi: 10.1061/(ASCE)CP.1943-5487.0000703, Article.

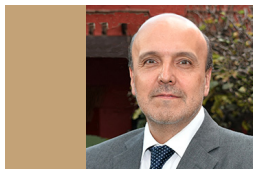


Dr. Omar Guillermo Rojas Altamirano
SNI Nivel C

SYNCHRONIZATION AND CHANGES IN VOLATILITIES IN THE LATIN AMERICAN'S STOCK EXCHANGE MARKETS

ABSTRACT. In this paper, we study a possible synchronization in volatility changes for some Latin America's stock exchange indexes. We also add the S&P 500 index to the analysis. We suggest a heterogeneity Markov switching model to capture changes in volatilities over time. To solve the problem of uncertainty in modeling each index, we suggest the Bayes Factor to identify the best Markov switching specification as the number of states, if any. We found that, all the daily growth rates for each index are well characterized by low, medium and high volatilities in different periods. We suggest some measures of synchronization based on the concordance by the changes in volatilities between the indexes. We show that, the Mexican, Chilean and the S&P 500 indexes are closer to each other than the rest. © 2017 Academic Publications, Ltd.

Cabrera, G., Coronado, S., Rojas, O. & Venegas-Martínez, F. (2017), Synchronization and changes in volatilities in the Latin American's stock exchange markets, *International Journal of Pure and Applied Mathematics* 114(1): 113-132, doi: 10.12732/ijpam.v114i1.10, Article.

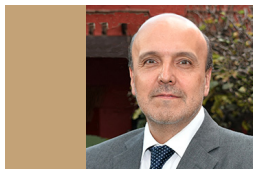


Dr. Juan de Dios Enrique Rosellón Díaz
SNI Nivel III

DISTRIBUTED PHOTOVOLTAIC POWER GENERATION: POSSIBILITIES, BENEFITS, AND CHALLENGES FOR A WIDESPREAD APPLICATION IN THE MEXICAN RESIDENTIAL SECTOR

ABSTRACT. Mexico plans to implement a national program to support the adoption of distributed photovoltaic generation (DPVG) among qualified households. The main objectives of such a program would be to reduce the burden of the substantial federal energy subsidy and increase the share of renewable energy sources used to generate electricity. In this paper, we assess the current conditions under which the Mexican residential electricity sector operates, and quantify the potential effects that the massive adoption of DPV systems would have on household expenditure and welfare, subsidy reduction, pollution and water resource usage. Based on the positive results in terms of both economic and environmental effects, our paper provides a significant support for further design and implementation of a DPVG program. © 2017 Elsevier Ltd.

Hancevic, P. I., Nuñez, H. M. & Rosellón, J. (2017), Distributed photovoltaic power generation: Possibilities, benefits, and challenges for a widespread application in the Mexican residential sector, *Energy Policy* 110: 478-489, doi: 10.1016/j.enpol.2017.08.046, Article.

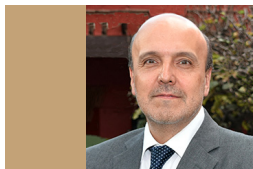


Dr. Juan de Dios Enrique Rosellón Díaz
SNI Nivel III

LINKS BETWEEN PRODUCTION AND CONSUMPTION OF ELECTRICITY WITH ECONOMIC PERFORMANCE IN MEXICO

ABSTRACT. Understanding the causal directions between electricity consumption (EC)/electricity production (EP) and Gross Domestic Product (GDP) is helpful for policymakers in order to design, redesign, and implement effective energy policies. Although there are many studies on this issue, no consistent conclusion exists. In this paper, we provide an updated analysis of such relationship for Mexico. We employ three causality tests and find no evidence of causal relation between EC/EP and GDP between 1965 and 2014. This has implications for the Mexican energy legislation liberalizing the electricity generation sector. Our results suggest that Mexican policymakers should consider enriching the bill by further designing policies that seek to promote enhanced generation output and capacity. © 2017 IEEE.

Massa, R. & Rosellón, J. (2017), Links between production and consumption of electricity with economic performance in Mexico, *International Conference on the European Energy Market*, EEM, Art. No. 7981859, doi: 10.1109/EEM.2017.7981859, Conference Paper.

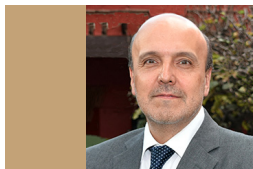


Dr. Juan de Dios Enrique Rosellón Díaz
SNI Nivel III

OPTIMAL TRANSMISSION PLANNING UNDER THE MEXICAN NEW ELECTRICITY MARKET

ABSTRACT. This paper addresses electricity transmission planning under the new industry and institutional structure of the Mexican electricity market, which has engaged in a deep reform process after decades of a state-owned-vertically-integrated-non-competitive-closed industry. Under this new structure, characterized by a nodal pricing system and an independent system operator (ISO), we analyze welfare-optimal network expansion with two modeling strategies. In a first model, we propose the use of an incentive price-cap mechanism to promote the expansion of Mexican networks. In a second model, we study centrally-planned grid expansion in Mexico by an ISO within a power-flow model. We carry out comparisons of these models, which provide us with hints to evaluate the actual transmission planning process proposed by Mexican authorities (PRODESEN). We obtain that the PRODESEN plan appears to be a convergent welfare-optimal planning process. © 2017 Elsevier Ltd.

Zenón, E. & Rosellón, J. (2017), Optimal transmission planning under the Mexican new electricity market, *Energy Policy* 104: 349-360, doi: 10.1016/j.enpol.2017.02.006, Article.

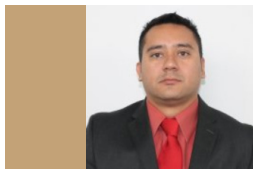


Dr. Juan de Dios Enrique Rosellón Díaz
SNI Nivel III

OPTIMAL TRANSMISSION TARIFF REGULATION FOR THE SOUTHERN BAJA-CALIFORNIAN ELECTRICITY NETWORK SYSTEM

ABSTRACT. The tariff imposed over the use of electricity transmission networks is one critical factor to achieve efficiency in electricity markets. In Mexico, the current transmission network tariffs are based on long run marginal costs. We propose an incentive price cap mechanism and apply it to the meshed network system in the isolated electricity system of Southern Baja California, Mexico. We further compare the current transmission tariffs set by the Mexican regulator (CRE) with the tariffs resulting from our regulatory scheme. We show that our mechanism prices the network at tariffs rendering superior welfare compared to the tariffs determined by Mexican authorities. © 2017 Universidad Nacional Autónoma de México, Facultad de Economía.

Espinosa R. & Rosellón J. (2017), Optimal transmission tariff regulation for the Southern Baja-Californian electricity network system, *Investigación Económica* 76(301): 3-56, doi: 10.1016/j.inveco.2017.12.001, Article.

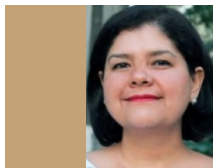


Dr. Edgar Demetrio Tovar García
SNI Nivel I

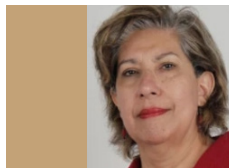
MARKET DISCIPLINE IN THE CENTRAL AMERICAN BANKING SYSTEM

ABSTRACT. The hypothesis of market discipline is empirically verified in the Central American banking system. A contrast is carried out on whether the riskier banks (the ones with the worst banking fundamentals) pay higher interest rates and receive smaller amounts in deposits. The generalized method of moments is used for dynamic panel data models (the SYS GMM estimator), as well as a sample of 30 banks from six Central American countries during the 2008–2012 period. Unlike the majority of the previous empirical literature, specifically for developed countries, no evidence of market discipline was found in Central America. The results are robust for several indicators of the banking fundamentals for purposes of internal demand of bank capital, and for other econometric models. These findings indicate weaknesses in the bank policy regarding the disclosure of information. © 2017 Universidad Nacional Autónoma de México, Facultad de Contaduría y Administración.

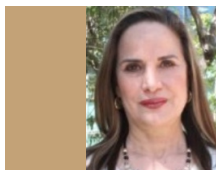
Tovar García, E. D. (2017), Market discipline in the Central American banking system, *Contaduría y Administración* 62(5): 1591-1609, doi: 10.1016/j.cya.2017.07.002, Article.



Dra. María Elena Gutiérrez Rentería
Profesor Investigador



Dra. Josefina Santana Villegas
Profesor Investigador

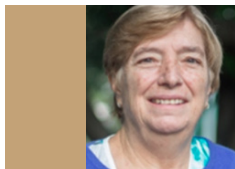


Dra. Martha Guadalupe Pérez Ayala Madero
Profesor Investigador

SMARTPHONE: USOS Y GRATIFICACIONES DE LOS JÓVENES EN MÉXICO EN 2015

ABSTRACT. This research is part of a study conducted between Chile, the United States and Mexico to identify how Hispanic young men and women use their smartphones. The purpose of the study is to identify the consumption habits, the preferences of this means as compared to others, as well as the main activities performed by young men and women in Mexico on their cell phones. The research method used in the study is a mixed method, as it uses techniques to obtain the results in a qualitative (through focal surveys) and quantitative (through online surveys) manner. The researched population is made by a group of young men and women from 18 to 25 years of age, currently enrolled at a private university from the metropolitan area of Guadalajara. Twenty-seven students participated in the focal surveys and 707 online surveys were conducted. Results show that smartphones have made available certain applications that instantly meet the different communication needs; youngsters use these devices for over five hours a day, WhatsApp being the most important social network to communicate with family and friends. In conclusion, you could say that, according to the population studied, the gender of the person is directly related to choosing the brand, time of consumption and, finally, choosing how to use the smartphones as compared to other online social networks and means of communication.

Gutiérrez-Rentería, M. E., Santana-Villegas, J. C. & Pérez-Ayala, M. (2017), Smartphone: Uses and rewards for Mexican youth in 2015 [Smartphone: Usos y gratificaciones de los jóvenes en México en 2015], *Palabra Clave* 20(1): 47-68, doi: 10.5294/pacla.2017.20.1.3, Article.



Dra. Clara Cristina Catarina Eccius Wellmann
Profesor Investigador



Mtro. Antonio Lara Barragán Gómez
Profesor Investigador

COMPARACIÓN DE PERFILES DE ANSIEDAD MATEMÁTICA ENTRE ESTUDIANTES MEXICANOS Y ESTUDIANTES ALEMANES

ABSTRACT. This article outlines the mathematics anxiety profiles of Mexican and German students by means of a questionnaire that has been drawn up ex professo. The mathematics anxiety can be defined around three description terms: beliefs, attitudes and emotions. The authors establish a Mathematics anxiety index and when they put it into practice; they observe that the German students tend to obtain a higher value, which means that they have a higher level of mathematics anxiety. The differences in the values of the Mathematics anxiety index can be understood in terms of cultural differences. This interpretation can be consistent with the cultural differences and matches the obtained results.

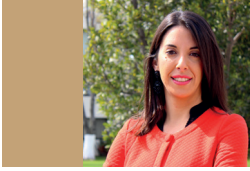
Eccius-Wellmann, C., Lara-Barragán, A. G., Martschink, B. & Freitag, S. (2017), A comparison of mathematics anxiety profiles between Mexican and German students [Comparación de perfiles de ansiedad matemática entre estudiantes mexicanos y estudiantes alemanes], *Revista Iberoamericana de Educación Superior* 8(23): 69-83, Article.

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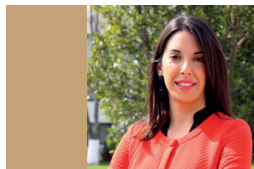


Dra. Elba Díaz Cerveró
SNI Nivel I

LA FICCIÓNALIZACIÓN DE LA FUGA DE JOAQUÍN GUZMÁN LOERA EN LA PRENSA MEXICANA. UN ESTUDIO DEL TRATAMIENTO EN LOS PERIÓDICOS "REFORMA", "EL UNIVERSAL", "LA JORNADA" Y "EXCÉLSIOR"

ABSTRACT. Reporting on drug trafficking could be considered complex from any point of view. The difficulties of those aspects of journalism are compounded even more so in Mexico which is considered one of the most dangerous countries in the world for reporters. This paper will show the results of a content analysis in the four main Mexican newspapers about the journalistic production related to the escape of Joaquin Guzmán Loera from Altiplano Penitentiary, a case that generated enormous international interest. The analysis of the data reveals that Mexican journalists' reporting tended to construct a narrative that varied between sensationalism and culture of fear.

Cerveró, E. D., Ibáñez, D. B. & Hueso, M. (2017) The fictionalization of Joaquin Guzman Loera leak in the Mexican press. A study of the characterization in Reforma, El Universal, la Jornada and Excélsior newspapers (2015) [La ficcionalización de la fuga de Joaquín Guzmán Loera en la prensa mexicana. Un estudio del tratamiento en los periódicos Reforma, El Universal, La Jornada y Excélsior (2015)], *Estudios Sobre el Mensaje Periodístico* 23(2): 773-792, doi: 10.5209/ESMP.58015, Review.

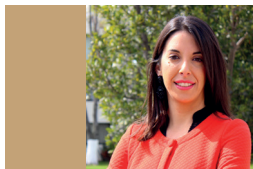


Dra. Elba Díaz Cerveró
SNI Nivel I

LA INTERACTIVIDAD EN EL PERIODISMO DIGITAL LATINOAMERICANO. UN ANÁLISIS DE LOS PRINCIPALES CIBERMEDIOS DE COLOMBIA, MÉXICO Y ECUADOR

ABSTRACT. Latin America, in general terms, is a continent with several contextual levels, which depend on historic, economic, political and social characteristics. Despite all this, there are aspects –such as digital divide– that occur again, to a greater or lesser extent, in the different Latin American countries. This digital divide promotes partially disconnected –and thus, invisible– societies, and tends to slow down possibilities of innovation and development of digital journalism. Methodology: In this study, and from the methodology proposed by Rodríguez, Codina & Pedraza (2012), we have analysed the management of interactivity in the main digital media in Mexico, Colombia and Ecuador in 2016. Results and conclusions: The results show a generally low implementation of interactivity options in digital ecosystems in these three Latin American countries. © 2017, University of La Laguna.

Barredo-Ibáñez D., Díaz-Cerveró E., Garzón K. T. P., Del Rosario Gómez R., Pérez S., Nava F. E., Quintero N. F. & Estrada L. G. (2017), Interactivity in Latin American digital journalism. An analysis of the main digital media of Colombia, Mexico and Ecuador (2016) [La interactividad en el periodismo digital latinoamericano. Un análisis de los principales cibermedios de Colombia, México y Ecuador (2016)], *Revista Latina de Comunicación Social* 72: 273-294, doi: 10.4185/RLCS-2017-1165, Article.

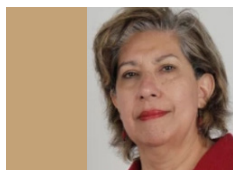


Dra. Elba Díaz Cerveró
SNI Nivel I

LAS POSIBILIDADES DE PARTICIPACIÓN DE LOS USUARIOS EN LOS PRINCIPALES CIBERMEDIOS NACIONALES MEXICANOS

ABSTRACT. In this research, we raise the question of which are the real possibilities of participation offered by Mexican cybermedia to their users. As an evaluation method, we applied an adaptation of the matrix created by Rodríguez, Codina and Pedraza (2012) to a group of 46 Mexican national cybermedia. The results indicate that the more interactive Mexican cybermedia are El Universal, Milenio and Excélsior, paradoxically three media which are not digital natives. As a conclusion, we identified a tendency to partially block the options related to the users' creativity, something that is also found in conventional journalism, which restricts the development of communities of readers around the cybermedia evaluated.

Díaz-Cerveró E. & Ibáñez, D. B. (2017), The possibilities of user participation in the main Mexican national cybermedia [Las posibilidades de participación de los usuarios en los principales cibermedios nacionales mexicanos], *Cuadernos.info* 40: 53-69, Review.

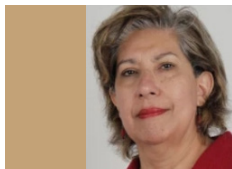


Dra. Josefina Santana Villegas
Profesor Investigador

MEASURING ATTITUDE TOWARD LEARNING ENGLISH AS A SECOND LANGUAGE: DESIGN AND VALIDATION OF A SCALE

ABSTRACT. English is becoming increasingly important as a means of communication in universities around the world. More and more universities in non-English speaking countries are requiring that their students prove their level of English, either upon entering the university, or for graduation. This is the case in most private institutions of higher education in Mexico. Public universities in the country are also beginning to require English. Thus, many learners have an extrinsic, but not necessarily intrinsic, motivation to learn. That is, they decide to learn the language because they must, not because they want to. Considering that, attitude and motivation have an important impact on language learning, the objective of this study was to develop an instrument to measure these two constructs. A scale was designed and validated to measure the following elements, which make up attitude related to English language learning: self-confidence, motivation, commitment, importance, sense of belonging, and need for the language. To this end, surveys were applied to postgraduate students of the Universidad Cristóbal Colón Campus Calasanz. The study found that motivation to learn the language was an important factor, whereas self-confidence in one's abilities was not.

Santana, J. C., García-Santillán, A., Ferrer-Nieto, C. & López-Martínez, M. J. (2017), Measuring attitude toward learning English as a second language: design and validation of a scale, *Journal of Psychological and Educational Research* 25(2): 165-182, Article.

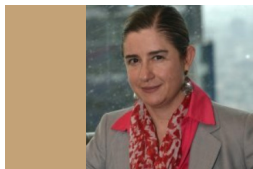


Dra. Josefina Santana Villegas
Profesor Investigador

VARIABLES AFFECTING PROFICIENCY IN ENGLISH AS A SECOND LANGUAGE

ABSTRACT. This study explores different variables leading to proficiency in English as a second language. Level of English on a placement exam taken upon entering a private university in Mexico was correlated to several variables. Additionally, participants (N = 218) were asked their perception of their own proficiency. A linear regression and a one-factor ANOVA were carried out. Three variables best explain the level obtained on the placement exam. These are number of instruction hours, type of school, and how frequently the learner reads in English. Findings also show that the participants' perception of their proficiency corresponds to the results obtained on the placement test. © 2017 by Academic Publishing House Researcher s.r.o.

Santana, J. C., García-Santillán, A., Escalera-Chávez, M. E., (2017), Variables affecting proficiency in English as a second language, *European Journal of Contemporary Education* 6(1): 138-148, doi: 10.13187/ejced.2017.1.138, Article.



Dra. María Teresa Nicolás Gavilán
SNI Nivel I



Dra. Sara Elvira Galbán Lozano
Profesor Investigador

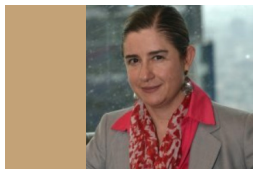


Dra. Claudia Fabiola Ortega Barba
Profesor Investigador

THE NEWSROOM: THE USE OF A TELEVISION SERIES FOR ETHICAL TRAINING OF FUTURE INFORMATION PROFESSIONALS

ABSTRACT. How can we foster ethical professional behavior in communication students? In order to answer this question, this article describes how a TV series was used in university teaching as a learning tool. This article consists of three sections: first, university teaching is presented as the context and professional ethics as the curricular space where the proposal is developed; second, we show why the use of TV dramas, besides motivating student interest, facilitates the acquisition of knowledge, skills, and ethical attitudes; third, we describe the use of a TV series, The newsroom, in the classroom and some testimonies that demonstrate the effectiveness of the strategy for the understanding of the subject content. © 2017, El Profesional de la Información. All rights reserved.

Nicolás-Gavilán, M. T., Galbán-Lozano, S. E. & Ortega-Barba, C. F. (2017). The newsroom: The use of a television series for the ethical training of future information professionals. [The newsroom: uso de una serie de televisión para la formación ética de futuros profesionales de la información] *Profesional de la Información* 26(2): 277-282, doi:10.3145/epi.2017. mar.14. Article.



Dra. María Teresa Nicolás Gavilán
SNI Nivel I



Dra. Sara Elvira Galbán Lozano
Profesor Investigador



Dra. Claudia Fabiola Ortega Barba
Profesor Investigador

TELEVISION SERIES USE IN TEACHING AND LEARNING PROFESSIONAL ETHICS IN COMMUNICATION

ABSTRACT. The work presented here is an exploratory and descriptive study under a qualitative approach. Its purpose was to show the use of television series, as a means of teaching and learning professional ethics in communication undergraduate students. Among the results, we found two direct areas of impact: teaching and learning. In the case of teaching, the professor shows an innovative practice and she realized different ways to improve it as a continuous way to advance her teaching. In the case of learning, the use of television series promoted the interest of the students and a significant learning. However, the most important finding of this study is that the teaching experience has contributed in the educational process of communicators specifically in ethical thinking. © Media Watch.

Nicolás-Gavilán M. T., Ortega-Barba C. F., Galbán-Lozano S. E. (2017), Television series use in teaching and learning professional ethics in communication, *Media Watch* 8(1): 44-58, doi: 10.15655/mw/2017/v8i1/41271, Article.

ESCUELA DE GOBIERNO Y ECONOMÍA

Anuario Institucional de Investigación 2017



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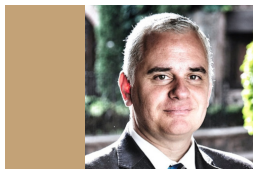


Dr. Cuauhtémoc Calderón Villarreal
SNI Nivel III

ANÁLISIS COMPARATIVO DE LA DESIGUALDAD SALARIAL ENTRE MÉXICO Y ESTADOS UNIDOS

ABSTRACT. The structure of the labor demand in the industrialized countries has changed and has caused an increase in the wage inequality among the different groups of workers (skilled and unskilled), while, in the developing countries this inequality has decreased. The actual paper analyses the factors that determine the wage inequality that exists between countries with bordering borders, like Mexico and the United States of America. The statistical analysis was developed for the 2005-2012 period, with data from the Encuesta Nacional de Ocupación y Empleo (ENOE) and the Current Population Survey (CPS). It was disaggregated the Gini Index with an approach of cooperative games. The results revealed that in Mexico, during the analyzed period, the wage inequality was reduced, while in the United States, it increased. © 2017 Universidad Nacional Autónoma de México, Facultad de Economía.

Calderón Villarreal, C., Reynoso, L. H., Adame, G. L. O. (2017), Análisis comparativo de la desigualdad salarial entre México y Estados Unidos, *Investigación Económica* 76(300): 3-31, doi: 10.1016/j.inveco.2017.02.004, Article.



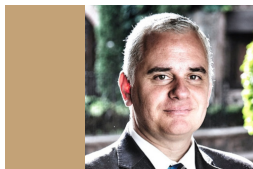
Dr. Esteban Colla de Robertis
Profesor Investigador

LOCAL INSTITUTIONS IN PERU AND THE PRESENCE AND NUMBER OF FAST-FOOD OUTLETS

ABSTRACT. Purpose: The paper aims to study the role of local institutions in the establishment of fast-food outlets in urban districts of Peru. In most urban districts, there are no fast-food outlets. The authors, therefore, study the effect of institutional quality on the presence or absence of these outlets and the number of outlets if these are present. Design/methodology/approach: The theoretical framework in which this paper is based on is the theory of agglomeration, which establishes that firms benefit from being close to each other. In particular, the paper builds on a model of market entry and competition in geographically independent local markets. An explicit expression was found for the equilibrium number of outlets (including zero) as a function of exogenous determinants of the demand for fast food in each market, available infrastructure and institutional quality of the district's government. Principal component analysis was used to construct measures of institutional quality based on administrative and organizational characteristics of district's municipalities. These measures were incorporated as explanatory variables in a zero-inflated Poisson model, which is appropriate to handle count data and to accommodate excess zeros and which also allows the specification of different models for the zero part and the positive part. Findings: Institutional quality mainly affects the presence of fast-food outlets in a district. The quality of urban development management and use of information systems are relevant. An institutional variable particularly relevant in explaining the number of outlets is the presence of an investment programming office in the municipality. The authors confirm the general hypothesis of the paper: institutions have a role in explaining both the presence and number of fast-food outlets in a district. Overall, the results of this paper suggest that institutional quality of a municipal district is related to better infrastructure, which lowers the costs of establishing outlets. Research limitations/implications: Limitations in the availability of data at the regional and urban district level did not allow the authors to analyze other

factors that affect entry decisions in the fast-food industry in Peru, such as controls to prevent corruption, legal uncertainty or crime. Another limitation was the lack of data on entry costs for each franchisee in each urban district. This forced the authors to use public infrastructure characteristics of the district as (imperfect) proxies of the entry costs. Practical implications: The instruments of urban development management and information systems can be effective at attracting investment to a district. These tools operate partly through an indirect effect, namely, the improvement of district infrastructure, which is necessary to reduce the costs of establishing companies. There is also synergy between national government's programs to attract investment and the good institutional quality in local governments. On the contrary, poor local institutions can be an obstacle to the successful implementation of those national programs. Social implications: Foreign direct investment has a positive impact on the economic development of a country through knowledge spillovers. Therefore, any administrative reform to make local government practices more efficient can have an indirect impact on development. Originality/value: Principal component analysis is a statistical tool that can be important in building good measures of institutional quality by allowing the combination of different observable characteristics into one component that can be interpreted as an operational restriction. The count model allows the use of the primary, easily observable, dependent variable, namely, the number of outlets. Finally, the two-part model makes it possible to discern the effect of institutional quality on the presence or absence of outlets and the number of outlets if these are present. © 2017, © Emerald.

Colla de Robertis, E. & Navarro Castañeda, S. (2017), Local institutions in Peru and the presence and number of fast-food outlets, *Management Research* 15(3): 338-376, doi: 10.1108/MR JIAM-06-2017-0755, Article.



Dr. Esteban Colla de Robertis
Profesor Investigador

THE PRODUCTIVITY COST OF SOVEREIGN DEFAULT: EVIDENCE FROM THE EUROPEAN DEBT CRISIS

ABSTRACT. We calibrate the cost of sovereign defaults using a continuous time model, where government default decisions may trigger a change in the regime of a stochastic TFP process. We calibrate the model to a sample of European countries from 2009 to 2012. By comparing the estimated drift in default relative to that in no-default, we find that TFP falls in the range of 3.70-5.88 %. The model is consistent with observed falls in GDP growth rates and subsequent recoveries and illustrates why fiscal multipliers are small during sovereign debt crises. © 2015, Springer-Verlag Berlin Heidelberg.

Alonso-Ortiz, J., Colla, E. & Da-Rocha, J.-M. (2017), The productivity cost of sovereign default: evidence from the European debt crisis, *Economic Theory* 64(4): 611-633, doi: 10.1007/s00199-015-0939-y, Article.



Dr. Salvador Rivas Aceves
SNI Nivel I

GOVERNMENT FINANCIAL REGULATION AND GROWTH

ABSTRACT. The effects of financial system on economic growth rate are identified. To do this in an endogenous stochastic growth model with two types of financial systems, efficient and inefficient ones, the effects on growth are studied. This investigation shows that financial inefficiency has a negative impact on growth. A financial regulation through a capital yield tax corrects negative impacts on growth; furthermore, the necessary conditions for growing under this scenario are characterized. An empirical study is carried out in order to verify the relationship between economic growth and financial regulations. © 2017 Universidad Nacional Autónoma de México, Facultad de Economía.

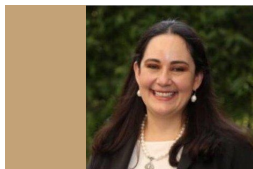
Rivas Aceves, S. & Amato, C. (2017) Government financial regulation and growth, *Investigación Económica* 76(299): 51-86, doi: 10.1016/j.inveco.2016.09.001, Article.

ESCUELA DE NEGOCIOS GASTRONÓMICOS

Anuario Institucional de Investigación 2017



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Dra. Julieta Domínguez Soberanes
Profesor Investigador

DISEÑO DE UN PRODUCTO DE CERDO LISTO PARA COMER ELABORADO MEDIANTE LA TÉCNICA DE SOUS VIDE BASADO EN SU ANÁLISIS SENSORIAL Y SU ÍNDICE PREBIÓTICO

ABSTRACT. New trends in product development are based in the incorporation of prebiotics; however, their use must be linked to consumer acceptability. This study compares in vitro prebiotic index (PI) and sensory consumer analysis of five different ready-to-eat pork Sous Vide marinade prototypes. Sole ingredients used in the marinade (MI) formulations and each prototype was evaluated for their PI: MI added with additives and, MI added with additives and prebiotics. Prebiotics were nopal fiber (*Opuntia ficus-indica*), corn fiber and, chicory inulin (*Chicorium intybus*). Consumer acceptance (n = 205) was evaluated by: landscape segmentation analysis (LSA), just about right (JAR) test and, penalty analysis (PA). Results show that ingredients with good PI (above 1) were obtained with chipotle (*Capicum annum*), garlic (*Allium sativum*) and, rosemary (*Rosmarinus officinalis*). Prebiotic prototypes: nopal fiber (*Opuntia ficus-indica*), corn fiber and, chicory inulin (*Chicorium intybus*), showed a prebiotic index of 1.20, 1.83 and, 1.62 respectively. LSA showed that the prototype, which contained chicory inulin as a prebiotic was located nearer to optimal regions, which is in accordance to results obtained by JAR and PA. Results reveal that chicory inulin-marinated Sous Vide pork meat possesses an accepted in vitro PI and the best sensory characteristics. © 2017, Universidad Autónoma Metropolitana Iztapalapa. All rights reserved.

Domínguez-Soberanes, J., Escalona-Buendía, H. B., Flores-Nájera, A., De-La-Rocha González, A., Chávez-Vela, N. & Rodríguez-Serrano, G. (2017), Product design of a ready to eat Sous vide marinated pork meat based on consumer acceptability and prebiotic index [Diseño de un producto de cerdo listo para comer elaborado mediante la técnica de Sous vide basado en su análisis sensorial y su índice prebiótico], *Revista Mexicana de Ingeniería Química* 16(2): 497-501, Article.

ESCUELA DE PEDAGOGÍA

Anuario Institucional de Investigación 2017



UNIVERSIDAD
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Dra. Consuelo Martínez Priego
Profesor Investigador

TOPOGRAFÍA DE LAS RELACIONES INTERPERSONALES EN LA POSTMODERNIDAD: AMISTAD Y EDUCACIÓN

ABSTRACT. This article considers friendship as a channel for education and as one of its objectives, as it is a necessary ingredient for a fulfilled life. This requires an initial study of interpersonal relationships in the postmodern context, considering their opportunities and risks. Our aim is to draw a topography of these relationships by analyzing texts by major thinkers of the last four decades. The result of this analysis is the core of the article, namely, that there are four categories which seem to give a proper account of the characteristics of interpersonal relationships in postmodernity and are relevant in education: 1) the questioning of the individual; 2) the appearance of the internet; 3) the recovery of emotions; and, finally, 4) the extension of the feminine space. As a conclusion, they may all be said to have an ambivalent character that requires central issues in education to be reconsidered: The awareness and emotional regulation; the new constitution of identity and intimacy on the internet; education for male-female relationships, which now exist outside the sexual sphere, and preventing violence in these relationships; as well as how to educate for cooperation in an individualistic society.

Romero-Iribas A. M. & Martínez Priego, C. (2017), Topography of interpersonal relationships in postmodernity: Friendship and education [Topografía de las relaciones interpersonales en la postmodernidad: Amistad y educación], *Revista Española de Pedagogía* 75(267): 309-322, doi: 10.22550/REP75-2-2017-08 Article.



Dra. María Isabel Muñoz Blanco
Profesor Investigador

RESPONDENT CONDITIONING TRAINING EFFECT ON THE BEHAVIOR OF THE AUDIENCE OF CREATIVITY

ABSTRACT. The present study aimed to understand the way the behavior of the audience of creativity changes by presenting a respondent conditioning training in between tests. 35 undergraduate psychology students were presented with a Q-sort test in order to assess the way the participants organized artistic images from architecture, photography and furniture design. After a first test, participants were presented with a respondent training conditioning where happy faces appeared together with architecture images and sad faces appeared with images of artistic photography and furniture design. A second test was presented after training. The results showed that the participants changed their responses between tests; however, the direction of change could not be predicted. These results are discussed in terms of the literature on evaluative conditioning and their implications for future studies with the audience of creativity.

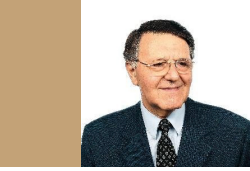
Muñoz-Blanco, M. I. & Vargas, M. A. P. (2017), Respondent conditioning training effect on the behavior of the audience of creativity. *International Journal of Innovation, Creativity and Change* 3(2): 18-32 Article.

FACULTAD DE CIENCIAS DE LA SALUD

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Dr. Evandro Agazzi Carminati
SNI Nivel III

VARIETIES OF SCIENTIFIC REALISM: OBJECTIVITY AND TRUTH IN SCIENCE

ABSTRACT. This book offers a comprehensive update on the scientific realism debate, enabling readers to gain a novel appreciation of the role of objectivity and truth in science and to understand fully the various ways in which antirealist conceptions have been subjected to challenge over recent decades. Authoritative representatives of different philosophical traditions explain their perspectives on the meaning and validity of scientific realism and describe the strategies being adopted to counter persisting antirealist positions. The coverage extends beyond the usual discussion of realism within the context of the natural sciences, and especially physics, to encompass also its applicability in mathematics, logic, and the human sciences. The book will appeal to all with an interest in the recent realist epistemologies of science, the nature of current philosophical debate, and the ongoing rehabilitation of truth as the legitimate goal of scientific Research © Springer International Publishing AG 2017.

Agazzi, E. (2017), *Varieties of Scientific Realism: Objectivity and Truth in Science*, New York: Springer International Publishing, 1-411, doi: 10.1007/978-3-319-51608-0, Book.



Dr. Evandro Agazzi Carminati
SNI Nivel III

INTRODUCTION: THE CONCEPTUAL KNOTS OF THE REALISM DEBATE

ABSTRACT. A couple of elementary ‘facts of life’ stimulate our reflection. The first is that “all humans want by their nature to know”, as Aristotle says at the beginning of his *Metaphysics*.

Agazzi, E. (2017). Introduction: The conceptual knots of the realism debate. *Varieties of scientific realism: Objectivity and truth in science*, New York: Springer International Publishing, 1-17, doi:10.1007/978-3-319-51608-0_1, Book Chapter.

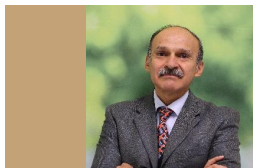


Dr. Evandro Agazzi Carminati
SNI Nivel III

THE TRUTH OF THEORIES AND SCIENTIFIC REALISM, VARIETIES OF SCIENTIFIC REALISM: OBJECTIVITY AND TRUTH IN SCIENCE

ABSTRACT. The thesis maintained in this paper is that scientific anti-realism was the consequence of having lost the confidence in the capability of science to attain truth, something that historically occurred at the end of the nineteenth century. Therefore, the requirement of truth was removed from science and replaced by the requirement of objectivity. This has a 'weak' sense, according to which scientific knowledge is 'independent of the single subjects' (intersubjectivity). In addition, however, every science is considered to investigate not reality in general, but only its specific objects ('strong' ontological sense of objectivity). This amounts to recovering the characteristic of truth for scientific knowledge, and giving it a realist interpretation both ontologically and epistemologically, at least for its empirically testable statements. The contemporary struggle about realism, however, regards the unobservable entities introduced in scientific theories, and the strategy proposed in the present paper is that of suitably extending to theories the notion of truth, which is immediately and directly defined for single declarative statements. From the referential nature of truth follows that if we have reasons for admitting the truth of a theory, we must also admit, for the same reasons, the existence of its referents, even when they are unobservable entities. © Springer International Publishing AG 2017.

Agazzi, E. (2017), The truth of theories and scientific realism, *Varieties of Scientific Realism: Objectivity and Truth in Science*, New York: Springer International Publishing, 49-68, doi: 10.1007/978-3-319-51608-0_3, Book Chapter.



Med. Guillermo Rafael Cantú Quintanilla
Profesor Investigador

SELF-MANAGEMENT AND HEALTH CARE TRANSITION AMONG ADOLESCENTS AND YOUNG ADULTS WITH CHRONIC KIDNEY DISEASE: MEDICAL AND PSYCHOSOCIAL CONSIDERATIONS

ABSTRACT. Health care transition (HCT) is a process that requires preparation as a continuum from pediatric to adult-focused services. For adolescents and young adults with chronic or ESRD, this process can be prolonged due to their physical, psychological, family, or ecological factors. HCT preparation is a matter of patient safety and patient rights as the consequences of poor preparation at the time of transfer to adult-focused services are great, including rejection of organs, disease relapse, or even death. We present a case to illustrate important points of HCT preparation, with suggestions for intervention by the interdisciplinary team members who serve (and will serve) these survivors of pediatric-onset health conditions. To monitor the HCT process, yearly measurements of skill mastery need to take place guide interventions. © 2017 National Kidney Foundation, Inc.

Díaz-González de Ferris M. E., Del Villar-Vilchis M., Guerrero R., Barajas-Valencia V. M., Vander-Schaaf E. B., de Pomposo A., Medeiros M., Rak E., Cantu-Quintanilla G., Raina R. & Alvarez-Elias A. C. (2017), Self-Management and Health Care Transition Among Adolescents and Young Adults With Chronic Kidney Disease: Medical and Psychosocial Considerations, *Advances in Chronic Kidney Disease* 24(6): 405-409, doi: 10.1053/j.ackd.2017.09.010, Review.



Dr. Francisco Javier Estrada Mena
SNI Nivel I

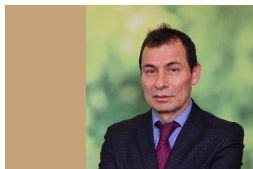


Mtro. Andric Christopher Pérez Ortiz
Profesor Investigador

EFFECTS OF (–)-EPICATECHIN ON FRONTAL CORTEX DAPC AND DYSBINDIN OF THE MDX MICE

ABSTRACT. Introduction multiple components of the dystrophin-associated protein complex (DAPC) are expressed in numerous tissues including the brain. Members of the DAPC and dysbindin are abnormally expressed in the brain of Duchenne Muscular Dystrophy (DMD) patients, which has been associated with cognitive impairments. However, little is known about the expression pattern of individual members of the DAPC in animal models of DMD and their relationship with dysbindin. Methods Ten mdx mice were randomly allocated into a control and intervention group [(–)-epicatechin (Epi) 1 mg/kg/day for four weeks] and results compared to a wild-type mice. After sacrifice, brain pre-frontal cortices were collected for Western blotting and immunoprecipitation assays, and sagittal sections processed for immunohistochemistry. Results Epi promotes a partial recovery of DAPC members [α 1-Syntrophin, sarcoglycans (SG), dystrophin 71 (Dp71)], dysbindin, and utrophin protein levels. Epi also appears to restore the association of DAPC between dysbindin, and utrophin with Dp71 and ϵ -SG. Co-immunostaining evidence increased protein levels of dysbindin, dystrophin, and ϵ -SG and their colocalization. Conclusions Altogether, results suggest that Epi is capable of restoring pre-frontal cortex DAPC and dysbindin levels of mdx mice towards that of healthy brains. The functional implications of such studies warrant further investigation. © 2017 Elsevier B.V.

Estrada-Mena, F. J., Rodríguez, A., Mendoza-Lorenzo, P., Neri-Gomez, T., Manjarrez-Gutierrez, G., Perez-Ortiz, A. C., Ordonez-Razo, R., Ceballos, G., Villarreal, F. & Ramirez-Sanchez, I. (2017), Effects of (–)-epicatechin on frontal cortex DAPC and dysbindin of the mdx mice, *Neuroscience Letters* 658: 142-149, doi: 10.1016/j.neulet.2017.08.056, Article.



Dr. Francisco Javier Estrada Mena
SNI Nivel I

PHARMACOGENETICS OF RESPONSE TO NEOADJUVANT PACLITAXEL TREATMENT FOR LOCALLY ADVANCED BREAST CÁNCER

ABSTRACT. Locally advanced breast cancer (LABC) cases have a varying five-year survival rate, mainly influenced by the tumor response to chemotherapy. Paclitaxel activity (response rate) varies across populations from 21.5 % to 84 %. There are some reports on genetic traits and paclitaxel; however, there is still considerable residual unexplained variability. In this study, we aimed to test the association between eleven novel markers and tumor response to paclitaxel and to explore if any of them influenced tumor protein expression. We studied a cohort of 140 women with LABC. At baseline, we collected a blood sample (for genotyping), fine needle aspirates (for Western blot), and tumor measurements by imaging. After follow-up, we ascertained the response to paclitaxel monotherapy by comparing the percent change in the pre-, post- tumor measurements after treatment. To allocate exposure, we genotyped eleven SNPs with TaqMan probes on RT-PCR and regressed them to tumor response using linear modeling. In addition, we compared protein expression, between breast tumors and healthy controls, of those genes whose genetic markers were significantly associated with tumor response. After adjusting for multiple clinical covariates, SNPs on the LPHN2, ROBO1, SNTG1, and GRIK1 genes were significant independent predictors of poor tumor response (tumor growth) despite paclitaxel treatment. Moreover, proteins encoded by those genes are significantly downregulated in breast tumor samples. © Perez-Ortiz et al.

Perez-Ortiz, A. C., Ramírez, I., Cruz-López, J. C., Villarreal-Garza, C., Luna-Angulo, A., Lira-Romero, E., Jiménez-Chaidez, S., Díaz-Chávez, J., Matus-Santos, J. A., Sánchez-Chapul, L., Mendoza-Lorenzo, P. & Estrada-Mena, F. J. (2017), Pharmacogenetics of response to neoadjuvant paclitaxel treatment for locally advanced breast cáncer, *Oncotarget* 8(63): 106454-106467, doi: 10.18632/oncotarget.22461, Article.

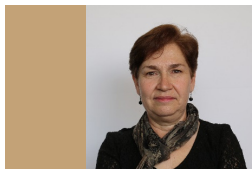


Dr. Desiderio Salomón Hernández Gutiérrez
SNI Nivel I

EVALUATING THE BIOLOGICAL RISK OF FUNCTIONALIZED MULTIWALLED CARBON NANOTUBES AND FUNCTIONALIZED OXYGEN-DOPED MULTIWALLED CARBON NANOTUBES AS POSSIBLE TOXIC, CARCINOGENIC, AND EMBRYOTOXIC AGENTS

ABSTRACT. Carbon nanotubes (CNTs) have been a focus of attention due to their possible applications in medicine, by serving as scaffolds for cell growth and proliferation and improving mesenchymal cell transplantation and engraftment. The emphasis on the benefits of CNTs has been offset by the ample debate on the safety of nanotechnologies. In this study, we determine whether functionalized multiwalled CNTs (fMWCNTs) and functionalized oxygen-doped multiwalled CNTs (fCOxs) have toxic effects on rat mesenchymal stem cells (MSCs) *in vitro* by analyzing morphology and cell proliferation and, using *in vivo* models, whether they are able to transform MSCs in cancer cells or induce embryo toxicity. Our results demonstrate that there are statistically significant differences in cell proliferation and the cell cycle of MSCs in culture. We identified dramatic changes in cells that were treated with fMWCNTs. Our evaluation of the transformation to cancer cells and cytotoxicity process showed little effect. However, we found a severe embryo toxicity in chicken embryos that were treated with fMWCNTs, while fCOxs seem to exert cardioembryotoxicity and a discrete teratogenicity.

Lara-Martínez, L. A., Massó, F., González, E. P., García-Peláez, I., Contreras-Ramos, A., Valverde, M., Rojas, E., Cervantes-Sodi, F., Hernández-Gutiérrez, S. (2017), Evaluating the biological risk of functionalized multiwalled carbon nanotubes and functionalized oxygen-doped multiwalled carbon nanotubes as possible toxic, carcinogenic, and embryotoxic agents, *International Journal of Nanomedicine* 12: 7695-7707, doi: 10.2147/IJN.S144777, Article.

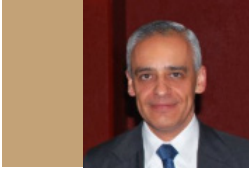


Med. María Lilia Loredo Mendoza
Profesor Investigador

THE BENEFICIAL EFFECTS OF ALLICIN IN CHRONIC KIDNEY DISEASE ARE COMPARABLE TO LOSARTAN

ABSTRACT. Recent studies suggest that allicin may play a role in chronic kidney disease (CKD), reducing hypertension and oxidative stress and improving renal dysfunction. In the present study, CKD was induced by 5/6 nephrectomy and the animals were divided into four treatment groups as follows: control (C), CKD, CKD+allicin (40 mg/kg pathway oral) (CKDA), and CKD+Losartan (20 mg/kg) (CKDL). After CKD induction, the rats developed hypertension from week 3 to the end of the study. This was associated with increased creatinine and blood urea nitrogen (BUN) levels in serum, increased albuminuria, increased urinary excretion of N-acetyl- β -D-glucosaminidase (NAG), increased nephrin expression, and increased histological alterations in the cortex. Otherwise, lipid and protein oxidation were higher in the CKD group than in the control group. A disturbance was observed in the expression levels of the nuclear factor erythroid 2-related factor 2/Kelch ECH associating protein 1 system (Nrf2/keap1) and the antioxidant enzymes catalase, superoxide dismutase, and heme oxygenase-1. Allicin or losartan treatments relieved renal dysfunction, hypertension, and oxidative stress. In addition, both treatments showed the same efficacy on the expression of angiotensin receptors, the nephrin, Nrf2/keap1 pathway, and eNOS. Further in silico analyses suggest that allicin and losartan could have a common mechanism involving interaction with AT1 receptors. Allicin showed antihypertensive, antioxidant, and nephroprotective effects.

García Trejo, E. M. Á., Buendía, A. S. A., Reyes, O. S., Arroyo, F. E. G., García, R. A., Mendoza, M. L. L., Tapia, E., Lozada, L. G. S. & Alonso, H. O. (2017), The beneficial effects of Allicin in chronic kidney disease are comparable to Losartan, *International Journal of Molecular Sciences* 18(9): 1989, doi: 10.3390/ijms18091980, Article.

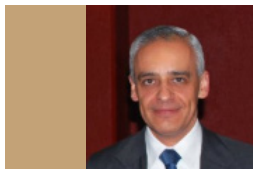


M. en C. Gregorio Tomás Obrador Vera
SNI Nivel III

GENETIC AND ENVIRONMENTAL RISK FACTORS FOR CHRONIC KIDNEY DISEASE

ABSTRACT. In order to change the current state of chronic kidney disease knowledge and therapeutics, a fundamental improvement in the understanding of genetic and environmental causes of chronic kidney disease is essential. This article first provides an overview of the existing knowledge gaps in our understanding of the genetic and environmental causes of chronic kidney disease, as well as their interactions. The second part of the article formulates goals that should be achieved in order to close these gaps, along with suggested timelines and stakeholders that are to be involved. A better understanding of genetic and environmental factors and their interactions that influence kidney function in healthy and diseased conditions can provide novel insights into renal physiology and pathophysiology and result in the identification of novel therapeutic or preventive targets to tackle the global public health care problem of chronic kidney disease. © 2017 International Society of Nephrology.

Obrador Vera, G. T., Schultheiss, U. T., Kretzler, M., Langham, R. G., Nangaku, M., Pecoits-Filho, R., Pollock, C., Rossert, J., Correa-Rotter, R., Stenvinkel, P., Walker, R., Yang, C.-W., Fox, C. S. & Köttgen, A. (2017), Genetic and environmental risk factors for chronic kidney disease, *Kidney International Supplements* 7(2): 88-106, doi: 10.1016/j.kisu.2017.07.004, Review.

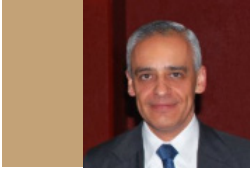


M. en C. Gregorio Tomás Obrador Vera
SNI Nivel III

GLOBAL KIDNEY HEALTH 2017 AND BEYOND: A ROADMAP FOR CLOSING GAPS IN CARE, RESEARCH, AND POLICY

ABSTRACT. The global nephrology community recognises the need for a cohesive plan to address the problem of chronic kidney disease (CKD). In July, 2016, the International Society of Nephrology hosted a CKD summit of more than 85 people with diverse expertise and professional backgrounds from around the globe. The purpose was to identify and prioritise key activities for the next 5–10 years in the domains of clinical care, research, and advocacy and to create an action plan and performance framework based on ten themes: strengthen CKD surveillance; tackle major risk factors for CKD; reduce acute kidney injury—a special risk factor for CKD; enhance understanding of the genetic causes of CKD; establish better diagnostic methods in CKD; improve understanding of the natural course of CKD; assess and implement established treatment options in patients with CKD; improve management of symptoms and complications of CKD; develop novel therapeutic interventions to slow CKD progression and reduce CKD complications; and increase the quantity and quality of clinical trials in CKD. Each group produced a prioritised list of goals, activities, and a set of key deliverable objectives for each of the themes. The intended users of this action plan are clinicians, patients, scientists, industry partners, governments, and advocacy organisations. Implementation of this integrated comprehensive plan will benefit people who are at risk for or affected by CKD worldwide. © 2017 Elsevier Ltd.

Levin, A., Tonelli, M., Bonventre, J., Coresh, J., Donner, J.-A., Fogo, A. B., Fox, C. S., Gansevoort, R. T., Heerspink, H. J. L., Jardine, M., Kasiske, B., Köttgen, A., Kretzler, M., Levey, A.S., Luyckx, V. A., Mehta, R., Moe, O., Obrador Vera, G. T., Pannu, N., Parikh, C. R., Perkovic, V., Pollock, C., Stenvinkel, P., Tuttle, K. R., Wheeler, D. C. & Eckardt, K.-U. (2017), Global kidney health 2017 and beyond: A roadmap for closing gaps in care, research, and policy, *The Lancet* 390(10105): 1888–1917, doi: 10.1016/S0140-6736(17)30788-2, Review.



M. en C. Gregorio Tomás Obrador Vera
SNI Nivel III

STRATEGIES TO IMPROVE MONITORING DISEASE PROGRESSION, ASSESSING CARDIOVASCULAR RISK, AND DEFINING PROGNOSTIC BIOMARKERS IN CHRONIC KIDNEY DISEASE

ABSTRACT. Chronic kidney disease (CKD) is a major global public health problem with significant gaps in research, care, and policy. In order to mitigate the risks and adverse effects of CKD, the International Society of Nephrology has created a cohesive set of activities to improve the global outcomes of people living with CKD. Improving monitoring of renal disease progression can be done by screening and monitoring albuminuria and estimated glomerular filtration rate in primary care. Consensus on how many times and how often albuminuria and estimated glomerular filtration rate are measured should be defined. Meaningful changes in both renal biomarkers should be determined in order to ascertain what is clinically relevant. Increasing social awareness of CKD and partnering with the technological community may be ways to engage patients.

Pena, M. J., Stenvinkel, P., Kretzler, M., Adu, D., Agarwal, S. K., Coresh, J., Feldman, H. I., Fogo, A. B., Gansevoort, R. T., Harris, D. C., Jha, V., Liu, Z.-H., Luyckx, V. A., Massy, Z. A., Mehta, R., Nelson, R. G., O'Donoghue, D. J., Obrador Vera, G. T., Roberts, C. J., Sola, L., Sumaili, E. K., Tatiyanupanwong, S., Thomas, B., Wiecek, A., Parikh, C. R. & Heerspink, H. J. L. (2017), Strategies to improve monitoring disease progression, assessing cardiovascular risk, and defining prognostic biomarkers in chronic kidney disease, *Kidney International Supplements* 7(2): 107-113, doi: 10.1016/j.kisu.2017.07.005, Review.



Med. Carlos Federico Ortiz Hidalgo
SNI Nivel II

ENFERMEDAD DE CASTLEMAN. ANÁLISIS HISTOPATOLÓGICO E INMUNOHISTOQUÍMICO DE TREINTA Y NUEVE CASOS

ABSTRACT. Introduction: Castleman disease (CD) is a rare lymphoproliferative that comprises two distinct clinical subtypes (unicentric and multicentric) and has two basic histopathology patterns that are hyaline-vascular (HV) and plasma-cell (PC) type. Some cases of multicentric PC disease are associated with HHV-8 infection. Objective: To present the histopathologic and immunohistochemical characteristics of 39 cases of CD. Methods: A review of cases with the diagnosis CD from the files of the Department of Pathology of the ABC Medical Centre in Mexico City was performed. Thirty-nine cases of CD were identified, and a detailed paraffin immunophenotypic study of 9 of them was completed using desmin, cytokeratin OSCAR (CO) and Epidermal growth factor receptor (EGFR), to evaluate the dendritic cell population. Results and Conclusions: Of the 39 cases of CD, 24 were HV and 15 CP. All HV cases were unicentric and only one case of CP was multicentric. The most frequent localization in both subtypes was in lymph nodes; 21/24 cases in HV and 15 cases of CP. All cases were immunostained with CD20 that was expressed in the germinal centers (CGs), CD3 in the paracortical zone, and CD21 in follicular dendritic cells (CDF) within CGs, with expansion towards the area of the hyperplastic mantle zone (only in the HV variant). One case of CD CP was positive for HHV-8. Of the nine cases (6 HV and 3 PC cases) that were detailed with IHC, we found EGFR expression in FDC in all but one of the 9 cases studied and desmin was positive in fibroblastic reticulum cells (FRC) in all, but one of the cases of CD.

Sevilla-Lizcano D. B., Frias-Soria C. L., Ortiz-Hidalgo C. (2017), Vitamin D deficiency in Mexican mothers and their newborns [Enfermedad de Castleman. Análisis histopatológico e inmunohistoquímico de treinta y nueve casos], *Gaceta Médica de México* 153(5): 550-558, doi: 10.24875/GMM.17003021, Article.



Med. Carlos Federico Ortiz Hidalgo
SNI Nivel II

LINFOMA ANAPLÁSICO DE CÉLULAS GRANDES: ESTUDIO CLÍNICO-PATOLÓGICO E INMUNOHISTOQUÍMICA DE 20 CASOS CLASIFICADOS DE ACUERDO A LA REVISIÓN DE LA ORGANIZACIÓN MUNDIAL DE LA SALUD DE NEOPLASIAS LINFOIDES DE 2016

ABSTRACT. Anaplastic large cell lymphoma (ALCL) is a type of non-Hodgkin lymphoma composed of CD30-positive neoplastic cells. The 2016 revision of the WHO classification of lymphoid neoplasms includes anaplastic lymphoma kinase (ALK) positive, ALK negative and breast implant associated ALCL. ALCL have distinct clinical and prognostic features between positive and negative cases. ALK-1 positive cases mostly occur in the first three decades of life while patients with ALK-1 negative are older. ALCL exhibit a very broad range of cytology appearances that include common pattern, lymphohistiocytic pattern, small-cell pattern, Hodgkin-like pattern and composite pattern. By definition, ALCL show strong CD30 staining on the cell membrane and in the Golgi region and the majority are epithelial membrane antigen positive, express one or more T-cell or Natural Killer antigens and are constantly negative for Epstein-Barr virus. We present the clinicopathologic and immunohistochemical analysis of 20 cases of ALCL studied at a single institution, classified according to the 2016 revision of lymphoid neoplasms. Nine cases were ALK-1 positive, ten ALK-1 negative, and one case as a breast implant associated ALCL ALK-1 negative. © 2017 Sociedad Mexicana de Oncología.

Sevilla-Lizcano, D. B. & Ortiz-Hidalgo, C. (2017). Anaplastic large cell lymphoma: Clinicopathological and immunohistochemical study of 20 cases classified according to the 2016 revision of the world health organization classification of lymphoid neoplasms. [Linfoma anaplásico de células grandes: Estudio clínico-patológico e inmunohistoquímica de 20 casos clasificados de acuerdo a la revisión de la Organización Mundial de la Salud de neoplasias linfoides de 2016], *Gaceta Mexicana de Oncología* 16(4): 207-216, doi: 10.24875/j.gamo. M18000114 Article.



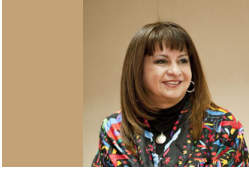
Dra. Nancy Carolina Reyes Zepeda
Profesor Investigador

SUPERVIVENCIA EN NIÑOS CON LEUCEMIA: UN GRAN RETO PARA NUESTRA SOCIEDAD CONTEMPORÁNEA

ABSTRACT. Medical complications evolve over time, proof of this is attention to the chronic degenerative and neoplastic problems of this century. A clear example are the childhood leukemias. As is well known, these are the main neoplasms in the pediatric age, since they constitute between 25 and 45 % of the types of cancer.

Undoubtedly, the history of the treatment of leukemia in children has been fascinating thanks to a change in its prognosis, being a highly lethal disease in the 60s, it has managed to cure some varieties up to 100 %. However, this story is far from be real all over the world, since even in this 21st century there are regions where this disease continues with high percentages of mortality.

Rendón-Macías M. E. & Reyes-Zepeda N. C. (2017), Survival in children with leukemia; a great challenge for our contemporary society = Supervivencia en niños con leucemia; un gran reto para nuestra sociedad contemporánea, *Revista Mexicana de Pediatría* 84(6): 213-215, Review.



Dra. Lourdes Velázquez González
SNI Nivel I

CONTRIBUTI DI PENSIERO SISTEMICO

ABSTRACT. Mexican pre Columbian culture is one of the great six mother civilisations but, compared with the Indian or Chinese ones, is far less known in the West. This culture had a notable richness and complexity that, from theoretical and scientific knowledge, led to applied science, producing important technological applications, such as astronomical observatories and calendars. These were at the same time also expression of human and ethical values, within a general idea of a somehow dualistic Universe, based on the struggle between contraries –light and darkness, life and death, male and female– that finally lead to a vision that one may define as theological. Our partial and segmented knowledge of Mexican Pre Columbian culture tends to converge into a unitarian vision that may, for some reason, be called ‘systemic’.

Velázquez L. (2017), Contributi di pensiero sistemico, *Revista di Filosofia Neo-Scholastica* 2: 233-237, Review.

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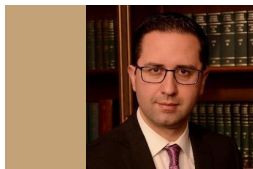


Dra. Mariana Durán Márquez
Profesor Investigador

GUAYANGAREO: LA «NUEVA MICHOCÁN» CONTRA EL OBISPO VASCO DE QUIROGA Y LA BÚSQUEDA DE UNA INTEGRACIÓN SOCIAL EN EL SIGLO XVI

ABSTRACT. In the beginnings of New Spain, particularly in the middle of the sixteenth century, Bishop Vasco de Quiroga maintained a serious confrontation with the inhabitants of Guayangareo, who sought to obtain the name of Michoacán, which originally corresponded to the bishopric established by Quiroga based on Various Royal Cedars. The conflict, turned into a trial that would last several years, would show the interest of Vasco de Quiroga, for a social integration, between the naturals and the Europeans of New Spain.

Sánchez, F. M. & Márquez, M. D. (2017), Guayangareo. The «new Michoacán» versus the bishop Vasco de Quiroga and the search for an integration in the XVI century [Guayangareo: La «nueva Michoacán» contra el obispo Vasco de Quiroga y la búsqueda de una integración social en el siglo XVI], *Hipogrifo* 5(2): 415-428, doi: 10.13035/H.2017.05.02.24, Review.



Dr. Pablo González Domínguez
Profesor Investigador

LA DOCTRINA DEL CONTROL DE CONVENCIONALIDAD A LA LUZ DEL PRINCIPIO DE SUBSIDIARIEDAD

ABSTRACT. This article studies the doctrine of conventionality control from an International Human Rights Law perspective. The first section explores the line of jurisprudence of this doctrine, from its creation in *Almonacid Arellano et al. v. Chile* (2006) to its latest development in *Andrade Salmon v. Bolivia* (2016). The second section analyzes the conceptual elements of conventionality control: its definition and legal foundations, its subjects, its object, and the normative parameters upon which it must be exercised. The third section responds to some of the strongest criticism that might be raised against the existence of this doctrine, arguing that the validity of conventionality control can be found on the principle of subsidiarity. This article shows a version of conventionality control that would allow increasing the effectiveness of IHRL at the domestic level, but that also recognizes the existence of legitimate spaces of freedom for States to define the scope of human rights and the means to fulfill with their IHRL obligations. © 2017, Universidad de Talca. All rights reserved.

González Domínguez, P. (2017), The doctrine of conventionality control in light of the principle of subsidiarity. [La doctrina del control de convencionalidad a la luz del principio de subsidiariedad], *Estudios Constitucionales* 15(1): 55-98, doi:10.4067/S0718-52002017000100003, Article.

FACULTAD DE FILOSOFÍA

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Dr. Eduardo Oscar Charpenel Elorduy
SNI Nivel I

RECEPCIÓN Y APROPIACIÓN DE LA FILOSOFÍA PRÁCTICA ARISTOTÉLICA EN LA FILOSOFÍA DEL DERECHO DE HEGEL

ABSTRACT. In this article, I examine the relation of Hegel's Philosophy of Right with the Aristotelian practical philosophy. My aim with this is to show, on the one hand, that some of the theses and central motifs of the Hegelian philosophy of right are better understood if one brings certain Aristotelian ideas to the forefront of the discussion and, on the other hand, that these ideas are subjected to a reinterpretation by Hegel due to the historical and philosophical demands of the Modern Age. In particular, the relationship between these two authors is analyzed by examining two specific subjects: The holistic methodology of a practical philosophy-broadly construed-And the theory of ethical motivation.

Elorduy, E. C. (2017), Reception and appropriation of the aristotelian practical philosophy in Hegel's philosophy of right [Recepción y apropiación de la filosofía práctica aristotélica en la Filosofía del derecho de Hegel], *Tópicos* 52: 173-211, Review.



Dr. Mauricio Lecón Rosales
SNI Nivel I

¿CÓMO OBLIGAR CON PALABRAS? FRANCISCO SUÁREZ Y LA PROMULGACIÓN DE LA LEY HUMANA

ABSTRACT. According to Francisco Suárez, the human action of giving a law implies the production of an obligation in the citizens by means of the lawgiver's words. The aim of this paper is to claim that Suárez's account on human law and its production can be rightfully described as a performative act. To justify this thesis I will describe, first, the powers and dispositions that the human legislator must have in order to promulgate a law. Second, I will show that the promulgation of a law must follow some conventions, including the propositional formulation of the law, in order to successfully produce an obligation. Finally, I will claim that the inner conditions and the extrinsic conventions considered by Suárez fit the conditions described by J. L. Austin for an utterance to be performative. © 2017 Cuadernos Salmantinos de Filosofía. All rights reserved.

Lecón Rosales, M. (2017), How to oblige with words? Francisco Suárez and the promulgation of human law [Cómo obligar con palabras? Francisco Suárez y la promulgación de la ley humana], *Cuadernos Salmantinos de Filosofía* 44: 35-53, Article.



Dr. Mauricio Lecón Rosales
SNI Nivel I

LA RECEPCIÓN DE LA POLÍTICA DE ARISTÓTELES EN DE POTESTATE REGIA ET PAPALI DE JUAN DE PARÍS

ABSTRACT. Aristotle's Politics influenced greatly among the authors of the twelfth century and onwards. However, it was differently received in each case which gave birth to a wide a variety of political doctrinas. The aim of this paper is to claim that John of Paris interpreted Aristotle's Politics in a monarchical fashion, in spite of some presumably republican ideas of Quidort and in contrast with other accounts of his contemporaries. For that purpose, a) I shall briefly review the Aristotelian polemic regarding the best form of government, b) I will explain the earliest latin interpretations on Book III of the Politics and c) I will finally address John of Paris's account on it. © 2017, Universidad del Zulia. All rights reserved.

Lecón R. M. (2017), The reception of Aristotle's politics in de potestate regia et papali of John of Paris [La recepción de la Política de Aristóteles en De potestate regia et papali de Juan de París], *Revista de Filosofía* (Venezuela) 85(1): 102-116, Article.



Dr. Mauricio Lecón Rosales
SNI Nivel I

RECUPERACIÓN SUARECIANA DE LOS CONCEPTOS ARISTOTÉLICOS DE (GREEK SOURCE)

ABSTRACT. The aim of this paper is to argue that Francisco Suárez doctrina of potency and act should be regarded as an Aristotelian account. I shall revise Suárez's notions of predicamental and transcendental potency and act in order to compare them to Aristotle's account of. Then, I will argue that Suárez's position should not be considered as a reductionist account in which potency is reduced to act, but rather as an attempt to spell out the meaning of Aristotle's doctrina.

Lecón Rosales, M. (2017), Suarez's recovery of the Aristotelian concepts of (Greek Source) [Recuperación suareciana de los conceptos aristotélicos de (Greek Source)], *Anuario Filosófico* 50(2): 345-369, doi: 10.15581/009.50.2.345-369, Article.

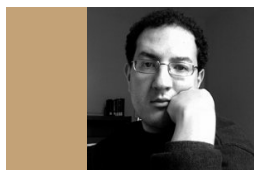


Dr. Mauricio Lecón Rosales
SNI Nivel I

LA VOLUNTAD COMO PRIMER MOTOR CREADO EN FRANCISCO SUÁREZ

ABSTRACT. The aim of this paper is to show that Francisco Suarez's claim that the will is the prime mover of the human actions is grounded in his own metaphysical system. For that purpose, I argue that the will is not necessitated to act by any extrinsic efficient cause: nor by God's grace, neither by the intellect, the law or fate. For all these active principles are either just a necessary condition for the will's act or something that necessitates the practical act of the intellect by which it guides the will, but does not affects the will itself. On the other hand, I argue that Suárez's account on potency and act allows conceiving an efficient cause that is able to determine itself. Besides Suárez distinction between the transcendental sense of potency and act and the predicamental one –among which only the latter is relevant for this matter–, for him act does not perfect potency. Then the will can simultaneously be denominated patient and agent regarding its own action since it does not imply that the will can give itself something it previously lacked.

Lecón Rosales, M. (2017) The will as first mover created in Francisco Suárez [La voluntad como primer motor creado en Francisco Suárez], *Scientia et Fides* 5(1): 165-186, doi: 10.12775/SetF.2017.007, Article.

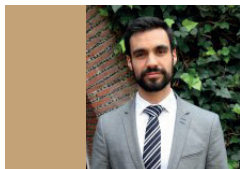


Dr. Luis Xavier López Farjeat
SNI Nivel II

LA VERSIÓN ÁRABE DEL DE DIVINATIONE PER SOMNUM DE ARISTÓTELES Y SU IMPACTO EN AVICENA Y SU TEORÍA DE LA PROFECÍA

ABSTRACT. The Epistle concerning Dreams (Risala al-Manamiyya) is a little known work where Avicenna deals with some relevant considerations regarding the way in which prophecy and veridical dreams take place. The theory contained in this treatise accurately illustrates how intricate Avicenna's theory of prophecy is and, at the same time, provides several clues in order to recognize the origin of this theory as it appears in major treatises such as *fī al-Nafs* and *Ilahiyat* of the *Šifā'*. The *Risala al-Manamiyya* also enables us to recognize the impact of several influences coming from the Ancient Greek tradition –mainly from Aristotle, Galen, Plotinus, and other Neoplatonics–. This article explains the theories of divination by means of dreams and the conception of prophecy, as they appear in the Arabic version of the *De divinatione per somnum*, a treatise where the origins of Avicenna's theory of prophecy can be found. Furthermore it shows the impact that the theory contained in this treatise had in the *Risala al-Manamiyya*. Finally, it expounds some remarks regarding the transmission and adaptation of the metaphysical and psychological points of view posed both in the Arabic version of the *De divinatione* and the *Risāla al-Manāmiyya*, alluding to the impact they had in the theories of prophecy found both in Avicenna's major treatises in the *Šifā'*. © 2017 CSIC.

López-Farjeat, L. X. (2017), The Arabic version of Aristotle's *de divinatione per somnum* and its impact in Avicenna's theory of prophecy [La versión árabe del *de divinatione per somnum* de Aristóteles y su impacto en Avicena y su Teoría de la profecía], *Al-Qantara* 38(1): 45-70, doi: 10.3989/alqantara.2017.002, Article.

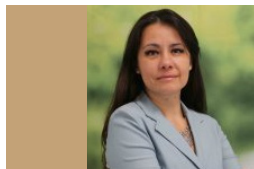


Dr. Leonardo Ruiz Gómez
SNI Nivel I

EL TIEMPO Y SU ANALOGÍA CON LA NOCIÓN DE ESPACIO EN LA FILOSOFÍA DE G. W. LEIBNIZ

ABSTRACT. Leibniz, as many of his contemporaries, establishes some conceptual connections between the notion of space and the notion of time. Since the concept of time is much less explored by Leibniz than the concept of space, this analogy could offer some clues to understand the first. However, it is important to analyse the limits of this analogy and the properties that can be inferred between the two notions, since there is no strict parallelism among them. The aim of this paper is to identify some essential elements of the Leibnizian concept of time in connection with his theory of space. First, I shall determine which extrapolations are valid between these two terms. Then, I shall provide a clear notion of time, as well as some possible contradictions within the Leibnizian system in this regard. Finally, some possible ways of solutions to these inconsistencies will be offered.

Ruiz-Gómez, L. (2017), Leibniz's notion of time and its analogy to his notion of space [El tiempo y su analogía con la noción de espacio en la filosofía de G. W. Leibniz], *Pensamiento* 73(76): 463-482, Article.



Dra. Laura Trujillo Liñán
SNI Nivel C

LA DISTOPÍA DE LA TECNOLOGÍA

ABSTRACT. In this paper, we will show the importance man has given the technique to identify it as part of its progress and the way in the search for this purpose has led him to forget himself and placed before him to technology. This excess has been described as the dystopia of the contemporary world to be a negative aspect against the development of mankind. It is a call to awareness; this subject should be priority at present, with regard to the impact of technology and other social phenomena like growing capitalism. © 2017, Universidad del Zulia. All rights reserved.

Trujillo Liñán, L. & Abraham Llamas, R. (2017), The dystopia of technology [La distopía de la tecnología], *Opción* 33(83): 599-619, Article.



Dr. Héctor Zagal Arreguín
SNI Nivel II

EUTRAPELIA: TOMÁS DE AQUINO Y ARISTÓTELES

ABSTRACT. Eutrapelia: Aquinas and Aristotle: In his discussion of the virtue of eutrapelia (Nicomachean Ethics IV.8, 1127b33-1128b7), Aristotle brings up the primacy of personal prudence over the moral law: the practically wise man is a law to himself. This principle represents a challenge for Thomas Aquinas, who feels uncomfortable with such moral autonomy. This article analyzes the Aristotelian account of eutrapelia, then examines the Aquinas's comments ad locum, and ends pointing out how, in a passage very little studied, Aquinas's Christianity had an effect and moves him to reinterpret the thesis of moral autonomy, turning it into a more harmless one. © 2017, Universidad del Zulia. All rights reserved.

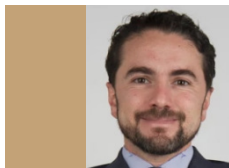
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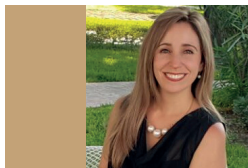
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Dr. Miguel Alcaraz Rivera
Profesor Investigador



Dra. Carolina Del Valle Soto
SNI Nivel C



Mtro. Arturo Jafet Rodríguez Muñoz
Profesor Investigador

ON THE CHARACTERIZATION STRATEGY OF A VOTER TRANSITION METHOD AND ITS INFLUENCE ON SOCIAL CHOICE

ABSTRACT. Digital social networks are used to share information in a group. The collective knowledge of the group in the shared subjects can be greater than the individual information a single member of the group has. It is not clear if this accumulation of data can be used by the group to answer questions better as a common entity than as a sum of individuals. One way a group can answer questions is with delegation of answering by selecting a leader who in turn will decide the answer. In this paper we propose an experiment where a leader is decided by a group by simple majority to answer a questionnaire with questions with a clear correct answer. The sum of the answers by the chosen leader is then compared with the average of the group to see if a significant improvement is reached. The result of the experiment corroborates the hypothesis as the chosen leader has a better result 1.99 standard deviations from the average results of the experts consulted. © 2018 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Alcaraz M., Del-Valle-Soto C., Rodríguez J. (2017), On the characterization strategy of a voter transition method and its influence on social choice, 2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO), 7-11, Conference Paper.

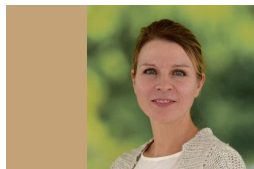


Dra. Isabella Bergamini
Profesor Investigador

THEORY AND PRACTICE IN ENVIRONMENTAL DESIGN: POST NORMAL SCIENCES AND VISIONING PROCESS ORIENTED DESIGN FOR SUSTAINABILITY

ABSTRACT. This contribution contains an analysis of the relationship between theory and practice in architecture, started from the particular similarity between scientific and design research and intended to nurture the debate around the possible evolution of the disciplinary tools of Architectural Technology. The contents are organized as follows: In the first section, there are investigated the affinities that supported the constitution of the methodological and instrumental apparatus of the technological culture of design. The second part is introducing the relationship between technological culture of design and post-normal sciences as a possible answer to the particular conditions of complexity and uncertainty of the moment. The third section is emphasizing the analogy between the instrumentations of several research areas that operate between environmental sustainability, futures studies and technological and environmental design as a starting point for further operational insights. © 2017 Firenze University Press.

Fanzini, D., Rotaru, I. & Bergamini, I. (2017), Theory and practice in environmental design: Post normal sciences and visioning process oriented design for sustainability, *TECHNE* 13: 151-158, doi: 10.13128/Techne 19752, Article.



Dra. Pía Berger
Profesor Investigador

BIOMASS AND BIOCHAR POTENTIAL, A CHANCE FOR SEMIDESERTIC AREAS LIKE AGUASCALIENTES, MEXICO

ABSTRACT. Biochar obtained from thermochemical conversion of biomass reduces greenhouse gas emissions, improves the physico-chemical and microbial properties of soil and absorbs pernicious substances. In addition, applying biochar in agriculture helps to significantly reduce the water consumption for irrigation, an important issue for Aguascalientes, a semidesertic site in the center of Mexico. Therefore, declaring the benefits by applying biochar to soils and estimating the minimum biomass and biochar potential of Aguascalientes is the key issue of this paper. © 2017 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Berger P. & Flesch F. (2017), Biomass and biochar potential, a chance for semi-desertic areas like Aguascalientes, Mexico, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 99-103, Conference Paper.



Dr. Jorge Brieva Rico
Profesor Investigador

DETECTION OF NON-HOMOGENEOUS CYCLES IN BLOOD FLOW SIGNALS IN CORONARY GRAFTS

ABSTRACT. Quasi-periodic blood flow signals, obtained by means of Doppler ultrasound techniques during graft verification, may be contaminated with random distortions (artifacts not periodical not homogeneous and affecting only some cycles in the signal). These distortions are not distributed regularly and cannot be characterized statistically or modelled with a known probability distribution function. Also, it is not possible to estimate when or where they will be presented and can cause the major deformations in the cycles where they occur, including the total loss of cycle morphology. In this paper, an improved analysis method to detect the presence of such distortions is proposed. It is based on a modified mean square error method to identify the affected cycles and then, it uses the well-known and widely used method Dynamic Time Warping for reducing the false positives detection. The identification, in time domain, of the affected cycles, and their exclusion of the signal analysis, allows to estimate parameters and extract the clinically useful information needed for a correct characterization of the blood vessel and to improve the results of coronary revascularization procedures. We tested the proposed algorithm in real signals and to evaluate the results we compute the pulsatility index. The results improve the false positive reduction comparing with the method based only in the modified mean square error reported previously. © 2017 SPIE.

Guzmán, D. T. & Brieva, J. (2017), Detection of non-homogeneous cycles in blood flow signals in coronary grafts, *Proceedings of SPIE - The International Society for Optical Engineering*, 10160, 1016004, doi: 10.1117/12.2256796, Conference Paper.



Dr. Jorge Brieva Rico
Profesor Investigador



Dr Ernesto Moya Albor
SNI Nivel C

PHASE-BASED MOTION MAGNIFICATION VIDEO FOR MONITORING OF VITAL SIGNALS USING THE HERMITE TRANSFORM

ABSTRACT. In this paper we present a new Eulerian phase-based motion magnification technique using the Hermite Transform (HT) decomposition that is inspired in the Human Vision System (HVS). We test our method in one sequence of the breathing of a newborn baby and on a video sequence that shows the heartbeat on the wrist. We detect and magnify the heart pulse applying our technique. Our motion magnification approach is compared to the Laplacian phase based approach by means of quantitative metrics (based on the RMS error and the Fourier transform) to measure the quality of both reconstruction and magnification. In addition a noise robustness analysis is performed for the two methods. © 2017 SPIE.

Brieva, J. & Moya-Albor, E. (2017), Phase-based motion magnification video for monitoring of vital signals using the Hermite transform, *Proceedings of SPIE - The International Society for Optical Engineering*, 10572, 105720M, doi: 10.1117/12.2285959, Conference Paper.



Dr. Jorge Brieva Rico
Profesor Investigador



Dr Ernesto Moya Albor
SNI Nivel C

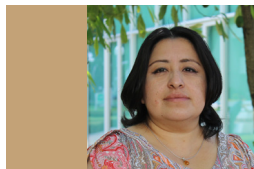


Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

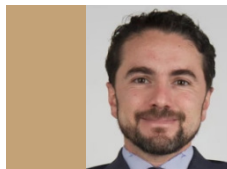
VIDEO MOTION MAGNIFICATION FOR MONITORING OF VITAL SIGNALS USING A PERCEPTUAL MODEL

ABSTRACT. In this paper we present an Eulerian motion magnification technique using a spatial decomposition based on the Steered Hermite Transform (SHT) which is inspired in the Human Vision System (HVS). We test our method in one sequence of the breathing of a newborn baby and on a video sequence that shows the heartbeat on the wrist. We estimate the heart pulse applying the Fourier transform on the magnified sequences. Our motion magnification approach is compared to the Laplacian and the Cartesian Hermite decomposition strategies by means of quantitative metrics. © 2017 SPIE.

Brieva, J., Moya-Albor, E., Gomez-Coronel, S. L. & Ponce, H. (2017), Video motion magnification for monitoring of vital signals using a perceptual model, *Proceedings of SPIE - The International Society for Optical Engineering*, 10160, 101600L, doi: 10.1117/12.2256971, Conference Paper.



Dra. María Luisa Cruz López
SNI Nivel C



Dr. Miguel Alcaraz Rivera
Profesor Investigador

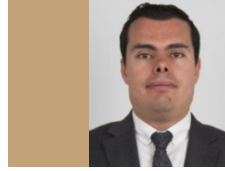
AUTONOMOUS GENERATION OF EXTENDED IMAGES OF DYNAMIC PHASE OBJECTS IN A DEPTH VOLUME SAMPLE USING A SIMPLE FOCUSING CRITERION AND K-MEANS CLUSTERING

ABSTRACT. The study of the movements of microscopic phase objects, as biological cells, is of high interest in the scientific community. Digital Holographic Microscopy (DHM) is a technique widely used for analysis of phase objects. It can record, in one shot, the sample complex field and then the complex field is refocused in several planes for the 3D sample reconstruction. However, when in the view field there are several cells at different distances from the hologram plane, the correct location of each cell is critical for the analysis of the sample. There are diverse approaches to find the optimal focusing distance of a phase object; however, most of them depend on the input of the cell location in the view field as parameter. This condition restrains their application to cells in movement. We present the analysis of moving phase objects, using an alternative focusing criterion based on the analysis of different sized windows. With this criterion, it is possible to create a depth map of the objects in the sample, and at the same time finds its location in the view field and discriminate them from the background. The depth map is segmented with the clustering K-means method and each cluster is analyzed to determine the optimal object focusing distance.

Cruz López, M. L., Alcaraz-Rivera, M., Girshovitz, P., Shaked, N. T. & Javidi, B. (2017), Autonomous generation of extended images of dynamic phase objects in a depth volume sample using a simple focusing criterion and K-means clustering, *Proceedings of SPIE - The International Society for Optical Engineering*, 10335, Art. No. 103350z, doi: 10.1117/12.2270359, Conference Paper.



Dra. Carolina Del Valle Soto
SNI Nivel C

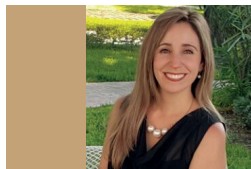


Mtro. Arturo Jafet Rodríguez Muñoz
Profesor Investigador

CML-WSN: A CONFIGURABLE MULTI-LAYER WIRELESS SENSOR NETWORK SIMULATOR

ABSTRACT. Wireless Sensor Networks (WSNs) have large applications in environments where access to human cannot be constant or where reliable and timely information is required to support decisions. WSNs must show high reliability, robustness, availability of information, monitoring capabilities, self-organization, among other aspects. Also, engineering requirements, such as low-cost implementation, operation, and maintenance are necessary. In this context, a simulator is a powerful tool for analyzing and improving network technologies used as a first step to investigate protocol design and performance test on large-scale systems without the need of real implementation. In this paper, we present a Configurable Multi-Layer WSN (CML-WSN) simulator. The CML-WSN simulator incorporates a configurable energy model to support any sensor specification as a one of its main features. The CML-WSN simulator is useful because it allows exploring prototypes with much less cost and time compared to the requirements needed in real networks implementations. © ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2017.

Del-Valle-Soto, C., Lezama, F., Rodríguez, J., Mex-Perera, C. & de Cote, E. M., (2017), CML-WSN: A configurable multi-layer wireless sensor network simulator, Lecture Notes of the Institute for Computer Sciences, *Social-Informatics and Telecommunications Engineering*, LNICST, 91-102, doi: 10.1007/978-3-319-49622-1_11, Conference Paper.



Dra. Carolina Del Valle Soto
SNI Nivel C

IMPACT OF THE MOBILE TERMINAL SCHEME ON MILLIMETER-WAVE RADIO OVER FIBER SYSTEMS BASED ON PHOTONIC HETERODYNING TECHNIQUES

ABSTRACT. The use of communication networks relying on millimeter-wave (mm-wave) wireless links promises a great capacity enhancement as well as improved security. However, given the high-directivity of mm-wave links, coverage requirements are difficult to meet unless the network is assisted by an infrastructure. Given its low-cost, power-efficiency, and high capacity, radio over fiber has emerged as a strong candidate for the implementation of such infrastructure. Among the different generation techniques, photonic heterodyning has attracted considerable attention due to its capacity to generate radio frequency (RF) signals in the entire microwave/mm-wave range without requiring broadband electro-optical modulator. However, the RF signals generated using these techniques suffer from significant phase noise, a major impairment that degrades the system performance. In this paper we study two approaches to overcome this limitation: (1) the use of optical sideband injection locking (OSBIL) to generate tones with highly correlated phase noise and (2) heterodyning independent lasers in combination with a mobile terminal (MT) that is insensitive to the phase of the RF signal. A qualitative comparison between the two techniques in terms of MT sensitivity to the RF phase noise, the power sensitivity, and base station power efficiency leads to the conclusion that OSBIL is more suitable for networks with medium-range node separation, whereas heterodyning of independent laser with phase-insensitive MT is a cost-efficient solution for networks where nodes are closer to each other. © 2017, Springer Science+Business Media New York.

Aldaya I., Campuzano G., Del-Valle-Soto C., Aragón-Zavala A. & Castañón G. (2017), Impact of the mobile terminal scheme on millimeter-wave radio over fiber systems based on photonic heterodyning techniques, *Optical and Quantum Electronics* 49(6), Art. No. 228, doi: 10.1007/s11082-017-1058-8, Review.

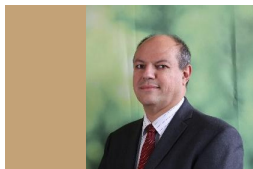


Dra. Carolina Del Valle Soto
SNI Nivel C

MPH-M, AODV-M AND DSRM PERFORMANCE EVALUATION UNDER JAMMING ATTACKS

ABSTRACT. In this work, we present the design of a mitigation scheme for jamming attacks integrated to the routing protocols MPH, AODV, and DSR. The resulting protocols are named MPH-M (Multi-Parent Hierarchical - Modified), AODV-M (Ad hoc On Demand Distance Vector - Modified), and DSR-M (Dynamic Source Routing - Modified). For the mitigation algorithm, if the detection algorithm running locally in each node produces a positive result then the node is isolated; second, the routing protocol adapts their paths avoiding the isolated nodes. We evaluated how jamming attacks affect different metrics for all these modified protocols. The metrics we employ to detect jamming attack are number of packet retransmissions, number of CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance) retries while waiting for an idle channel and the energy wasted by the node. The metrics to evaluate the performance of the modified routing protocols are the throughput and resilience of the system and the energy used by the nodes. We evaluated all the modified protocols when the attacker position was set near, middle and far of the collector node. The results of our evaluation show that performance for MPH-M is much better than AODV-M and DSR-M. For example, the node energy for MPH-M is 138.13 % better than AODV-M and 126.07 % better than DSR-M. Moreover, we also find that MPH-M benefits much more of the mitigation scheme than AODV-M and DSR-M.

Del-Valle-Soto, C., Mex-Perera, C., Monroy, R. & Nolasco-Flores, J. A. (2017), MPH-M, AODV-M and DSRM performance evaluation under jamming attacks, *Sensors* (Switzerland) 17(7), 1573, doi: 10.3390/s17071573, Article.



Dr. Lorenzo Miguel Elguea Fernández
Profesor Investigador



Dr. Félix Orlando Martínez Ríos
Profesor Investigador

AN EFFICIENT METHOD TO COMPARE LATENCIES IN ORDER TO OBTAIN THE BEST ROUTE FOR SDN

ABSTRACT. Comparing two or more routes on Internet is difficult owing to the variability of the measurements resulting from the different routes or use conditions. With current tools such as SDN [1], it is important to determine with certainty which the best route between a user and an internet service. This will be achieved with fast measurements which do not affect the operation of the network. With trends such as IoT, the best routes can be identified based on latency and not just on the jumps between autonomous systems, fact that optimizes data traffic in a specific way whether it is IPv4 or IPv6. As time elapses, it becomes more important to have a perfect setting for the LAN, which means optimal DNS, LDAP Servers appropriate number, etc. That's why we propose a precise method that contemplates every possible variation of data, thus making a comparison by means of the use of confidence limits. © 2017 The Authors. Published by Elsevier B.V.

Elguea L. M. & Martínez-Ríos, F. (2017), An efficient method to compare latencies in order to obtain the best route for SDN, *Procedia Computer Science* 116: 393-400, doi: 10.1016/j.procs.2017.10.076, Conference Paper.



M.C. Juan Carlos García Sánchez
Profesor Investigador

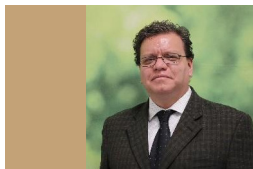


Dr. Ramiro Velázquez Guerrero
SNI Nivel I

PASSIVE VIBRATION CONTROL IN CIVIL STRUCTURES: EXPERIMENTAL RESULTS

ABSTRACT. This work is related to the structural and dynamic analysis of vibrations tested in a model of building-like structure which is armed by a three-story building with a Tuned Mass Damper vibration absorber. The structure it is connected to an electromagnetic shaker, which excited the support of the structure, provides forces with a wide range of excitation frequencies, including some resonance frequencies of the structure. The vibration absorber is a typical passive absorber known as Tuned Mass Damper (TMD), located over the third story building to reduce the vibrations. The overall mechanical structure is modeled using Euler-Lagrange methodology. The passive control is synthesized to actively attenuate the vibration system response via the TMD substructure, caused by excitation forces of earthquake acting on the base of the structure to improve the performance of the system and reduce the effect of vibrations. Some experimental results are included to illustrate the overall system performance. © 2018 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Enríquez-Zárate, J., García-Sánchez, J. C. & Velázquez, R. (2017), Passive vibration control in civil structures: Experimental results, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 72-76, Conference Paper.

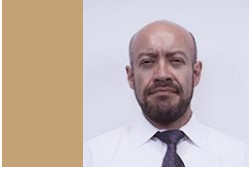


Dr. Roberto González Ojeda
SNI Nivel I

PRESINTERING OF TiCN-TiC-WC-Cr₃C₂-Ni CERMETS UNDER N₂-H₂ ATMOSPHERES

ABSTRACT. C/N ratios in TiCN-TiC-WC-Cr₃C₂-Ni cermets can be intentionally modified by changing the composition of the presintering atmosphere. This affects not only the sinterability but also the final microstructure of these materials. Melting occurs at lower temperatures as the nitrogen content of the presintering atmosphere rises. However, the final densities are lower due to the precipitation of free carbon. Grain growth of the carbonitride phase is accelerated in samples presintered in N₂ due to the activation of solution reprecipitation kinetics. Finally, the precipitation of the Cr-rich M₇C₃ carbide can also be controlled by the appropriate selection of the presintering atmosphere up to 7.8 wt. % Cr contents. © 2016 Elsevier Ltd.

Ezquerro, B. L., González Ojeda, R., Iparraguirre, I., Rodríguez, N. & Sánchez-Moreno, J. M. (2017), Presintering of TiCN-TiC-WC-Cr₃C₂-Ni Cermets Under N₂-H₂ Atmospheres, *International Journal of Refractory Metals and Hard Materials* 62: 21-28, doi: 10.1016/j.ijrmhm.2016.10.011, Article.

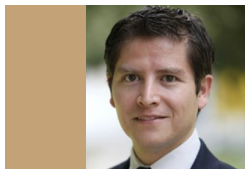


Dr. Salvador Gutiérrez Alcalá
Profesor Investigador

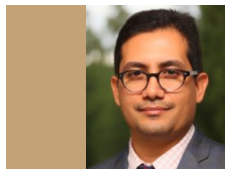
STATE-CONSTRAINED CONTROL OF NONLINEAR SYSTEMS IN REGULAR FORM

ABSTRACT. A method that enforces asymmetrical limits on part of the state of a nonlinear system in Regular Form is presented. To that end, a particular artificial potential function that incorporates the domain of interest is used and conditions for the stabilizability of a nonlinear system over a gradient vector field are introduced. Necessary and sufficient conditions are given for the state's first block to be enforced to stay within the set of allowed values by the state's second block; whenever such conditions hold, state's first block is said to be a constraintable vector. For all initial conditions inside the domain of interest, the resulting closed-loop of a stabilizable system over the artificial potential function's gradient vector field shows a conservative behavior, i.e., the state of the system exhibits periodical responses. A geometrical approach is introduced to estimate an admissible lower bound for the constraints to be enforced on the state's first block.

Gutiérrez Alcalá, S., Loukianov A. G. & Sanchez E. N. (2017), State-Constrained Control of Nonlinear Systems in Regular Form, *IFAC-PapersOnLine* 50(1): 11835-11840, doi: 10.1016/j.ifa.col.2017.08.1996, Article.



Dr. José Sebastián Gutiérrez Calderón
SNI Nivel C

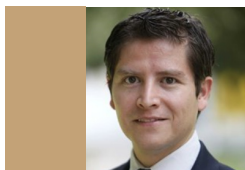


Dr. Ramiro Velázquez Guerrero
SNI Nivel I

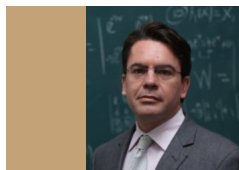
A PORTABLE TACTILE DISPLAY BASED ON PIN LATERAL TRACTION IEEE MEXICAN HUMANITARIAN TECHNOLOGY CONFERENCE

ABSTRACT. This paper introduces a simple yet novel tactile display device based on the lateral traction of its contact pins. In this concept, a single row of eight pins slides laterally on a rail to display tactile information as a traditional upwards/downwards pin-matrix display does. The advantage of this concept is that a row of N pins can display some information that has been traditionally done with a matrix of $N \times N$, thus, reducing significantly the number of actuators, simplifying their electronic drive, and allowing the development of low-cost, lightweight, compact, and highly-portable tactile displays. A first prototype has been developed using miniature DC motors to actuate the tactile pins along an 18 mm length rail at a 1 Hz refreshable bandwidth. Actuator, tactile display design, and prototype as well as user perceptual results are presented and discussed.

Gutiérrez, S. & Velázquez R. (2017), A portable tactile display based on pin lateral traction, *2017 IEEE Mexican Humanitarian Technology Conference (MHTC)*, Art. No. 7926195, 45-50, doi: 10.1109/MHT.7926195, Conference Paper.



Dr. José Sebastián Gutiérrez Calderón
SNI Nivel C

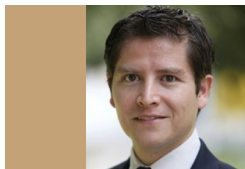


Dr. Pedro Manuel Rodrigo Cruz
SNI Nivel I

ENERGETIC ANALYSIS OF SIMPLIFIED 2-POSITION AND 3-POSITION NORTH-SOUTH HORIZONTAL SINGLE-ACAXIS SUN TRACKING CONCEPTS

ABSTRACT. Detection of leakages in pipelines is a matter of continuous research because of the basic importance for a waterworks system is finding the point of the pipeline where a leak is located and –in some cases– a nature of the leak. There are specific difficulties in finding leaks by using spectral analysis techniques like FFT (Fast Fourier Transform), STFT (Short Term Fourier Transform), etc. These difficulties arise especially in complicated pipeline configurations, e.g. a zigzag one. This research focuses on the results of a new algorithm based on FFT and comparing them with a developed STFT technique. Even if other techniques are used, they are costly and difficult to be managed. Moreover, a constraint in the leak detection is the pipeline diameter because it influences accuracy of the adopted algorithm. FFT and STFT are not fully adequate for complex configurations dealt with in this paper, since they produce ill-posed problems with an increasing uncertainty. Therefore, an improved Tikhonov technique has been implemented to reinforce FFT and STFT for complex configurations of pipelines. Hence, the proposed algorithm overcomes the aforementioned difficulties due to applying a linear algebraic approach. © 2017 Polish Academy of Sciences. All rights reserved.

Gutiérrez, S. & Rodrigo, P. M. (2017), Energetic analysis of simplified 2-position and 3-position North-South horizontal single-acaxis sun tracking concepts, *Solar Energy* 157: 244-250, doi: 10.1016/j.solener.2017.08.036, Article.

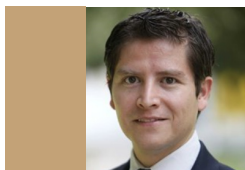


Dr. José Sebastián Gutiérrez Calderón
SNI Nivel C

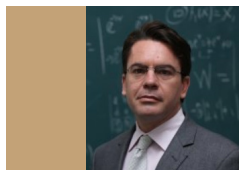
PROTOTYPE FOR AN OFF-GRID PHOTOVOLTAIC SYSTEM WITH LOW COST SOLAR TRACKING

ABSTRACT. Sun trackers allow the energy yield of photovoltaic systems to be increased. Among the different types of sun tracking strategies, North-South horizontal single-axis sun trackers are of big interest nowadays, especially for their implementation in utility-scale photovoltaic plants. It is important to find concepts which simplify as much as possible these sun trackers. In this paper, an energetic analysis of two very simple tracking strategies, based on a 2-position or 3-position rotatory movement for the North-South horizontal single-axis tracker, is carried out for latitudes up to 50°. The tracker positions (morning/afternoon for 2-positions, or morning/noon/afternoon for 3-positions) change at pre-defined daily schedules and the tilt angle at the morning and afternoon periods is fixed. The energetic analysis was carried out over a set of 22 locations worldwide and the captured irradiation was compared to that of equator-pointed optimally tilted fixed systems and to that of the best energetically efficient North-South horizontal single-axis tracker, i.e. the continuous sun tracker. Results indicate that, depending on the analysed location, the 2-position tracker can provide between 41 % and 74 %, and the 3-position tracker can provide between 68 % and 87 % of the annual irradiation gains that the North-South horizontal single-axis continuous sun tracker achieves with respect to an optimally tilted fixed system. Therefore, these types of simplified tracking concepts, especially the 3-position tracker, can be seen as alternatives to existing North-South horizontal single-axis continuous sun trackers, providing significant energy gains with respect to fixed photovoltaic systems. © 2017 Elsevier Ltd.

Gutiérrez S. (2017), Prototype for an off-grid photovoltaic system with low cost solar tracking, *2017 IEEE Mexican Humanitarian Technology Conference (MHTC)*, Art. No. 7926198, 7-11, doi: 10.1109/MHTC.2017.7926198, Conference Paper.



Dr. José Sebastián Gutiérrez Calderón
SNI Nivel C

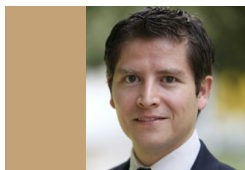


Dr. Pedro Manuel Rodrigo Cruz
SNI Nivel I

PROTOTYPE FOR WATER REUSE IN HOUSE SHOWERS: SAVINGS AND ECONOMICS

ABSTRACT. The main purpose of this paper is to demonstrate the savings and economics of using an automated watering system within households. The paper will argue about a device capable of optimizing water consumption allowing water reuse. Device will be automated and will use an electric and mechanical system to redirect water to different reservoirs. System will make use of a wide diversity of sensors such as temperature, presence, and volume. Since project is being developed under Mexican investigators, this system is focused in Mexican values. Due to savings made on water bill it is expected to also have a monetary saving, making it a win-win to humans and the environment. It is important to resemble that all calculation within this article were made to solve the Mexican water scarcity problem, particularly in the City of Aguascalientes, but can also be replicated to any location. The city of Aguascalientes has water scarcity problems. Because of this an analysis was made in order to preserve this natural and vital resource as much as possible. © 2018 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Ramos-Mayol Y., Ruiz-Esparza A., Gutiérrez S. & Rodrigo P. M. (2017), Prototype for water reuse in house showers: Savings and economics, 2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (*EnvIMEKO*), 56-61, Conference Paper.



Dr. José Sebastián Gutiérrez Calderón
SNI Nivel C

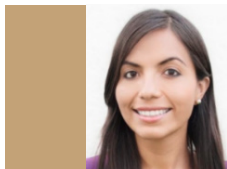


Dr. Ramiro Velázquez Guerrero
SNI Nivel I

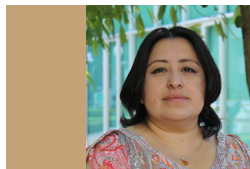
REVIEW OF SYSTEM CONTROLLER FOR SMART HOMES/ BUILDING APPLICATIONS

ABSTRACT. SCADA systems have been used during the last years in order to control and supervise industrial processes within a long distance, thus considerably reducing the loss of information, apart from offering a higher speed and security of data. Nowadays, due to the fast development of Internet of Things, of wireless communication and of electronics, a better efficiency in industrial processes has been established, this being possible due to the use of specialized protocols and software, which, have been able to expand to house and building applications because of the easiness of their programming protocol and graphic interface, together with a low cost. The objective of this work is to show the different and mostly used control systems for applications in houses and smart buildings. © 2017 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Gutiérrez S., Velázquez R. & Alvarez J. (2017), Review of system controller for smart homes/building applications, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 104-108, Conference Paper.



Mtra. Irma Cecilia Landa Ávila
Profesor Investigador



Dra. María Luisa Cruz López
SNI Nivel C

ENGAGEMENT IN A VIRTUAL REALITY GAME WITH GESTURE HAND INTERFACE. AN EMPIRICAL EVALUATION OF USER ENGAGEMENT SCALE (UES)

ABSTRACT. The combination of virtual environments and gesture control interface has increased in the past years. It is believed that these technologies could increase user engagement and the user experience. However, there is still no standard scale to measure user engagement in those systems. We apply the UES to a virtual reality game with gesture hand control, to evaluate its viability in this kind of system. A sample of 164 individuals, who attended a huge technology trend and information event, completed a questionnaire after playing the game. The game includes puzzle solving using hand gesture interface. The UES scale is composed of six aspects or subscales: Perceived Usability (PU), Aesthetics (AE), Novelty (NO), Felt Involvement (FI), Focused Attention (FA), and Endurability (EN). The analysis results indicated that the scale had good reliability for all the aspects or sub-scales included. As a result of applying the principal component analysis, we found that the FA and AE components retained all its items. Meanwhile, the PU sub-scale is divided into three different components, and the NO, FI and EN subscales are combined in a new component. We establish a discussion of the characteristics and usability of virtual reality systems and gesture hand control that could cause these variations in the UES components. Also, we discuss the context as a potential key factor to influence engagement and user experience.

Landa-Avila, I. C. & Cruz, M. L. (2017), Engagement in a virtual reality game with gesture hand interface. An empirical evaluation of user engagement scale (UES), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 10289 LNCS, 414-427, doi: 10.1007/978-3-319-58637-3_33, Conference Paper.



Dr. Félix Orlando Martínez Ríos
Profesor Investigador

A NEW HYBRIDIZED ALGORITHM BASED ON POPULATION-BASED SIMULATED ANNEALING WITH AN EXPERIMENTAL STUDY OF PHASE TRANSITION IN 3-SAT

ABSTRACT. This paper is about experiments for satisfiability problem using a new algorithm (GR-MM-PBSA) that improves the algorithm Population-Based Simulated Annealing (PBSA). GR-MM-PBSA runs in a parallel way Simulated Annealing (SA) and Threshold Annealing (TA) algorithms with a Golden Ratio space search strategy and Markovian Model to select initial and final temperature. In this paper we execute different hybridized Simulated Annealing (or Threshold Accepting) algorithms and compares the efficiency of these, using a metric based on transition phase effect. Simulated Annealing Algorithms (SAA) theoretically can reach the optimum if the control parameters and cooling scheme are chosen correctly. All algorithms are compared with a metric based on transition phase obtained for 3-SAT instances. This paper shows the results of SAA hybridizations are more efficient than the original algorithm, without increasing their computational complexity. We also show the experimental data about runs with 820 3-SAT instances with ratio clauses-variables between 2.0 to 6.0. © 2017 The Authors. Published by Elsevier B.V.

Martínez-Ríos F. (2017), A new hybridized algorithm based on Population-Based Simulated Annealing with an experimental study of phase transition in 3-SAT, *Procedia Computer Science* 116, 427-434, doi: 10.1016/j.procs.2017.10.022, Conference Paper.



Dra. María de Lourdes Martínez Villaseñor
SNI Nivel I

FUZZY-BASED APPROACH OF CONCEPT ALIGNMENT

ABSTRACT. The need to share and reuse information has grown in the new era of Internet of things and ubiquitous computing. Researchers in ontology and schema matching use mapping approaches in order to achieve interoperability between heterogeneous sources. The use of multiple similarity measures that take into account lexical, structural and semantic properties of the concepts is often found in schema matching for the purpose of data integration, sharing and reusing. Mappings identified by automatic or semi-automatic tools can never be certain. In this paper, we present a fuzzy-based approach to combine different similarity measures to deal with scenarios where ambiguity of terms hinder the process of alignment and add uncertainty to the match. © 2017, Springer International Publishing AG.

De Lourdes Martínez-Villaseñor, M. & González-Mendoza, M. (2017), Fuzzy-based approach of concept alignment, *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 10586 LNCS, 172-180, doi: 10.1007/978-3-319-67585-5_18, Conference Paper.

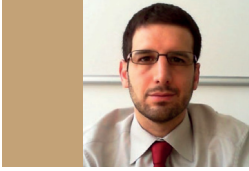


Dra. María de Lourdes Martínez Villaseñor
SNI Nivel I

OVERVIEW OF A FRAMEWORK FOR UBIQUITOUS USER MODELS INTEROPERABILITY, LECTURE NOTES OF THE INSTITUTE FOR COMPUTER SCIENCES

ABSTRACT. Researchers in the user modeling community have been interested in sharing and reuse profile information from heterogeneous sources. Ubiquitous user model interoperability allows enrichment of adaptive systems obtaining a better understanding of the user, and decreases the effort associated with creating a user model. We present a framework that enables the interoperability between profile suppliers and consumers with a mixed approach that consist in central ubiquitous user model ontology and a process of concept alignment. The central ontology is a flexible representation of a ubiquitous user model to cope with the dynamicity of a distributed multi-application environment that provides mediation between profile suppliers and consumers. The process of concept alignment automatically discovers the semantic mappings in order to interpret the information from heterogeneous sources and integrate them into a ubiquitous user model. © ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2017.

Martínez-Villaseñor L. & González-Mendoza M. (2017), Overview of a Framework for Ubiquitous User Models Interoperability. In: Sucar E., Mayora O. & Munoz de Cote E. (eds.), *Applications for Future Internet. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering*, 179, Springer, Cham, 185-188, doi: 10.1007/978-3-319-49622-1_20, Conference Paper.

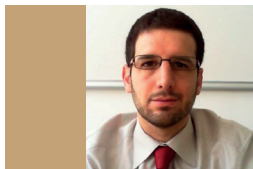


Dr. Luis Miralles Pechuán
Profesor Investigador

A METHODOLOGY BASED ON DEEP LEARNING FOR ADVERT VALUE CALCULATION IN CPM

ABSTRACT. In this research, we propose a methodology for advert value calculation in CPM, CPC and CPA networks. Accurately estimating this value increases the three previous networks' incomes by selecting the most profitable advert. By increasing income, publishers are better paid and improved services are afforded to advertisers. To develop this methodology, we propose a system based on traditional Machine Learning methods and Deep Learning methods. The system has two inputs and one output. The inputs are the user visit and the data about the advertiser. The output is the advert value expressed in dollars. Deep Learning predicts model behavior more precisely for many supervised problems. The three experiments carried out allow us to conclude that DL is a supervised method that is very efficient in the classification of spam adverts and in the estimation of the CTR. In the prediction of online sales, DLNN have shown, on average, worse performance than cubist and random forest methods, although better performance than model tree, model rules and linear regression methods. © 2016, Springer-Verlag Berlin Heidelberg.

Miralles-Pechuán, L., Rosso, D., Jiménez, F. & García, J. M. (2017), A methodology based on Deep Learning for advert value calculation in CPM, CPC and CPA networks, *Soft Computing* 21(3): 651-665, 10.1007/s00500-016-2468-4, Article.



Dr. Luis Miralles Pechuán
Profesor Investigador

MULTI-OBJECTIVE EVOLUTIONARY FEATURE SELECTION FOR ONLINE SALES FORECASTING

ABSTRACT. Sales forecasting uses historical sales figures, in association with products characteristics and peculiarities, to predict short-term or long-term future performance in a business, and it can be used to derive sound financial and business plans. By using publicly available data, we build an accurate regression model for online sales forecasting obtained via a novel feature selection methodology composed by the application of the multi-objective evolutionary algorithm ENORA (Evolutionary NON-dominated Radial slots based Algorithm) as search strategy in a wrapper method driven by the well-known regression model learner Random Forest. Our proposal integrates feature selection for regression, model evaluation, and decision making, in order to choose the most satisfactory model according to an a posteriori process in a multi-objective context. We test and compare the performances of ENORA as multi-objective evolutionary search strategy against a standard multi-objective evolutionary search strategy such as NSGA-II (Non-dominated Sorted Genetic Algorithm), against a classical backward search strategy such as RFE (Recursive Feature Elimination), and against the original data set. © 2016 Elsevier B.V.

Jiménez, F., Sánchez, G., García, J. M., Sciavicco, G. & Miralles, L. (2017), Multi-objective evolutionary feature selection for online sales forecasting, *Neurocomputing* 234: 75-92, doi: 10.1016/j.neucom.2016.12.045, Article.



Dr. Ernesto Moya Albor
SNI Nivel C

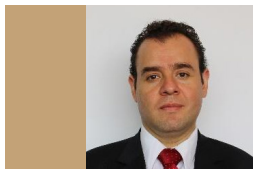


Dr. Jorge Brieva Rico
Profesor Investigador

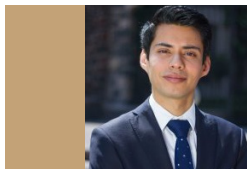
3D OPTICAL FLOW ESTIMATION IN CARDIAC CT IMAGES USING THE HERMITE TRANSFORM

ABSTRACT. Heart diseases are one of the most important causes of death in the Western world. It is, then, important to implement algorithms to aid the specialist in analyzing the heart motion. We propose a new strategy to estimate the cardiac motion through a 3D optical flow differential technique that uses the Steered Hermite transform (SHT). SHT is a tool that performs a decomposition of the images in a base that model the visual patterns used by the human vision system (HSV) for processing the information. The 3D + t analysis allows to describe most of motions of the heart, for example, the twisting motion that takes place on every beat cycle and to identify abnormalities of the heart walls. Our proposal was tested on two phantoms and on two sequences of cardiac CT images corresponding to two different patients. We evaluate our method using a reconstruction schema, for this, the resulting 3D optical flow was applied over the volume at time t to obtain a estimated volume at time $t + 1$. We compared our 3D optical flow approach to the classical Horn and Shunk's 3D algorithm for different levels of noise. © 2017 SPIE.

Moya-Albor, E., Mira, C., Brieva, J., Escalante-Ramirez, B. & Venegas, E. V. (2017), 3D optical flow estimation in cardiac CT images using the hermite transform, *Proceedings of SPIE - The International Society for Optical Engineering*, 10160, 1016010, doi: 10.1117/12.2256777, Conference Paper.



Dr. Ernesto Moya Albor
SNI Nivel C



Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I



Dr. Jorge Brieva Rico
Profesor Investigador

AN EDGE DETECTION METHOD USING A FUZZY ENSEMBLE APPROACH

ABSTRACT. Edge detection is one of the most important low level steps in image processing. In this work we propose a fuzzy ensemble based method for edge detection including a fuzzy c-means (FCM) approach to define the input membership functions of the fuzzy inference system (FIS). We tested the performance of the method using a public database with ground truth. Also, we compared our proposal with classical and other fuzzy based methods, using F-measure curves and the precision metric. We conducted experiments with different levels of salt & pepper noise to evaluate the performance of the edge detectors. The metrics illustrate the robustness of the choice of the threshold in the binarization step using this fuzzy ensemble method. In noisy conditions, the proposed method works better than other fuzzy approaches. Comparative results validated that our proposal overcomes traditional techniques. © 2017, Budapest Tech Polytechnical Institution. All rights reserved.

Moya-Albor, E., Ponce, H. & Brieva, J. (2017), An edge detection method using a fuzzy ensemble approach, *Acta Polytechnica Hungarica* 14(3): 149-168, doi: 10.12700/APH.14.3.2017.3.9, Article.

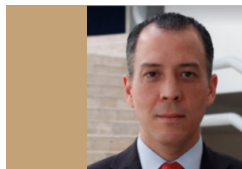


Dr. Elías Olivares Benítez
SNI Nivel I

INSULAR BIOBJECTIVE ROUTING WITH ENVIRONMENTAL CONSIDERATIONS FOR A SOLID WASTE COLLECTION SYSTEM IN SOUTHERN CHILE

ABSTRACT. The combination of virtual environments and gesture control interface has increased in the past years. It is believed that these technologies could increase user engagement and the user experience. However, there is still no standard scale to measure user engagement in those systems. We apply the UES to a virtual reality game with gesture hand control, to evaluate its viability in this kind of system. A sample of 164 individuals, who attended a huge technology trend and information event, completed a questionnaire after playing the game. The game includes puzzle solving using hand gesture interface. The questionnaire was adapted from the original proposed by O'Brien, to fit the videogame application. The UES scale is composed of six aspects or subscales: Perceived Usability (PU), Aesthetics (AE), Novelty (NO), Felt Involvement (FI), Focused Attention (FA), and Endurability (EN). The analysis results indicated that the scale had good reliability for all the aspects or sub-scales included. As a result of applying the principal component analysis, we found that the FA and AE components retained all its items. Meanwhile, the PU sub-scale is divided into three different components, and the NO, FI and EN subscales are combined in a new component. We establish a discussion of the characteristics and usability of virtual reality systems and gesture hand control that could cause these variations in the UES components. Also, we discuss the context as a potential key factor to influence engagement and user experience. © Springer International Publishing AG 2017.

Arango González, D. S., Olivares-Benitez, E. & Miranda, P. A. (2017), Insular Bi-objective Routing with Environmental Considerations for a Solid Waste Collection System in Southern Chile, *Advances in Operations Research*, 2017, Art. No. 4093689, 10.1155/2017/4093689, Article.



Dr. Francisco Alejandro Orozco Argote
SNI Nivel I

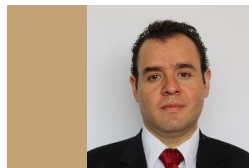
MODELING THE PERFORMANCE IMPACTS CAUSED BY AN EARTHQUAKE TO THE CONSTRUCTION INDUSTRY: CASE STUDY ON THE 2010 CHILE EARTHQUAKE

ABSTRACT. Natural disasters affect the construction industry in many ways other than the direct damages. This paper presents a model that evaluates the performance impacts caused by an earthquake to the construction industry by using the 2010 Chilean earthquake as case study. The main variables affected by a seismic event in construction companies and their relationships were modeled by means of the use of Partial Least Square (PLS). The modeling framework was developed by interviewing CEOs of construction companies located in areas affected by the earthquake. Then, a model of interrelationships, which would explain how variables are affected by an earthquake was developed. The main findings showed that when a severe telluric event occurs, the two most affected factors were Relationship with the Owner/Clients and Image, while the most affected indexes were Owner/Client Satisfaction and Financial Situation. Thus, this research emphasizes the importance of these four variables (factors and indexes), when the construction industry faces a large earthquake.

Forcael, E., González, V., Opazo, A., Orozco, F. & Araya, R. (2017), Modeling the performance impacts caused by an earthquake to the construction industry: Case study on the 2010 Chile earthquake, *Revista de la Construcción* 16(2), 215-228, 10.7764/RDLC.16.2.215, Article.



Dr. José Mauricio Pardo Benito
Profesor Investigador



Dr. Ernesto Moya Albor
SNI Nivel C



Dr. Jorge Brieva Rico
Profesor Investigador

IMAGE ANALYSIS APPLIED TO A FREEZE-CONCENTRATION WATER PURIFICATION SYSTEM

ABSTRACT. Freeze concentration is a promising water purification technology, especially due to the low levels of energy consumption when compared with other processes such as evaporation. Nevertheless, its development is still at pilot plant scale and more knowledge of the process is needed. One of the important parameters needed for design and control of the process is the growth velocity of the crystal, commonly known as the limit velocity. Above this velocity, ice crystals will entrap solids and separation will not be successful. In this work, we describe a non-invasive technique to measure this limit velocity based on image analysis. Photographs were taken every 30 minutes in an experimental rig that allowed freezing the sample unidirectional. Back lighting was used in order to observe variations in luminosity at the samples surface. Image processing algorithms were used to segment the image, to identify the freezing front and to model its movement. Under the experimental conditions of this work, it was determined that the limiting freezing front velocity was 1.17 mm/h, which is a valuable information for the design and control of the process. © 2018 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Pardo J. M., Moya-Albor E., Ibarra G. O. & Brieva J. (2017), Image analysis applied to a freeze-concentration water purification system, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 16-19, Conference Paper.

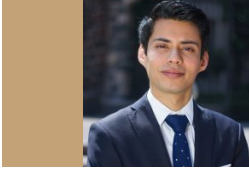


Dr. Claudio de Jesús Pita Ruiz Velasco
SNI Nivel I

WEIGHTED SUMS OF SQUARES VIA GENERALIZED EULERIAN POLYNOMIALS

ABSTRACT. We give explicit formulas for the weighted sum of squares $\sum_{j=0}^{m-1} z^j (a_j + b)^2$, where $a, b \in \mathbb{C}$ are given, and $z \in \mathbb{C}$, $z \neq 0, 1$ is the weight. In the case $a, b \in \mathbb{Z}$ and $z \in \mathbb{Q}$, we show that there is a one-to-one correspondence between our weighted sums and Primitive Pythagorean Triples. The main tools we use are the Z-Transform of sequences and a generalization of Eulerian polynomials.

Pita Ruiz Velasco, C. de J. (2017), Weighted sums of squares via generalized eulerian polynomials, *Fibonacci Quarterly* 55(5): 149-165, Conference Paper.

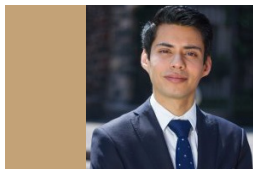


Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

CAN CRUSH: AN AUTOMATED WASTE COMPACTING SYSTEM FOR PUBLIC AREAS

ABSTRACT. Overwhelming amount of waste is generated every year globally. This problem has been shown to be significant interest in solving the waste management, e.g. land filling is a common practice. However, environmental issues are presented. In particular, land filling is an expensive method in terms of the volume cost, so compactors are required to accommodate more waste. Different compactors have been developed for both mobile and static usage mode as the automatic compacting receptacles normally used for fast food areas, mall food courts, airports, parks or any public areas. But, they are designed for mixed waste and prevent for recycling. In that sense, this paper aims to present a proof of concept of an automatic compacting receptacle system exclusively for aluminum cans. Using a mechatronics design, the proposal was implemented in a functional prototype. Preliminary results detected strengths and weaknesses of the proposal, also suggesting that the proposal can be applied for public areas in near future. © 2017 IEEE.

Becker J., Ponce C., Rodriguez J., Vazquez D. & Ponce H. (2017), Can crush: An automated waste compacting system for public areas, *2017 IEEE Mexican Humanitarian Technology Conference (MHTC)*, 149-152, doi: 10.1109/MHTC.2017.7926206, Conference Paper.

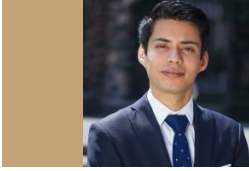


Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

DESIGN OF AN AUTOMATED HIVE FOR BEE PROLIFERATION AND CROP BETTERMENT

ABSTRACT. Apiculture has been a method for harvesting honey and helping crop proliferation, nonetheless late climate changes have affected bee population. Having an automated hive as a tool for beekeepers would help to increase and protect current bee population guaranteeing crop proliferation needed for human consumption. In this paper, we propose an electronic beehive that recollect honey automatically, regulate the temperature of the inner hive and distribute food for bees. Preliminary results showed the control and automation of the proposed system as well as the prototype implementation, concluding that the automated beehive might be able to improve bee proliferation and crop betterment in an automated way. © 2017 IEEE.

Lopez-Tagle E., Siqueiros E. & Ponce H. (2017), Design of an automated hive for bee proliferation and crop betterment, *2017 14th International Conference on Electrical Engineering, Computing Science and Automatic Control (ICEEE)*, Art. No. 8108878, doi: 10.1109/ICEEE.2017.8108878, Conference Paper.

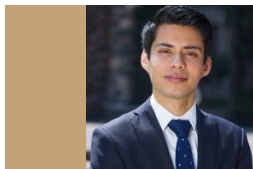


Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

ELECTRIC WHEELCHAIR MODULE: CONVERTING A MECHANICAL TO AN ELECTRIC WHEELCHAIR

ABSTRACT. There is a growing need for transportation, either inside a house or office, as well as in the streets and other public spaces. This constant need is a disadvantage for anyone with some kind of disability, especially those that suffer motor disabilities. Electric wheelchairs are part of the technological solutions to this demand. However, their cost are very high in contrast to mechanical wheelchairs. In that sense, this paper aims to present a new module device that can be used for converting a mechanical wheelchair to an electrical one. The proposed device was designed for simplicity in installation, high benefit-cost ratio and easiness in control movement. Preliminary results showed the implementation of the proposal in a functional prototype. © 2017 IEEE.

Galván, E., González, G., Hernández, G., Manon, S. & Ponce, H. (2017), Electric wheelchair module: Converting a mechanical to an electric wheelchair, *2017 IEEE Mexican Humanitarian Technology Conference (MHTC)*, Art. No. 7926208, 70-74, doi: 10.1109/MHTC.2017.7926208, Conference Paper.



Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

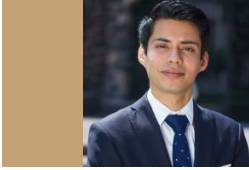


Dra. María de Lourdes Martínez Villaseñor
SNI Nivel I

INTERPRETABILITY OF ARTIFICIAL HYDROCARBON NETWORKS FOR BREAST CANCER CLASSIFICATION

ABSTRACT. In machine learning, interpretability refers to understand the underlying behavior of the prediction of a model in order to identify diagnosis criteria and/or new rules from its output. Interpretability contributes to increase the usability of the method. Also, it is relevant in decision support systems, such as in medical applications. White-box models like tree-based, rule-based and linear models are considered the most comprehensible, but less accurate or simplistic. In contrast, black-box models like nonlinear and ensemble models are more accurate hence more complex to interpret. Thus, a trade-off between accuracy and interpretability is often made when building models to support human experts in a decision-making process. Artificial hydrocarbon networks (AHN) is a supervised learning method that has been proved to be very effective for regression and classification problems. In fact, its training process suggests a kind of interpretability. Thus, the objective of this work is to present first efforts proving the capacity of artificial hydrocarbon networks (AHN) to deliver interpretable models. In order to assess the interpretability of AHN, we address the breast cancer problem using a public dataset. Results showed that AHN can be transformed in treebased and rule-based models preserving high accuracy in the output classification. © 2017 IEEE.

Ponce, H. & De Lourdes Martínez-Villaseñor, M. (2017), Interpretability of artificial hydrocarbon networks for breast cancer classification, *2017 International Joint Conference on Neural Networks (IJCNN)*, 2017-May, 7966301, 3535-3542, doi: 10.1109/IJCNN.2017.7966301, Conference Paper.

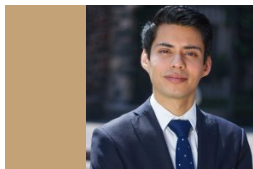


Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

KYNEKILEKTROS: AN INTEGRATED SYSTEM FOR AUGMENTING CAPABILITIES ON STREET TRIPS

ABSTRACT. Generation system based on the transformation of kinetic energy into, electrical energy through an alternator, with a central signals processing unit and its interpretation of quantitative and qualitative information in real time of the user activity and of the same system during the journey for its projection in the electronic device to which is directed the electric charge, fastened on a subsystem of anchorage and connection. © 2017 IEEE.

Anzures, K., Cazares, H., Scott, A., Soberon, F. & Ponce, H. (2017), Kynekilektros: An integrated system for augmenting capabilities on street trips, *2017 IEEE Mexican Humanitarian Technology Conference (MHTC)*, Art. No. 7926205, 18-21, doi: 10.1109/MHTC.2017.7926205, Conference Paper.

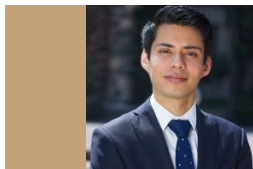


Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

MEDI-KIT: DEVELOPING A SOLUTION TO IMPROVE ATTENTION ON MEDICAL TREATMENT

ABSTRACT. Leaving unattended a medical treatment may have consequences, from prolonging a recovery waiting time to mortal circumstances. Several technological solutions have been proposed for this problem, including pillboxes and automated pill dispensers. In that sense, this paper aims to present the development of an automatic pill dispenser to improve attention on medical treatment when a patient does not take medicine on time. The implementation considers two components: A fixed device that works as the main automated pill dispenser, and a portable device that can communicate with the fixed device in order to synchronize medical treatment information in both devices. Experimental results prove that this functional prototype improves the number of times a patient forgets to follow a medical treatment and it reduces the delays in taking pills. © 2017 IEEE.

Mondragón, A., De Hoyos, A., Trejo, A., González, M. & Ponce, H. (2017), Medi Kit: Developing a solution to improve attention on medical treatment, *2017 IEEE Mexican Humanitarian Technology Conference (MHTC)*, Art. No. 7926207, 28-33, doi: 10.1109/MHTC.2017.7926207, Conference Paper.

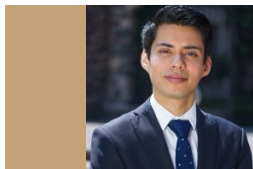


Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I

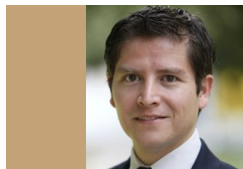
A NOVEL ARTIFICIAL HYDROCARBON NETWORKS BASED VALUE FUNCTION APPROXIMATION IN HIERARCHICAL REINFORCEMENT LEARNING

ABSTRACT. Reinforcement learning aims to solve the problem of learning optimal or near-optimal decision-making policies for a given domain problem. However, it is known that increasing the dimensionality of the input space (i.e. environment) will increase the complexity for the learning algorithms, falling into the curse of dimensionality. Value function approximation and hierarchical reinforcement learning have been two different approaches proposed to alleviate reinforcement learning from this illness. In that sense, this paper proposes a new value function approximation using artificial hydrocarbon networks –a supervised learning method inspired on chemical carbon networks– with regularization at each subtask in a hierarchical reinforcement learning framework. Comparative results using a greedy sparse value function approximation over the MAXQ hierarchical method was computed, proving that artificial hydrocarbon networks improves accuracy and efficiency on the value function approximation. © Springer International Publishing AG 2017.

Ponce, H. (2017), A Novel Artificial Hydrocarbon Networks Based Value Function Approximation in Hierarchical Reinforcement Learning. In Pichardo-Lagunas O., Miranda-Jiménez S. (eds.), *Advances in Soft Computing. MICAI 2016. Lecture Notes in Computer Science*, vol 10062. Springer, Cham, 211-225, doi: 10.1007/978-3-319-62428-0_18, Conference Paper.



Dr. Hiram Eredín Ponce Espinosa
SNI Nivel I



Dr. José Sebastián Gutiérrez Calderón
SNI Nivel C

PREDICTING CLIMATE CONDITIONS USING INTERNET-OF-THINGS AND ARTIFICIAL HYDROCARBON NETWORKS

ABSTRACT. The prediction and understanding of environmental conditions is of great importance to prevent and analyze changes in environment, supporting meteorological based sectors, such as agriculture. In that sense, this paper presents an Internet of Things (IoT) system for predicting climate conditions, i.e. temperature, using artificial intelligence by means of a supervised learning method, the artificial hydrocarbon networks model. It allows predicting the temperature of remote locations using information from a web service comparing it with a field temperature sensor. Experimental results of the supervised learning model are presented in two modes: offline training to detect the suitable parameters of the model and testing to validate the model with new data retrieval from the web service. Preliminary results conclude that artificial hydrocarbon networks model predicts remote temperature with mean error of 0.05°C in testing mode. © 2018 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Ponce, H., Gutiérrez, S. & Montoya, A. (2017), Predicting climate conditions using internet-of-things and artificial hydrocarbon networks, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 62-66, Conference Paper.



Dra. María José Quintana Hernández
SNI Nivel I



Dr. Roberto González Ojeda
SNI Nivel I

MICROSTRUCTURES OF A PRESSURE DIE CAST AL-8.5 % SI-3.5 % CU ALLOY

ABSTRACT. Quantitative microstructural measurements of constituents of an Al-Si-Cu alloy, used to manufacture a part with thin sections by Pressure Die Casting (PDC), do not correspond to phase diagram calculations. A simulation of the liquid velocity when filling the mold was made in order to understand the relation between this parameter and pressure, cooling rate and the eutectic amount and morphology. Also, the microstructures of the same alloy solidified in a ceramic crucible (low cooling rate) and in a metal flask (high cooling rate) were compared to those obtained by PDC to analyze the role of pressure on the displacement of eutectic composition and formation of different eutectic morphologies. The amount of constituents varies with distance from the mold walls, producing higher or lower pressure zones, which may be estimated from the Al-Si phase diagram simulation at different pressures. As these pressures must be very high (2 GPa), a possible explanation for the displacement of the eutectic point is the combination of high cooling rate of the manufacturing process, entrapment of gases during solidification and influence of the alloying elements.

Barbes, M. A., Quintana, M. J., Verdeja, L. F. & González, R. (2017), Microstructures of a pressure die cast Al-8.5 % Si-3.5 % Cu alloy, *Kovove Materialy* 55(2): 89-96, doi: 10.4149/km-2017-2-89, Article.



Dra. María José Quintana Hernández
SNI Nivel I

SOLIDIFICATION AND SOLID-STATE TRANSFORMATIONS OF METALS AND ALLOYS

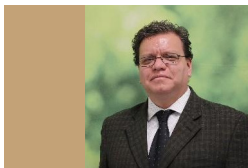
ABSTRACT. Solidification and Solid-State Transformations of Metals and Alloys describes solidification and the industrial problems presented when manufacturing structural parts by casting, or semi-products for forging, in order to obtain large, flat or specifically shaped parts. Solidification follows the nucleation and growth model, which will also be applied in solid-state transformations, such as those taking place because of changes in solubility and allotropy or changes produced by recrystallization. It also explains the heat treatments that, through controlled heating, holding and cooling, allow the metals to have specific structures and properties. It also describes the correct interpretation of phase diagrams so the reader can comprehend the behaviour of iron, aluminium, copper, lead, tin, nickel, titanium, etc., and the alloys between them or with other metallic or metalloid elements.

This book can be used by graduate and undergraduate students, as well as physicists, chemists and engineers who wish to study the subject of Metallic Materials and Physical Metallurgy, specifically industrial applications where casting of metals and alloys, as well as heat treatments are relevant to the quality assurance of manufacturing processes. It will be especially useful for readers with little to no knowledge on the subject, and who are looking for a book that addresses the fundamentals of manufacturing, treatment and properties of metals and alloys.

Pero-Sanz Elorz, J. A., Quintana Hernández, M. J. & Verdeja González, L. F. (2017), *Solidification and Solid-State Transformations of Metals and Alloys*, Amsterdam: Elsevier, 1-364, Book.



Dra. María José Quintana Hernández
SNI Nivel I

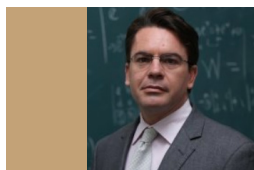


Dr. Roberto González Ojeda
SNI Nivel I

TRIBO-CORROSION PROTECTION OF VALVES AND ROTORS USING CERMET LAYERS APPLIED WITH HVOF

ABSTRACT. Protection of conventional steel parts in equipment that must withstand wear of the tribo-corrosion type (combination of heat and an aqueous medium) can be achieved by High Velocity Oxy-Fuel (HVOF) techniques, applying carbide-based cermet layers which decrease tribological and corrosion mechanisms. Three different carbide layers were applied to a ferritic-pearlitic steel in order to characterize properties such as sliding friction coefficient, phase identification, adhesion to the substrate, porosity, layer thickness and wear mechanisms. An example of a real rotatory equipment after a working campaign, both with and without protective layer is presented. The capacity of the protective layer to extend the life of parts like the one analyzed is evident even if zones of the layer are detached during the campaign. © 2017, Pleiades Publishing, Ltd.

Quintana, M. J., González, R., Fernandez, D. & Verdeja, L. F. (2017), Tribo-corrosion protection of valves and rotors using cermet layers applied with HVOF, *Protection of Metals and Physical Chemistry of Surfaces* 53(2): 373-378, doi: 10.1134/S2070205117020198, Article.

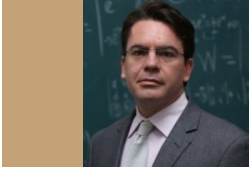


Dr. Pedro Manuel Rodrigo Cruz
SNI Nivel I

CHARACTERIZATION OF THE SPECTRAL MATCHING RATIO AND THE Z-PARAMETER FROM ATMOSPHERIC VARIABLES FOR CPV SPECTRAL EVALUATION

ABSTRACT. The spectral matching ratio (SMR) and the Z-parameter are indexes used to assess the direct solar spectrum and its coupling to the multijunction solar cells employed in high-concentrator photovoltaic systems. An experimental campaign based on component cell sensors equivalent to a lattice-matched GaInP/GaInAs/Ge solar cell was carried out in Jaén, South of Spain, in order to measure the spectral data required to obtain these indexes. The main atmospheric parameters influencing the solar spectrum were simultaneously registered. An analysis of the data was carried out to characterize the spectral indexes by simple expressions as a function of air mass, aerosol optical depth, and precipitable water. As a result, the indexes are approximated with root mean square errors between 5.18 % and 6.49 %. The expressions for the SMR between the top and middle subcells and between the middle and bottom subcells were compared to other expressions proposed in the literature. The SMR between the top and bottom subcells and the Z-parameter were characterized from atmospheric variables for the first time. This study is an alternative method for the spectral evaluation of high-concentrator photovoltaic systems without using any relatively expensive measuring equipment, given that a meteorological database is available for a particular location worldwide. © 2017 IEEE.

Rodrigo, P. M., Fernández, E. F., Theristis, M. & Cruz, F. A. (2017), Characterization of the Spectral Matching Ratio and the Z-Parameter from Atmospheric Variables for CPV Spectral Evaluation, *IEEE Journal of Photovoltaics* 7(6) 8038795: 1802-1809, doi: 10.1109/JPHOTOV.2017.2747156, Article.

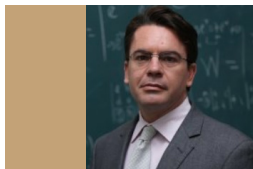


Dr. Pedro Manuel Rodrigo Cruz
SNI Nivel I

DEFINITION OF A SIMPLE INDEX FOR THE SPECTRAL CHARACTERIZATION OF PHOTOVOLTAIC SYSTEMS

ABSTRACT. The electrical output of a photovoltaic system is often related to the plane-of-array global irradiance and the cell operating temperature. However, the spectral distribution of the irradiance also influences the system electrical behavior, through its coupling with the spectral response of the photovoltaic material employed. Since early in the 1990s, many authors have evaluated the spectral performance of different types of semiconductors under real operating conditions worldwide. For this purpose, different methods and indexes have been proposed. In this paper, the fundamentals of the spectral characterization of the photovoltaic materials are introduced and 3 available spectral indexes are reviewed. The analysis of the advantages and disadvantages of these indexes leads to the definition of a simple index, which has never been used in the literature. This index, named as Spectral Average Useful Fraction, could be suitable for a quick spectral evaluation of a photovoltaic system with the only requirement of knowing the average incident spectrum of the site and the absorption limit of the photovoltaic material. An extensive comparison with the 3 available indexes should be carried out in order to assess the usefulness of the proposed index. This will be the object of future works. © 2018 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Rodrigo, P. M. & Fernández, E. F. (2017), Definition of a simple index for the spectral characterization of photovoltaic systems, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 83-86, Conference Paper.

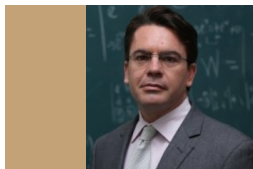


Dr. Pedro Manuel Rodrigo Cruz
SNI Nivel I

IMPROVING THE PROFITABILITY OF GRID-CONNECTED PHOTOVOLTAIC SYSTEMS BY SIZING OPTIMIZATION

ABSTRACT. The profitability of grid-connected photovoltaic (PV) systems and, hence, the penetration of this renewable energy source in the society, can be improved by sizing optimization, just finding a correct matching between the PV array peak power and the inverter nominal power. However, PV designers usually base the system sizing on rule-of-Thumbs or rough estimations, which implies losing the opportunity of developing more cost-effective installations with the same system components. In this paper, a sizing case study in Aguascalientes, central México, is analyzed based on solar irradiance and ambient temperature data of 10 years. A crystalline silicon PV module and a state-of-The-Art string inverter are characterized to model the rated energy yield of typical trading/industrial grid-connected PV systems. An economic objective function is proposed to optimize the system size, which accounts for the cost of inverters, cost of the rest of elements of the system and cost of electricity for the customer. Results indicate that array-To-inverter power sizing ratios between 1.13 and 1.19 as a function of the system costs can optimize the profitability. The study can be replicated to other locations, PV module technologies and grid-connected inverters. © 2017 IEEE.

Rodrigo, P. M., (2017), Improving the profitability of grid-connected photovoltaic systems by sizing optimization, *2017 IEEE Mexican Humanitarian Technology Conference (MHTC)*, Art. No. 7926194, 1-6, doi: 10.1109/MHTC.2017.7926194, Conference Paper.

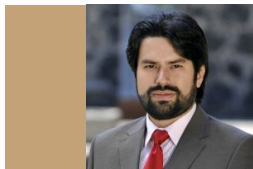


Dr. Pedro Manuel Rodrigo Cruz
SNI Nivel I

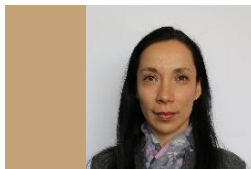
QUANTIFICATION OF THE SPECTRAL COUPLING OF ATMOSPHERE AND PHOTOVOLTAIC SYSTEM PERFORMANCE: INDEXES, METHODS AND IMPACT ON ENERGY HARVESTING

ABSTRACT. Photovoltaic system performance is affected by changes in the input sunlight spectrum. Moreover, the different photovoltaic materials employed show different spectral responses, having different spectral behaviour as a result. Many authors have developed methods and proposed indexes for quantifying the spectral influences in photovoltaic systems under the time-varying weather variables. These methods use different equipment, different procedures and assumptions, present different levels of complexity and accuracy, and have advantages and disadvantages in each specific context and application. In this paper, for the first time, a systematic review of the available methods and photovoltaic spectral indexes is presented. Each alternative is analysed in detail and a comparative study is done. In addition, as several authors have measured and/or calculated the spectral impact on the energy yield of the different photovoltaic technologies at particular locations and climates, the existing results are summarized and discussed in order to elucidate the spectral behaviour of each technology as a function of the relevant atmospheric parameters, i.e. air mass, aerosol optical depth and precipitable water. The presented study covers non-concentrating and high-concentrating photovoltaic technologies and is intended for clarifying the methods available for the spectral analysis and the spectral impact on energy harvesting of the photovoltaic technologies. © 2017 Elsevier B.V.

Rodrigo, P. M. Fernández, E. F., Almonacid, F. M. & Pérez-Higueras, P. J. (2017), Quantification of the spectral coupling of atmosphere and photovoltaic system performance: Indexes, methods and impact on energy harvesting, *Solar Energy Materials & Solar Cells* 163: 73-90, doi: 10.1016/j.solmat.2017.01.018, Article.



Dr. Rodrigo Romero Silva
SNI Nivel C



Dra. Margarita María Elvira Hurtado Hernández
SNI Nivel C

THE DIFFERENCE OF MEAN WAITING TIMES BETWEEN TWO CLASSES OF CUSTOMERS IN A SINGLE-SERVER FIFO QUEUE: AN EXPERIMENTAL STUDY

ABSTRACT. Previous studies have shown that the distribution of mean waiting times of different classes of customers is different for each class in a GI/G/1 queue with FIFO discipline. This experimental simulation study is motivated by those results as it investigates which are the conditions causing a difference of mean waiting times between two classes of customers using a FIFO discipline. Results from the study show that having a difference in the squared coefficient of variation of inter-arrival times between classes is the most important factor to determine whether a difference of mean waiting times between two classes exists. Furthermore, if a difference of mean service times between the two classes exists, the class with the highest mean service time will tend to have the smallest mean waiting time between the two classes, resulting in an unfair policy. © 2017 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

Romero-Silva, R. & Hurtado, M. (2017), The difference of mean waiting times between two classes of customers in a single-server FIFO queue: An experimental study, *Cogent Engineering* 4(1), Art. No. 1321082, doi:10.1080/23311916.2017.1321082, Article.



Dr. Rodrigo Romero Silva
SNI Nivel C



Dra. Margarita María Elvira Hurtado Hernández
SNI Nivel C

ESTIMATION OF QUANTILE CONFIDENCE INTERVALS FOR QUEUEING SYSTEMS BASED ON THE BOOTSTRAP METHODOLOGY

ABSTRACT. This paper presents a simple methodology for estimating confidence intervals of quantiles in queueing systems. The paper investigates the actual probability density function of quantile estimators resulting of independent replications. Furthermore, we present a methodology, based on the concepts of bootstrapping, i.e., re-sampling and sub-sampling, to calculate the variability of an estimator without running different independent replications. Contrary to what overlapping and non-overlapping batching procedures suggest, we propose to randomly select data points to form a sub-sample, instead of selecting time-consecutive data points. The results of this study suggest that this proposal reduces the correlation between sub-samples (or batches) and overcomes the issue of normality. © 2017, Springer International Publishing AG.

Romero-Silva, R. & Hurtado, M. (2017), Estimation of quantile confidence intervals for queueing systems based on the bootstrap methodology, *Communications in Computer and Information Science*, *Communications in Computer and Information Science* 742, 275-286, doi: 10.1007/978-3-319-66963-2_25, Conference Paper.



Dr. Julio César Rosas Caro
SNI Nivel I

CONTINUOUS INPUT-CURRENT BUCK-BOOST DC-DC CONVERTER FOR PEM FUEL CELL APPLICATIONS

ABSTRACT. This paper proposes a buck-boost converter topology with continuous input-current capability for proton exchange fuel cells (PEMFC) systems. The continuous input-current feature of the converter contributes to maintain the PEMFC life-time, which is in sharp contrast with traditional buck-boost converters whose input currents damage the PEMFC and reduce the efficiency. Moreover, this converter offers the main advantages found in traditional topologies, such as the Cuk or the SEPIC converters, using a reduced number of electronic components. In particular, the topology features buck-boost conversion range capability, low input-current ripple, and a simple low-cost structure. A detailed analysis that encompasses steady state analysis, dynamic modelling, stability analysis, control and experimental results are provided. © 2017 Hydrogen Energy Publications LLC.

Valdez-Resendiz, J. E., Sanchez, V. M., Rosas-Caro, J. C., Mayo-Maldonado, J. C., Sierra, J. M. & Barbosa, R. (2017), Continuous input-current buck-boost DC-DC converter for PEM fuel cell applications, *International Journal of Hydrogen Energy* 42(51): 30389-30399, doi:10.1016/j.ijhydene.2017.10.077, Article.



Dr. Julio César Rosas Caro
SNI Nivel I

A DC–DC CONVERTER WITH QUADRATIC GAIN AND INPUT CURRENT RIPPLE CANCELATION AT A SELECTABLE DUTY CYCLE

ABSTRACT. In this paper we study the modeling and control of an interleaved DC-DC multilevel topology that exhibits a high-voltage gain and a minimum ripple point design. In this configuration, the current ripple cancelation point can be arbitrarily defined according to a desired specification, which represents an advantage with respect to classical topologies whose minimum ripple point is constrained (e.g. by a duty cycle equal to 0.5). We present a generalized model for the converter that is valid for any number of levels and useful for control purposes. Experimental results of the ripple cancelation as well as a closed-loop implementation is presented. © 2017 IEEE.

García-Vite, P. M., Soriano-Rangel, C. A., Rosas-Caro, J. C. & Mancilla-David, F. (2017), A DC–DC converter with quadratic gain and input current ripple cancelation at a selectable duty cycle, *Renewable Energy* 101: 431-436, doi: 10.1016/j.renene.2016.09.010, Article.



Dr. Julio César Rosas Caro
SNI Nivel I

MODELING AND CONTROL OF AN INTERLEAVED DC-DC MULTILEVEL BOOST CONVERTER

ABSTRACT. In this paper we study the modeling and control of an interleaved DC-DC multilevel topology that exhibits a high-voltage gain and a minimum ripple point design. In this configuration, the current ripple cancelation point can be arbitrarily defined according to a desired specification, which represents an advantage with respect to classical topologies whose minimum ripple point is constrained (e.g. by a duty cycle equal to 0.5). We present a generalized model for the converter that is valid for any number of levels and useful for control purposes. Experimental results of the ripple cancelation as well as a closed-loop implementation is presented. © 2017 IEEE.

Villarreal-Hernández, C. A., Mayo-Maldonado, J. C., Valdez-Resendiz, J. E. & Rosas-Caro, J. C. (2017), Modeling and control of an interleaved DC-DC multilevel boost converter, *2017 IEEE 18th Workshop on Control and Modeling for Power Electronics (COMPEL)*, 8013301, 1 0.1109/COMPEL.2017.8013301, Conference Paper.



Dr. Julio César Rosas Caro
SNI Nivel I

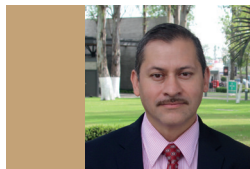
PARALLELING A SYNCHRONVERTER AND A PWM-BASED CONVERTER FOR SUPPLYING A MICROGRID

ABSTRACT. The paper's aim is to present the parallel operation of a synchronverter and a PWM-based inverter in order to feed the load of a microgrid. The main motivation lies on the fact that the power electronics advancements made feasible the creation of microgrids fed by renewable energies, which ordinarily have as common factor the use of voltage source converters. Results are promising for operating a microgrid in an isolated way. © 2017 IEEE.

Ramirez J. M. & Rosas-Caro J. C. (2017), Paralleling a synchronverter and a PWM-based converter for supplying a microgrid, *2017 IEEE PES Innovative Smart Grid Technologies - Latin America (ISGT-LA)*, 1-6, doi: 10.1109/ISGT-LA.2017.8126727, Conference Paper.



Dr. Julio César Rosas Caro
SNI Nivel I



Dr. Antonio Valderrábano González
SNI Nivel I

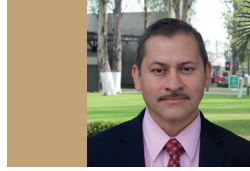
QUADRATIC BUCK-BOOST CONVERTER WITH POSITIVE OUTPUT VOLTAGE AND CONTINUOUS INPUT CURRENT FOR PEMFC SYSTEMS

ABSTRACT. Electrical power processing is an essential component of proton exchange membrane fuel cell (PEMFC or simply FC) conversion systems. The first stage of power conditioning usually consists of a DC-DC converter that enables a suitable DC bus voltage for a load feeder –or grid-tie– inverter. Motivated by the current needs in power conditioning of PEMFC systems, we propose a new power electronics converter. The proposed topology has a quadratic buck-boost voltage gain which allows a wide range of input voltages, providing a fixed output voltage with additional compelling features such as the circumvention of the use of transformers, coupled inductors or extreme duty cycles. Moreover, the input current of the proposed converter is continuous and its output voltage is positive with respect to the input one, which is in sharp contrast with respect to other buck-boost topologies whose output voltages are in general negative. The main principles, steady-state analysis, and a small-signal model for the proposed circuit operating in continuous conduction mode (CCM) are presented in detail. Simulation and experimental results are provided to validate the theoretical analysis. © 2017 Hydrogen Energy Publications LLC.

Rosas-Caro, J. C., Sanchez, V. M., Valdez-Resendiz, J. E., Mayo-Maldonado, J. C., Beltran-Carbajal, F. & Valderrabano-González, A. (2017). Quadratic buck-boost converter with positive output voltage and continuous input current for PEMFC systems. *International Journal of Hydrogen Energy* 42(51): 30400-30406, doi: 10.1016/j.ijhydene.2017.10.079, Article.



Dr. Julio César Rosas Caro
SNI Nivel I



Dr. Antonio Valderrábano González
SNI Nivel I

QUADRATIC GAIN CONVERTER WITH OUTPUT VOLTAGE RIPPLE MITIGATION

ABSTRACT. This paper introduces a DC-DC converter topology with the following features: (i) quadratic voltage gain, which allows the converter to work with wide voltage line variations in a wide operation voltage range with a minimal variation of duty cycle and without the use of extreme duty cycles; (ii) output voltage ripple mitigation, this feature can be accomplished in a specific duty cycle by proper selection of components and PWM signals. The proposed converter can be designed to have zero output voltage ripple for the nominal gain (duty cycle), this allows the use of small values of capacitance. The operating principles and steady-state equations, for the discussed topology in CCM are presented in detail. Experimental tests are presented to validate the propositions. © 2017 IEEE.

Garcia-Vite P. M., Valdez-Resendiz J. E., Mayo-Maldonado J. C., Rosas-Caro J. C., Del Rosario Rivera-Espinosa M. & Valderrábano-González A. (2017), Quadratic gain converter with output voltage ripple mitigation, *2017 IEEE Energy Conversion Congress and Exposition (ECCE)*, 2017-January, 8096439, 2253-2259, doi: 10.1109/ECCE.2017.8096439, Conference Paper.

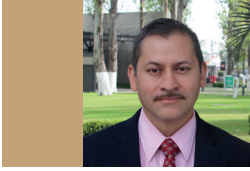


Dr. Julio César Rosas Caro
SNI Nivel I

SIMULATION AND COMPARATIVE ANALYSIS OF DFIG-BASED WECS USING STATOR VOLTAGE AND STATOR FLUX REFERENCE FRAMES

ABSTRACT. This paper performs the control of active and reactive power of DFIG-based WECS. The model of the WECS is oriented to both reference frames, stator voltage and stator flux, respectively; furthermore controllers for both reference frames are designed. A mathematical analysis of the dynamic behavior of spatial flux and stator voltage reference vectors is presented in order to carry out a comparison to determine which of them offers a better performance in the controlled variables, taking into account the particular scenario in which the WECS is going to be controlled. Highlighting is also given about the implications of using one or other of the selected reference frames. Simulation results of a 50 HP WECS are carried out in PSim software in order to show the performance of the WECS for every reference frame. © 2003-2012 IEEE.

Calderón, G., Mina, J., Rosas, J., Madrigal, M., Claudio, A. & López, A. (2017), Simulation and Comparative Analysis of DFIG-based WECS Using Stator Voltage and Stator Flux Reference Frames, *IEEE Latin America Transactions* 15(6): 1052-1059, Art. No. 7932692, doi: 10.1109/TLA.2017.7932692, Article.



Dr. Antonio Valderrábano González
SNI Nivel I

A REAL-TIME SOSM SUPER-TWISTING TECHNIQUE FOR A COMPOUND DC MOTOR VELOCITY CONTROLLER

ABSTRACT. In this paper, a real-time robust closed-loop control scheme for controlling the velocity of a Direct Current (DC) motor in a compound connection is proposed. This scheme is based on the state-feedback linearization technique combined with a second-order sliding mode algorithm, named super-twisting, for stabilizing the system and achieving control goals. The control law is designed to track a periodic square reference signal, being one of the most severe tests applied to closed-loop systems. The DC motor drives a squirrel-cage induction generator which represents the load; this generator must work above the synchronous velocity to deliver the generated power towards the grid. A classical proportional-integral (PI) controller is designed for comparison purposes of the time-domain responses with the proposed second-order sliding mode (SOSM) super-twisting controller. This robust controller uses only a velocity sensor, as is the case of the PI controller, as the time derivative of the velocity tracking variable is estimated via a robust differentiator. Therefore, the measurements of field current and stator current, the signal from a load torque observer, and machine parameters are not necessary for the controller design. The validation and robustness test of the proposed controller is carried out experimentally in a laboratory, where the closed-loop system is subject to an external disturbance and a time-varying tracking signal. This test is performed in real time using a workbench consisting of a DC motor-Alternating Current (AC) generator group, a DC/AC electronic drive, and a dSPACE 1103 controller board. © 2017 by the authors. Licensee MDPI, Basel, Switzerland.

Morfín, O. A., Castañeda, C. E., Valderrábano-González, A., Hernández-González, M. & Valenzuela, F. A. (2017), A real-time SOSM super-twisting technique for a compound DC motor velocity controller, *Energies* 10(9), 1286, doi: 10.3390/en10091286, Article.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

ANALYSIS OF VIBRATIONS IN A WIND TURBINE EXCITED BY EARTHQUAKES

ABSTRACT. In this paper, the authors aimed to summarize the results of an analytical study that evaluated the vibration analysis control of an on-shore wind turbine subjected to earthquake forces. The on-shore wind turbine (model G80-2.0 MW, manufactured by Gamesa Company) was modeled mathematically as a simplified mechanical system. The primary purpose of this work is related to the analysis of the lateral displacement of the wind turbine and to undertake a mechanical vibration study to reduce the effects of such displacements induced by earthquake ground motions across the entire system. Simulated records corresponding to the maximum credible earthquake risk associated with the design spectra for the specific study site (Istmo de Tehuantepec in the state of Oaxaca, Mexico) were used to carry out the analysis. The mechanical system is modeled via the Euler-Lagrange formalism and the system is described as an inverted pendulum with a concentrated mass at the free end. Finally, some results are presented through numerical simulations, considering the real parameters of the onshore wind turbine. © 2018 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Enríquez-Zárate, J. & Velázquez, R. (2017), Analysis of vibrations in a wind turbine excited by earthquakes, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 2017-August 67-71, Conference Paper.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

CONSTRUCTING TACTILE LANGUAGES FOR SITUATIONAL AWARENESS ASSISTANCE OF VISUALLY IMPAIRED PEOPLE

ABSTRACT. This paper reports on the findings from an experiment on human performance in tactile language learning and tactile memory. A set of four vibrotactile patterns representing verbal words was presented to a group of 20 voluntary subjects. Upon learning, subjects were capable of recognizing the patterns with high accuracy. Patterns were then combined with the aim of constructing sentences that gradually represent more complex ideas. Recognition rates remained satisfactory for sentences involving two, three, and four tactile words. A novel approach of tactile stimuli was explored: podotactile stimulation. For this study, a prototype of wearable electronic tactile display that stimulates the foot sole with vibrations was used. Results obtained suggest that it is possible to construct tactile languages that could enhance situational awareness feedback provided by assistive devices. Springer.

Velázquez, R. & Pissaloux, E. (2017), Constructing tactile languages for situational awareness assistance of visually impaired people, In *Mobility of Visually Impaired People: Fundamentals and ICT Assistive Technologies*, 597-616, Cham: Springer, doi: 10.1007/978-3-319-54446-5_19, Book Chapter.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

HIGH EFFICIENCY-BASED GEOTHERMAL PROBE

ABSTRACT. Vertical geothermal exchangers (geothermal probes) are very complex, especially in presence of diverse and possible lithotypes which values of thermal conductivity expressed in W/mk, are necessary for the determination of thermal resistance; they also influence the design of the thermal probe. One the simplified methods to design thermal probes is based on its capability to interact with lithostratigraphy that permits to know the thermal conductivity. The efficiency of the thermal probe is highly related to the nature of the filling fluid because it steers the thermal exchange with the soil under test. That is why it is important to study and formulate ad hoc mixture. © 2017 IMEKO-International Measurement Federation Secretariat. All rights reserved.

Blois, L., Blois, C. A., Caponi, M., Lay-Ekuakille, A. & Velázquez, R. (2017), High efficiency-based geothermal probe, *2017 7th IMEKO TC19 Symposium on Environmental Instrumentation and Measurements (EnvIMEKO)*, 123-126, Conference Paper.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I



M. C. Ricardo Macías Quijas
Profesor Investigador

KINEMATIC COMPUTATIONS FOR SMALL-SIZE HUMANOID ROBOT KUBO

ABSTRACT. This paper overviews the kinematics and workspace computer simulation of a small-size humanoid robot named KUBO. This bipedal walking platform has 20 degrees of freedom (DOF) and is powered by servomotors that perform reliable torque and precise motion. Made entirely from aluminum and assembled with commercial off-the-shelf actuators and sensors, KUBO is a self-developed low-cost platform for research into humanoid robots, human-like motion, bipedal walking, and control. It is capable of moving forward, backward, sideways, it can turn in any direction, lie down, and get up. In addition, it performs object tracking and recognition using an on-board video camera. In this paper, the design, implementation, mechanical analysis, and vision capabilities of this prototype are presented and discussed. © 2006-2017 Asian Research Publishing Network (ARPN).

Hernández, E., Velázquez, R. et al. (2017), Computations for small-size humanoid robot KUBO, *ARPN Journal of Engineering and Applied Sciences (JEAS)* 12(24): 7311-7320, Article.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

LEAK DETECTION IN WATERWORKS: COMPARISON BETWEEN STFT AND FFT WITH AN OVERCOMING OF LIMITATIONS

ABSTRACT. Detection of leakages in pipelines is a matter of continuous research because of the basic importance for a waterworks system is finding the point of the pipeline where a leak is located and –in some cases– a nature of the leak. There are specific difficulties in finding leaks by using spectral analysis techniques like FFT (Fast Fourier Transform), STFT (Short Term Fourier Transform), etc. These difficulties arise especially in complicated pipeline configurations, e.g. a zigzag one. This research focuses on the results of a new algorithm based on FFT and comparing them with a developed STFT technique. Even if other techniques are used, they are costly and difficult to be managed. Moreover, a constraint in the leak detection is the pipeline diameter because it influences accuracy of the adopted algorithm. FFT and STFT are not fully adequate for complex configurations dealt with in this paper, since they produce ill-posed problems with an increasing uncertainty. Therefore, an improved Tikhonov technique has been implemented to reinforce FFT and STFT for complex configurations of pipelines. Hence, the proposed algorithm overcomes the aforementioned difficulties due to applying a linear algebraic approach. © 2017 Polish Academy of Sciences. All rights reserved.

Lay-Ekuakille, A., Griffo, G., Visconti, P., Primiceri, P. & Velázquez, R. (2017), Leak detection in waterworks: Comparison between stft and fft with an overcoming of limitations, *Metrology and Measurement Systems* 24(4): 631-644, doi: 10.1515/mms-2017-0049, Article.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

MOBILITY OF VISUALLY IMPAIRED PEOPLE: FUNDAMENTALS AND ICT ASSISTIVE TECHNOLOGIES

ABSTRACT. This book discusses the design of the new mobility assistive information and communication technologies (ICT) devices for the visually impaired. The book begins with a definition of the space concept, followed by the concept of interaction with a space during mobility and this interaction characteristics. The contributors will then examine the neuro-cognitive basis of space perception for mobility and different theories of space perception. The text presents the existing technologies for space perception (sense recovery with stem and iPS cells, implants, brain plasticity, sensory substitution devices, multi modal technologies, etc.), the newest technologies for mobility assistance design, the way the feedback on environment is conveyed to the end-user. Methods for formative and summative evaluations of the mobility devices will also be discussed. The book concludes with a look to the future trends in research and technology development for mobility assistive information and communication technologies. © Springer International Publishing AG 2018. All rights reserved. Springer.

Pissaloux, E. & Velázquez, R. (2017). *Mobility of visually impaired people: Fundamentals and ICT assistive technologies*, Cham: Springer, 1-652, doi: 10.1007/978-3-319-54446-5, Book.



Dr. Ramiro Velázquez Guerrero
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MODEL OF COGNITIVE MOBILITY FOR VISUALLY IMPAIRED AND ITS EXPERIMENTAL VALIDATION

ABSTRACT. This paper reports the results of three experiments on tactile perception, spatial representation, and tactile display design for assistive mobility devices for blind, partially sighted, and deaf blind people. The results indicate the potentials of tactile displays for supporting environmental exploration and mobility. Voluntary test subjects showed reasonably good ability to determine the direction of motion of an arrow, with best recognition rates in the up and right directions. They showed reasonably good ability to use a tactile display to detect and avoid obstacles after a very short learning period and more limited ability to learn and remember an environmental representation using information from a tactile display and walking through the environment without specific instructions. Springer.

Pissaloux, E. & Velázquez, R. (2017), Model of cognitive mobility for visually impaired and its experimental validation, In *Mobility of Visually Impaired People: Fundamentals and ICT Assistive Technologies*, Cham: Springer, 311-352, doi: 10.1007/978-3-319-54446-5_11, Book Chapter.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

MODELING AND DESIGNING A FULL BEAMFORMER FOR ACOUSTIC SENSING AND MEASUREMENT

ABSTRACT. People acquire spatial knowledge by physically experiencing the environment through locomotion. Spatial knowledge generally emerges from the interactions between the specific types of sensory data and the cognitive strategies involved in locomotion. This chapter reviews the fundamental concepts and evidences of spatial cognition. First, the interplay between visual data and mobility is addressed. The importance of landmarks and visual cues is highlighted for implementing both simple and complex navigation strategies such as path integration (PI), landmark-based, and geometry-based, which are the main cognitive mechanisms for spatial learning. Some neural evidences of spatial cognition are given to underline the brain mechanisms involved in cognitive mapping. A review of relevant literature models on cognitive mapping is also presented to better understand how spatial representations are formed at the level of the brain. The chapter provides some insights on how to adapt all these concepts for mobility and spatial knowledge assistance of people with visual impairments. Springer.

Lay-Ekuakille, A., Giannoccaro, N. I., Casciaro, S., Conversano, F. & Velázquez, R. (2017), Modeling and designing a full beamformer for acoustic sensing and measurement, *International Journal on Smart Sensing and Intelligent Systems* 10(3): 718-734, Article.



Dr. Ramiro Velázquez Guerrero
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A NEW FRAMEWORK FOR COGNITIVE MOBILITY OF VISUALLY IMPAIRED USERS IN USING TACTILE DEVICE

ABSTRACT. This paper proposes a novel framework for a better understanding of human cognitive locomotion and its interaction with the new tactile technologies that assist mobility and the acquisition of spatial knowledge in the absence of sight [case of visually impaired people (VIP), seniors, etc.]. Unlike the existing mobility models, the proposed framework encompasses four elements: 1) walking with obstacle avoidance, 2) orientation, 3) spatial awareness, and 4) actual physical displacement, and is based on the concept of the tactile gist, a refreshable (dynamic) egocentric tactile representation of the perceived scene. The relevance of the tactile gist concept for achieving the assistance of human mobility has been evaluated with three basic original spatial experiments (homing with obstacle avoidance, localization of a passage and its size estimation, and navigation in an apartment) using a purposely designed perception-movement platform and a touch stimulating tangible wearable refreshable device. The collected results show that the tactile gist might be considered as a scene representation and should be integrated into an assistive device for sightless people. The proposed approach may impact the design of mobility aids for VIP as it reinforces their natural mobility skills and may lead to new mobility strategies of VIP in (un-) known environment. © 2017 IEEE.

Pissaloux, E. E., Velázquez, R. & Maingreud, F. (2017), A New Framework for Cognitive Mobility of Visually Impaired Users in Using Tactile Device, *IEEE Transactions on Human-Machine Systems* 47(7): 1040-1051, 8095002, doi: 10.1109/THMS.2017.2736888, Article.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

ON SPATIAL COGNITION AND MOBILITY STRATEGIES

ABSTRACT. People acquire spatial knowledge by physically experiencing the environment through locomotion. Spatial knowledge generally emerges from the interactions between the specific types of sensory data and the cognitive strategies involved in locomotion. This chapter reviews the fundamental concepts and evidences of spatial cognition. First, the interplay between visual data and mobility is addressed. The importance of landmarks and visual cues is highlighted for implementing both simple and complex navigation strategies such as path integration (PI), landmark-based, and geometry-based, which are the main cognitive mechanisms for spatial learning. Some neural evidences of spatial cognition are given to underline the brain mechanisms involved in cognitive mapping. A review of relevant literature models on cognitive mapping is also presented to better understand how spatial representations are formed at the level of the brain. The chapter provides some insights on how to adapt all these concepts for mobility and spatial knowledge assistance of people with visual impairments. Springer.

Pissaloux, E. & Velázquez, R. (2017), On spatial cognition and mobility strategies, In *Mobility of Visually and ICT Assistive Technologies*, 137-166, Cham: Springer, doi: 10.1007/978-3-319-54446-5_5, Book Chapter.



Dr. Ramiro Velázquez Guerrero
SNI Nivel I

TOWARDS A COGNITIVE MODEL OF HUMAN MOBILITY: AN INVESTIGATION OF TACTILE PERCEPTION FOR USE IN MOBILITY DEVICES

ABSTRACT. Off-grid photovoltaic systems turn solar light into electricity working apart from the electrical grid. These types of systems tend to use a fixed structure with an optimal orientation for the assembly of the photovoltaic modules. Based on this concept, if it is necessary to increase the production of energy, the number of photovoltaic modules should be increased, which has an impact in the cost of the system. The present investigation explores the possibility of increasing the energy production without having to add more photovoltaic modules, through the use of a mobile solar tracking system attached to the off-grid photovoltaic system. In order for this concept to be useful, it is necessary for the tracking system to have a low cost. This article describes the practical implementation of an off-grid photovoltaic system with a low cost solar tracking system. Two design related decisions were taken in order to reduce costs: first, to implement a tracker with an only axis north-south with an optimal tilt (21° for Aguascalientes), which simplifies the mechanical design in respect to a two axis tracking; second, to divide the daily movement of the actuator in 10 steps, instead of performing a continuous movement, which simplifies the electrical control. The prototype has a monitoring system that can measure the increments in terms of solar irradiation capture in respect to a fixed structure system. The measurements of four full operational days are presented as results, as well as the prototype implementation costs table. © 2017 IEEE.

Pissaloux, E., Velázquez, R., Hersh, M. & Uzan, G. (2017), Towards a Cognitive Model of Human Mobility: An Investigation of Tactile Perception for use in Mobility Devices, *The Journal of Navigation*, 1-17, 10.1017/S0373463316000461, Article.



Dr. Sergio Velázquez Rodríguez
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EVALUATION OF NUTRIENTS REMOVAL ($\text{NO}_3\text{-N}$, $\text{NH}_3\text{-N}$ AND $\text{PO}_4\text{-P}$) WITH *CHLORELLA VULGARIS*, *PSEUDOMONAS PUTIDA*, *BACILLUS CEREUS* AND A CONSORTIUM OF THESE MICROORGANISMS IN THE TREATMENT OF WASTEWATER EFFLUENTS

ABSTRACT. In this research removal of $\text{NH}_3\text{-N}$, $\text{NO}_3\text{-N}$ and $\text{PO}_4\text{-P}$ nutrients from municipal wastewater was studied, using *Chlorella vulgaris*, *Pseudomonas putida*, *Bacillus cereus* and an artificial consortium of them. The objective is to analyze the performance of these microorganisms and their consortium, which has not been previously studied for nutrient removal in municipal wastewater. A model wastewater was prepared simulating the physicochemical characteristics found at the wastewater plant in Chapala, Mexico. Experiments were carried out without adding an external carbon source. Results indicate that nutrient removal with *Chlorella vulgaris* was the most efficient with a removal of 24.03 % of $\text{NO}_3\text{-N}$, 80.62 % of $\text{NH}_3\text{-N}$ and 4.30 % of $\text{PO}_4\text{-P}$. With *Bacillus cereus* the results were 8.40 % of $\text{NO}_3\text{-N}$, 28.80 % of $\text{NH}_3\text{-N}$ and 3.80 % of $\text{PO}_4\text{-P}$. The removals with *Pseudomonas putida* were 2.50 % of $\text{NO}_3\text{-N}$, 41.80 of $\text{NH}_3\text{-N}$ and 4.30 % of $\text{PO}_4\text{-P}$. The consortium of *Chlorella vulgaris*-*Bacillus cereus*-*Pseudomonas putida* removed 29.40 % of $\text{NO}_3\text{-N}$, 4.2 % of $\text{NH}_3\text{-N}$ and 8.4 % of $\text{PO}_4\text{-P}$. The highest biomass production was with *Bacillus cereus* (450 mg/l) followed by *Pseudomonas putida* (444 mg/l), the consortium (205 mg/l) and *Chlorella vulgaris* (88.9 mg/l). This study highlights the utility of these microorganisms for nutrient removal in wastewater treatments. © IWA Publishing 2017.

Gómez-Guzmán, A., Jiménez-Magaña, S., Guerra-Rentería, A. S., Gómez-Hermosillo, C., ParraRodríguez, F. J., Velázquez, S., Aguilar-Uscanga, B. R., Solís-Pacheco, J. & González-Reynoso, O., (2017), Evaluation of nutrients removal ($\text{NO}_3\text{-N}$, $\text{NH}_3\text{-N}$ and $\text{PO}_4\text{-P}$) with *Chlorella vulgaris*, *Pseudomonas putida*, *Bacillus cereus* and a consortium of these microorganisms in the treatment of wastewater effluents, *Water Science & Technology* 76(1): 49-56, doi: 10.2166/wst.2017.175, Article.

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El mundo actual no adolece de información sino de conocimiento. Un conocimiento confiable y un saber comprometido que oriente a las personas y sirva de faro en sus decisiones. Una tarea no fácil para las instituciones que han tomado con seriedad su papel de influir positivamente en el siglo XXI.

Desde su fundación, la Universidad Panamericana ha estado preocupada por cumplir los tres objetivos de cualquier universidad: transmitir el conocimiento, conservarlo y generarlo. Pero es desde el año 2014, de acuerdo a los lineamientos estratégicos definidos por la Rectoría General, que la Universidad Panamericana ha decidido transitar hacia una universidad de investigación e influencia.

Para el 2016 logramos superar el umbral de las 100 publicaciones científicas, lo que nos permitió por primera vez ser incluidos en el Scimago Institutions Ranking. El avance logrado hasta el año pasado (2014 al 2017), refleja un crecimiento del 96 % –un anual compuesto del 25 %–. En el caso de profesores miembros del Sistema Nacional de Investigadores, se ha logrado un crecimiento del 56 % de 2016 a la fecha, con un incremento anual compuesto del 25 %.

Desde el Consejo Institucional de Investigación se vio conveniente publicar un primer anuario de investigación que recopila las publicaciones científicas de 2017, un año histórico en nuestras propias dimensiones, por el número de publicaciones científicas.

Detrás de estas cifras hay algo más importante, el trabajo de cada profesor investigador, cuyo esfuerzo se puede ver plasmado en este anuario. Nuestro reconocimiento a todos y cada uno de ellos y un agradecimiento especial a toda la comunidad académica y directiva que han incentivado y acompañado el logro de los objetivos trazados en materia de investigación.



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