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Interdisciplinary Congress of Renewable Energies - Industrial Maintenance - Mechatronics and Informatics

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Abstracts Collection

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Volumen VIII

The Abstracts Collection will offer the volumes of selected contributions of researchers who contribute to the scientific dissemination activity of the Colegio de Ingenieros en Energías Renovables de Querétaro A.C. in its research areas of Engineering Science and Technology, Education, Power and Energy, Computer Science, Mechatronics, Industrial Applications and Communications, Technology Management in Industry and Education, New Technologies, Computer Science, Application Development, Computer Security, Information and Communication Technologies, Industrial Maintenance, Electrical Substations, Electrical Motors, Infrared Thermography, Energy Saving, Vibration Analysis, Automation, Solar Cookers, Biomass, Biofuels, Photovoltaic Systems, Fuel Cells, Solar Energy, Education, Power Generation, Electric Power, Electric Power Transmission and Distribution, Electric Power Systems Management, Information Systems, Renewable Energies, Computer Applications, Instrumentation applied to industry, Telecommunications and security protocols. In addition to having a total evaluation, in the hands of the directors of the Colegio de Ingenieros en Energías Renovables de Querétaro A.C., the quality and timeliness of its chapters, each individual contribution was refereed to international standards (LATINDEX-DIALNET-ResearchGate-DULCINEA-CLASE-HISPANA-Sudoc- SHERPA-UNIVERSIA-V|LEX), the Collection of abstracts thus proposes to the academic community, recent reports on new developments in the most interesting and promising areas of current research.

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Interdisciplinary Congress on Renewable Energies - Industrial Maintenance - Mechatronics and Informatics

Colegio de Imgenieros en Energias Renovables de Queretaro.A.C. October 26-27, 2023.

Preface

The Colegio de Ingenieros en Energías Renovables de Querétaro A.C. (CIER-QUERÉTARO), and its chapters of Renewable Energy, Industrial Maintenance, Mechatronics and Informatics, technical sponsors of the Interdisciplinary Congress of Renewable Energy, Maintenance, Mechatronics and Informatics, CIERMMI 2023, are pleased to invite you to the 4th, edition of this congress, which will be held on October 26-27, 2023, in the city of San Juan del Río, Querétaro, Mexico.

The general objective is to establish a space for discussion and reflection on topics related to the areas of: renewable energy, industrial maintenance, mechatronics and computer science with the participation of students, professors, researchers and national and international speakers, promoting the formation and consolidation of research networks. Contributing to provide a space for dissemination and discussion of the presentations of students, graduates, academics and researchers, representatives of the various institutions of higher education and research centers in our country. Promoting the formation of research networks among different institutions. Offering a space for undergraduate, master's, doctoral and postdoctoral students, in which they can present the progress of the research they are carrying out as thesis or graduate work. Providing a space in which study groups and members of academic bodies, linked to the curricular program of renewable energy, industrial maintenance, mechatronics and computer science careers, can present the research work developed within their institution and in collaboration with other national or international educational institutions. Establishing a training space for the attendees, through the development of specific papers and conferences. This volume VIII-2023 contains 114 refereed participations dealing with these issues in chosen from among the contributions, we gathered some researchers and graduate students, from 32 states of Mexico. We thank the anonymous reviewers for their feedback who contributed greatly in improving the articles for publication in these proceedings by reviewing the manuscripts that were submitted. Finally, we wish to express our gratitude to the Colegio de Ingenieros en Energías Renovables de Querétaro A.C. in the process of preparing this edition which can be consulted at http://ecorfan.org/ collections.php.

San Juan del Río, Qro
October 26-27, 2023.

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Switchable emissions of an Erbium-doped fiber laser using cascaded MZIs based on CHCF

Emisiones conmutables de un láser de fibra dopada con Erbio utilizando MZIs en cascada basados en CHCF

HERRERA-PIAD, Luis, VELAZQUEZ-GONZALEZ, Felipe, DURAN-PEREZ, Oscar and BRIANZA-GORDILLO, Gerardo

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Abstract

In this work, a single and dual-wavelength erbium-doped fiber laser (EDFL) based on two Mach-Zehnder interferometers (MZIs) in cascade structure was experimentally validated. MZIs were assembled by joining a capillary hollow-core fiber (CHCF) piece between two multimode fibers (MMFs) sections. The switchable operation is reached by moving the spectrum of one MZI when the temperature is increased. The maximum measured signal noise to ratio (SNR) was more than 50 dB for the single and dual-wavelength laser lines. Besides, stable output is shown since no power and wavelength variations were noticed. It is important to mention that emissions are obtained at precise wavelength positions and not arbitrarily as described by other investigations. This EDFL can be used in applications of optical fiber communications systems and fiber sensing.

Erbium-doped fiber laser, Mach-Zehnder interferometer, multiwavelength laser emission

Factors repeatability and reproducibility in the thickness of the non-magnetic coating

Factores de repetibilidad y reproducibilidad en el espesor del recubrimiento no magnético

RAMÍREZ-ROMÁN, Adolfo, CHABAT-URANGA, Jacqueline, RODRÍGUEZ-RODRÍGUEZ, Luis Alberto and SUÁREZ-ÁLVAREZ, Ángel

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Abstract

The present experimental research refers to an-R&R study with the use of non-magnetic coating thickness measuring equipment on metal plate surface type analyzing the results in software that allows to demonstrate the reliability of measurements by the quality inspectors, using the intentional non-probabilistic sampling technique, choosing one piece per batch. An important study through equipment to measure non-magnetic coating on ferrous material parts, which allows to determine the effectiveness of the company through the measurement and control of specifications required by standard, detecting areas of opportunity in the process (the measurement system fails with operators or equipment failure or coating variability on the part). Therefore, each piece analyzed is described with its numerical data of thickness measurements through tables and graphs. By which, allows to compare the competencies of the staff according to the type of material and the work environment where each experimental study was developed.

Operators, Variability, Experimental

Hydrometeorological Data Analysis: A Case of Study of Ejido La Providencia, Saltillo, Coahuila.

Análisis de Datos Meteorológicos para Sistemas Hídricos. Caso de Estudio: Ejido La Providencia, Saltillo, Coahuila.

CANALES-PATIÑO, Eduardo Luis, SILVESTRE-DIAZ, Sergio Enrique, PARGA-MARRUFFO, César Joel and SOSA-FLORES, Noé Antonio

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Abstract

In Saltillo, Coahuila de Zaragoza, there are places such as La Providencia common land county, that are considered arid or semi-arid places, where drought is a solid problem. There are water supply alternatives for domestic use such as rainwater systems and atmospheric-water collectors, however, weather conditions are variable and extreme, therefore, it is necessary to collect and to analyze meteorological data in the area. In this work, the precipitation and humidity of the area have been analyzed, finding potential on specific dates of the year to taken as departure to start with water storage systems develop.

Precipitation, Humidity, Water Systems

GIS as a tool to apply the Universal Equation of Soil Loss in the Sextin River Basin.

Los SIG como herramienta para aplicar la Ecuación Universal de Perdida de Suelo en la cuenca del Río Sextín.

SERVÍN-PRIETO, Alan Joel, MARTINEZ-BURROLA, Juan Manuel, HERNANDEZ-LOPEZ, Mónica and VIRAMONTES-ACOSTA, Adriana

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Abstract

Erosion is a process in which the superficial layer of the soil is lost, which provides the plants with the highest concentration of nutrients and the water they need, thanks to its high organic matter content. According to the United Nations Organization and Goal 2 'Zero Hunger' of the Sustainable Development Goals, soil erosion is a factor that restricts the ability to produce nutritious food. In this sense, it is important to monitor this natural process, an effective method is the implementation of the Universal Soil Loss Equation, which is a quantitative method of indirect evaluation that can be used through Geographic Information Systems in a determined area, in this method variables such as topography, land slope, land use, site geology, and average annual rainfall. The study site of this research is the Sextín River Basin located northwest of the State of Durango, Mexico, with a surface area of 4,906.8 km^2. The results obtained indicate that the rate of soil loss reaches a value of 27,201 tons/ha/year, corresponding mainly to areas where the topography presents a high percentage of its slopes.

USLE, GIS, Soil

Analysis, selection and assignment of vehicles to distribution routes for finished products using mixed integer linear programming

Análisis, selección y asignación de vehículos a rutas de distribución para productos terminados utilizando programación lineal entera mixta

VELARDE-CANTÚ, José Manuel, LÓPEZ-ACOSTA, Mauricio, CHACARA-MONTES, Allán and RAMÍREZ-CÁRDENAS, Ernesto

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Abstract

In the present investigation, an optimization model based on mixed integer linear programming is established, which considers the analysis and careful selection of the vehicles to be used for the distribution of finished products, as well as the assignment of the route to follow from a distribution center or production plant to the different points or end customers. The main objective is to minimize the different costs related to the transfer, management and programming of the different trips to each of the clients that make up the distribution network. A basic-practical mathematical model is presented, in which the principles of the efficient allocation of each of the trips to each client based on the transport problem are established, as well as aspects of the problem addressed, such as a network of star distribution. In the same way, procedures are established for carrying out different activities within the product distribution area in order to contribute to the efficient management of the different logistical resources available to the organization.

Logistics, Distribution, Transportation, Linear

Annual emissions of Greenhouse Gases of motor vehicles in the Academic Unit Valle de las Palmas UABC

Emisión anual de Gases de Efecto Invernadero de vehículos motorizados en la Unidad Académica Valle de las Palmas UABC

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Abstract

The purpose of this research is to carry out a quantify motor vehicles that enter the Valle de las Palmas Academic Unit (UA) of the Autonomous University of Baja California, calculate the GHG Levels based on CO2 emissions and evaluate the environmental impact generated by transportation according to indicators of the Transportation category of the UI GreenMetrics 2023 Guide. A manual counting method is used to know the number and type of vehicles that travel to the UA and with based on these results, determine the emissions of GHG as well as the environmental impact generated by motor vehicles that travel to the UA. Its conclude that the type of motor vehicles that travel to the UA us heterogeneous, consisting of private cars, urban transport, and motorcycles and these generate 1884 metric tons of CO2 per year, so with these data there is a baseline of environmental impact generated by transport that travels to the UA, existing areas of opportunity for improvement for the benefit of air quality and the health of the university community.

GHG Emissions, Quantify Motor Vehicles, Higher Education

Comparison of Gasoline, Hybrid and Electric Vehicles

Comparación de Automóviles a Gasolina, Híbrido y Eléctrico

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Abstract

It is well known that hybrid and electric cars have been proposed and considered as the available alternative to gasoline vehicle, to try and reduce the consumption of fossil fuels to meet global environmental objectives. Therefore, the average user should have an analytical comparison to determine if the available alternatives are useful to them and their particular situation. As such, this project aims to provide a purchasing recommendation to the average user based off their needs while highlighting the strengths and weaknesses of the three types of automobiles available: gasoline, hybrid and electric. To complete this comparison, the best-selling cars in Mexico of each available category, with similar measurements and passenger capacity, were selected. Subsequently, it was decided that a journey of over 1000 km across the country would be the best comparison, deciding on the travel route to start from Torreón, Coahuila to Puebla, Puebla. After calculating the total energy needed for each vehicle to complete the same route, the stops needed to recharge and complete the route, as well as the time needed, it was concluded that compared to the gasoline car, the hybrid is an option with similar performance on long trips, while the electric car is not recommended for long trips like the one analyzed in this report.

Car comparison, Comparative Analysis, Mobility alternatives, Electric Vehicles, Hybrid Vehicles

2 Biology, Chemistry and Life Sciences

Dynamics of land use on the coast of delta grijalva, Mexico, to generate development strategies

Dinámica de usos del suelo en la costa del delta grijalva, México, para generar estrategias de desarrollo

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Abstract

The present investigation analyzed the change of coverage in the periods 2000-2018, through the digitalization and visual interpretation of orthophotos and satellite images, a comparative analysis was made between the digitization carried out in both years to identify the losses and possible strategies in the area of study and the coastline was analyzed. The results show that the loss of highest observance was the mangrove area, suffering a decrease of 4.78% and in profits the uses for hydrophytic vegetation, family gardens, urbanization and bodies of water, hydrophilic vegetation being the most profitable with a 5.24 %. For the analysis of the coastline, a loss of 262.2 meters in a period of 18 years was obtained in the area adjoining the Gulf of Mexico and, finally, by comparing the map of change of uses with that provided by the Program of Management Ecological State of Tabasco 2013, gives us a vision of the lack of compliance with the same program, which leads to poor application and use of land, generating environmental degradation and this in turn contributes to increased vulnerability to impacts caused by climate change.

Changes In Uses, Vegetation Cover, Coastline

Proposal for a Circular Economy of glycerin as a by-product of biodiesel production

Propuesta de una Economía Circular de la glicerina como subproducto de la producción de biodiesel

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Abstract

The Circular Economy of glycerin a proposal to reduce the environmental impact, the economic contribution, as well as avoid the discharge of used edible oils into bodies of water, the problems towards gray water treatment plants in the pretreatment process, in the landfill to prevent runoff from contaminating the soil, due to the type of Karstic soil in the region. Obtaining glycerin is one of the objectives of the project, part of the work is its application of fuel cells, as an alternative source of renewable energy. The proposed methodology Circular Economy of glycerin by-product obtained from biodiesel and the uses derived from it, the economic contribution and sustainability of this. As a result, obtaining an environmental, economic benefit, which requires both compliance with environmental laws and regulations, letting the population of the northern area of Quintana Roo know that there are alternative places to the pipes, throwing it in garbage bags where they deposit their used oil, the use of glycerin as a component livestock feed supplement as soil fertilizers and use in the generation of biogas.

Circular Economy, Glycerin, Biodiesel

Elaboration of germinable bioplastic based on corn olot

Elaboración de bioplástico germinable a base de olot de maíz

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Abstract

The present work was developed within the facilities of the Instituto Tecnológico Superior de Poza Rica, said research work aims to develop a germinable bioplastic based on corn cob, which will reduce environmental contamination, generating a biodegradable and germinable product at the same time. time. The elaboration of the bioplastic was carried out taking into account the methodology described by Guzmán (2013) using cob powder instead of corn starch and with an additional input, gelatin. In this way, 10 tests were carried out, starting from procedure 1 in which 5 tests were carried out, from which it is concluded that the prototypes presented curves and breaks in their structure, and have even reduced their dimensions. Likewise, for procedure 2, 3 tests are carried out where it is obtained that if there has been a resistance to perforation (there is no fracture) and there has been a decrease in its size.

Bioplastic, Corn Cob, Biodegradable

Microplastics in ecosystems and health

Microplásticos en los ecosistemas y la salud

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Abstract

Microplastics are very small plastic particles, less than 5mm in diameter. These materials may originate from the degradation of larger plastic products, such as bottles and bags, or may be intentionally manufactured for use in cosmetics. Microplastics are a significant environmental problem because they can be ingested by marine animals and other living things, causing them significant damage. Furthermore, these materials can act as toxic contaminants. The objective of this study is to know and understand the negative effects of microplastics on ecosystems, and on human health, and to know the technologies that are being used to reduce this type of contamination through recycling and the development of alternatives to plastic, as well as knowing the policies that are being developed to address this problem. This study seeks to create greater public awareness of the problem, improve understanding of the effects on ecosystems, and identify the sources and routes of entry of microplastics into the environment. In summary, research on microplastics is essential to address the problem of plastic pollution and to find effective solutions to protect our environment and health.

Microplastics, Pollution, Ecosystems, Health

Effect of natural coating and cryopreservation on the quality of Creole corn seeds

Efecto del recubrimiento natural y de la criopreservación sobre la calidad de las semillas de maíz criollo

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Abstract

Creole maize races have economic and socio-cultural importance in the Mexican population. However, due to climate change, the presence of pests and the urbanization of the land, make it difficult to conserve this plant germplasm. The objective of this study was to evaluate the physiological quality of landrace seeds treated and not treated with a biofilm and frozen for 30 days under in vitro conditions. The variables evaluated were: imbibition rate, standard germination, germination speed index and the percentage of humidity and the statistical significance was analyzed by means of a Tukey test. The results of the imbibition rate, in the seeds treated and frozen at -85°C presented higher absorption percentages with respect to the other treatments, with no statistical difference. A tendency was found in the reduction in the germination of the native corn grains treated and frozen at temperatures of -20°C and -84°C. No increase in quality was found in the seeds treated with the cactus-based biofilm.

Germination, Imbibition, Maize, Biofilm

Properties and uses of rosemary (rosmarinus officinalis) as a medicinal plant

Propiedades y usos del romero (*rosmarinus officinalis*) como planta medicinal

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Abstract

In recent years, the effect on health of the bioactive compounds present in rosemary (*Rosmarinus officinalis*) has been studied, as well as their functional, medicinal and/or toxicological properties. The objective of this work was to describe the properties of the chemical compounds found in rosemary, as well as their uses in traditional medicine. Studies have shown that rosemary and rosemary essential oil have great antioxidant capacity derived from their flavonoid compounds and phenolic acids. In addition, it has been observed that these compounds have activity improving conditions of the nervous, digestive, circulatory, cardiac and bone systems. It has been used as an antirheumatic, since it improves pain. In addition, it has been attributed great antioxidant and anti-inflammatory power.

Rosemary, Essential Oil Of Rosemary, Traditional Medicine

Comparative Study of the Antimicrobial Activity of Silver Nanoparticles Obtained from *Tagetes erecta* (Cempasúchil) by Green Synthesis

Estudio Comparativo de la Actividad Antimicrobiana de las Nanopartículas de Plata Obtenidas a partir de *Tagetes erecta* (Cempasúchil) mediante Síntesis Verde

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Abstract

Nanomaterials' application can provide solutions to technological and environmental challenges, in the areas of solar energy conversion, catalysis, medicine and water treatment. Silver nanoparticles (Ag-Np's) stand out for their potential and versatility, due to their optical, electrical, mechanical, and structural properties, their photoactivity promotes them as an antimicrobial agent (bactericide-fungicide). The effect caused by Ag ions in microorganisms is already known, however, the mechanism of action is still not entirely clear. In the present study, silver nanoparticles were synthesized using the Cempasúchil flower (Tagetes erecta) extract as a reducer by a simple and ecological route. Aqueous silver ions exposed to the flower extract were reduced, leading to silver nanoparticles' biological synthesis. The silver nanoparticles were characterized by UV-visible spectroscopy, where it showed a maximum peak from 410 nm to 425 nm. The silver nanoparticles' synergistic antimicrobial potential was evaluated with the following microorganisms: Escherichia coli and Aspergillus niger, through the Kirby-Bauer method, where inhibition halos of 2 to 2.2 cm were obtained, showing the antimicrobial activity of the Ag-Np' s.

Nanoparticles, Antimicrobial Effect, Extract

The potential of microalgae for the development of innovative technologies for the protection and preservation of the environment

El potencial de las microalgas para innovar las tecnologías para el cuidado y conservación del medioambiente

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Abstract

Microalgae are mainly known for their high nutritional value, protein and lipid content. They are used to enrich animal feeds and are recommended as food supplements in the human diet. Nowadays, it is possible to design the cultivation conditions of microalgae in order to produce them with the specific characteristics desired. Since this is so important, the aim of this work is to present the progress made by different research groups on the best cultivation conditions to optimize the intensive production of microalgae. It also presents the most recent lines of research on the use of microalgae for the care of the environment, their potential application in the remediation of air pollution, as well as their use in the removal of various toxic substances in water. The methodology used was to make an exhaustive bibliographic review of books, journals, theses and articles on the subject, showing in a simple, clear and summarized way that microalgae are an option of 100% natural use, of multiple benefits in the protection and restoration of ecosystems, in addition to being a sustainable alternative to other technological options for the remediation of water and air pollution.

Cultivation, Biofuels, Environmental Remediación

Short-term association between morbidity and daily concentrations of O_3 and PM_{10} in the Bajío region: A time series study

Asociación a corto plazo entre la morbilidad y las concentraciones diarias de O_3 y PM_{10} en la región del Bajío: Un estudio de series de tiempo

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Abstract

Short-term effects of air pollution on the health of residents in the region of Bajío in Guanajuato, Mexico were assessed from 2012-2015 using a time-series approach. Irapuato showed the highest number of exceedances (884) to the maximum allowable limit established by NOM-020-SSA1-2021, followed by Silao (477) and Salamanca (53), respectively. With respect to PM_{10}, all municipalities showed significant exceedances to the maximum allowable limit established by NOM-025-SSA1-2021; Celaya with 518, León with 281 and Salamanca with 210 exceedances, respectively. Comparing both pollutants, we concluded that the pollution due to PM_{10} is a hotspot in the Bajío region in comparison with pollution due to O_3. The association between PM_{10} and morbidity was positive and significant, since when PM_{10} concentrations increased, the risk values also increased: Irapuato with 0.32%, Silao with 0.24%, Celaya with 0.20% and León with 0.02%. In the case of ozone, correlations found were positive but not significant; therefore, we concluded that there was not a significant risk of morbidity by ozone exposure. Population between 0 and 59 years was identified as the most vulnerable age sub-group, suggesting that, activities of people played an important role in the exposure to these pollutants, since, people in this group comprises workers and students of all ages, who develop their activities outside home, just in the hours in which O_3 and PM_{10} reach their peak levels as a result of industrial activity and mobile sources.

Morbidity, Association, Exposure, Contaminants, Vulnerable

Biomass: Teaching Strategy for the Laboratory at University Level

Biomasa: Estrategias de Enseñanza para el Laboratorio a Nivel Universitario

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Abstract

Biomass is defined as that organic product of vegetable origin that can convert the energy coming from sunlight into chemical energy contained in the vegetable carbohydrates' links. Its study is important since this contained chemical energy can be used in the form of fuels, electricity and/or chemical reagents that can be used as precursors. This paper presents a proposal for teaching biomass in the laboratory at university level. The experimental proposal exposes an easy and accessible practice to meet this objective. This methodology has been applied in two different universities where engineering courses are taught. The materials used are accessible and cheap. Once the practice was finished, a survey was applied to the students to verify the subject's understanding, obtaining favorable results. In conclusion, this proposal offers an easy and low-cost methodology for teaching the topic of Biomass in the laboratory at university level.

Biomass, Methodology, Laboratory, University Level

3 Medicine and Health Sciences

Precise Modeling and 3D Printing of Biocompatible Craniofacial Prostheses

Modelado Preciso e Impresión 3D de Prótesis Craneofaciales Biocompatibles

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Abstract

Currently, the fabrication of accurate maxillofacial prostheses involves the integration of 3D modeling and printing technologies. This entails using tomographic scans information in (DICOM) images obtained through computed tomography "CT Scan", free-use software, and 3D printers [I, II]. These techniques are widely used by physicians and engineers, however, a generalized methodology for creating prostheses with “absolute accuracy” to patient requirements has not yet been formally established, according to Pöppe, J.P., et al. (2011) [III]. This paper shows the case of a male athlete who required implanting a large volume prosthesis in the right parietal of the Calota. The implanted prosthesis is not absolutely exact, which causes frequent headaches, in addition to being aesthetically sub-optimal. In this work, the objective is to propose a methodology that allows generating maxillofacial prostheses using DICOM images. Python libraries included in free software are used for visualization, '*.stl' stereolithographic modeling and eventual 3D printing [IV, V]. This specific case is deepened, examining each aspect in detail, and the results are compared with those of the prosthesis placed, thus contributing to improving the generation of "absolutely accurate" prostheses.

Maxillofacial Prosthetics, Suboptimal, Tomographic, Tomography, Cranial Implants, Stereolithography, Free Software, Employed, Methodology, Established, Parietal, Aesthetics

4 Humanities and Behavioral Sciences

The impact of the STEAM methodology on the academic performance of students' in learning about the Solar System on elementary school

Impacto de la metodología STEAM en el rendimiento académico de los estudiantes en el aprendizaje del Sistema Solar en la educación primaria

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Abstract

The STEAM methodology as a pedagogical proposal in science teaching has been little explored in basic education in Mexico. The present investigation was developed in an elementary school in the city of Ocosingo, Chiapas, Mexico, it focused on applying the STEAM methodology with a focus on inquiry and the development of a group project, in order to demonstrate if this methodology impacts on academic performance of 5th grade students in the learning of the Solar System in the subject of Natural Sciences. The study was carried out under a quantitative approach of a descriptive type with a quasi-experimental design, using as information gathering instruments, tests designed for the study and a survey under the Likert scale that allowed obtaining the perception of the students in relation to the teaching methodology used in its inquiry phases. The results show that the use of this methodology as a didactic tool in the learning of the Solar System, significantly increases the learning of the students, as well as the pleasure to develop their learning through this methodology with the use of technological tools and the development of a group project.

STEAM, Inquiry, Academic Performance, Elementary School, Didactic

App 4LG3BR4 a tool for learning basic Algebra in students of Information and Communication Technologies

App 4LG3BR4 una herramienta para el aprendizaje del Álgebra básica en alumnos de Tecnologías de la Información y Comunicación

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Abstract

Currently, technology has evolved and has been adopted in education, this is where another field opens up to analyze academic performance, now students do not interact with books or notebooks, they can do it with a Tablet, with a PC, a Smartphone or some other device that allows them to be interconnected; in this sense, the educational experience has different dimensions. Therefore, this research focused on the use of a mobile application for learning basic algebra, with the students of the Division of Information and Communication Technologies of the Technological University of La Selva. The study was carried out under a quasi-experimental quantitative approach, using tests designed with dichotomous answers (pre-test and post-test) as data collection tools. The results show that using the App 4LG3BR4 in the subject of Linear Algebra in the teaching and learning process, significantly increases the academic performance of students, compared to the traditional teaching of these subjects in the aforementioned subject.

Mathematics, Algebra, Application, Mobile

Police officers professionalization impact in the public security agencies of the Jalisco State through a hybrid model

El impacto de la profesionalización de agentes policiales en las dependencias de seguridad pública del Estado de Jalisco a través de un modelo híbrido

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Abstract

The prevention of high-impact crimes is fundamental for the healthy coexistence and integral development of the population of all the entities of the country. In Jalisco, based on the events that occurred in 2020 and as a result of the work of the technical committees aimed at citizen security, the Government of the State of Jalisco instructed the Secretary of Planning and Citizen Participation and the Secretary of Innovation, Science and Technology, the implementation of a strategy that strengthens and consolidates the profiles of the police officers of the Secretary of Security, with the Technological University of Jalisco being responsible for operating the professionalization project, which was carried out during the year 2022, ending with the development of crime prevention skills, protocol management and dispute resolution among others, for which the UTJ through a hybrid model with the support of Information and Communication Technologies, professionalization was carried out of the state and municipal agents of Guadalajara, Zapopan, Tlajomulco and Tlaquepaque, generating positive impacts in 811 colonies from the Guadalajara Metropolitan Area.

Professionalization, Police Officers, Hybrid Models

Alternative material with PET: Comparison of CEB-PET, CEB and Concrete block

Material alternativo con PET: Comparativa del BTC-PET, BTC y Bloque de concreto

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Abstract

Climate change has generated the need to propose alternatives that reduce the impact of human activities and the real estate market is one of these, an area of opportunity is the production of construction materials that demand energy and use of non-renewable resources. , taking into account one of the indicators of the 2030 Agenda for Sustainable Development, objective 11, of the 11c that says: Provide support to the least developed countries, so that they can build sustainable and resilient buildings using local materials. The objective was to compare the CEB-PET prototype with respect to the CEB and the concrete block, as an alternative for the construction of walls in Saltillo Coahuila. The methodology was quantitative, quasi-experimental, carrying out laboratory and field work. The results indicate that the CEB-PET has a Compressive Strength of 82,194 kg/cm2 and can be used as a load-bearing wall; Regarding cost, it can compete with a concrete block and in relation to its application in the work, it is handled in the same way as a concrete block.

Alternative, Sustainable, Prototype

Learning in the biosphere reserve in entlebuch, Switzerland: environmental sustainability and social management

Aprendizaje en la reserva de la biosfera de entlebuch (Suiza): sostenibilidad medioambiental y gestión social

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Abstract

The present study corresponds to the second stage of an investigation on the diagnosis and proposal for the application of destination criteria from an environmental approach in rural communities in the State of Morelos, with the objective of designing strategies for permanent intervention through training. on the use and management of solid waste for sustainable use and strategies for the reduction and recovery of recyclable waste, including environmental awareness campaigns. The Academic Body CAMOR 145-Management of Tourist and Cultural Heritage-CONAHCYT, responsible for the research, has defined two major initiatives, one of training through the visit to the Biosphere Reserve in Entlebuch, Switzerland and another of action, through the organization of a congress oriented towards the definition of social management needs, with a view to proposing activities for the application of the tourism sustainability criteria proposed by the Global Sustainable Tourism Council (GSTC) in order to provide guidance to communities on management strategies and safeguarding of the tourist heritage in their regions.

Environmental, Criteria, Biosphere, Sustainability, Diagnosis

An approach to online and face-to-face teaching and learning styles from the experience of the past confinement

Un acercamiento a los estilos de enseñanza y aprendizaje en línea y presencial desde la experiencia del pasado confinamiento

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Abstract

The characterization of teaching activities with online materials, methods, and strategies prior to the pandemic and currently in person, allows contrasting the development of the teaching process in two different environments and their corresponding activities developed by teachers to achieve competencies in students who are studying Basic Sciences in careers such as Engineering, in this research some of those experiences lived during confinement are recovered.

Pandemic, Confinement, Skills

Injection mold improvement for a jar for cosmetic use through CNC machining

Mejora de molde de inyección para un tarro de uso cosmético mediante el maquinado CNC

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Abstract

This project shows the improvement of a three-gram capacity jar for cosmetic use, manufactured by the company Ingeniería, Pailería Industrial y Mantenimiento S.A. de C.V. (IPIMSA). The jar for cosmetic use showed a leak between the jar and the lid, by means of the leak test, in a vacuum machine. To determine the root cause, an Ishikawa diagram is used, later, it was analyzed that the 110 T horizontal injection machine (Van Dorn) is in perfect condition, the problem was identified when disassembling the plastic injection mold, since the plate for the string of the jar was machined with the concentricity offset by one millimeter, causing the walls of the string of the jar to be uneven and thin, which is why the objective of this project is to improve the machining of the string generating plate of the jar. Jar for cosmetic use, to meet the leak test by the customer. For the machining, the Haas VF2 CNC machining center with a resolution of 0.001 mm, from the Universidad Tecnológica del Valle de Toluca, was used.

Injection molding machine, CNC machine, G & M Code

Management of the Life and Career Plan to improve the organizational climate in SMEs

Gestión del Plan de Vida y Carrera para mejorar el clima organizacional en MyPyMES

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Abstract

The purpose of this paper is to develop a strategic model to establish the best mechanisms, tools and policies to implement a Life and Career Plan in order to reduce staff turnover and improve the organizational climate of SMEs. A model was developed, based on gradient such a work, indicators, processes and guidelines, strategic measurements, analysis for staff retention, creation and development of a culture of change, growth and internal development, generating commitment in order to optimize the use of resources and productivity. The model generated a concise, clear and solid base to generate metrics and statistics, save economic resources, ways to increase productivity, make efficient use of new technologies and the Internet of Things, to guarantee sustainability, speed flexibility, privacy of processed information and energy backup, in order to promote change in favor of the development of competitive advantage in SMEs. The results allowed, through a collegiate work between the members of the interdisciplinary team, the construction of a Life and Career Plan Model that achieved a more productive workforce and improved the control and retention of talent between 13 – 17%, although with a residual risk associated with routines due to updates and/or changing needs of SMEs.

Life and career plan, Talent retention, Business belonging

Perfectionism, Anxiety and Achievement Academic in Medical Students

Perfeccionismo, Ansiedad y Rendimiento Académico en Estudiantes de Medicina

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Abstract

Objective: to analyze the relationship between perfectionism, anxiety and academic performance in medical students. Methodology: non-experimental research with a quantitative and correlational approach. The sample was non-probabilistic of the intentional type and included 363 medical students from universities in Mexico; 29.2% men and 70.8% women, with an age of 20.87 years. Two instruments were applied: the Multifactorial Perfectionism Scale and the Trait and State Anxiety Inventory. To obtain information on the academic performance of the students, they were asked their cumulative general average up to now. Data collection was carried out using a Google form and the collected data was analyzed in the SPSS version 23.0 program. Contribution: A significant difference was found in general anxiety, women presented higher levels of anxiety. compared to men (2.62 vs 2.37 p=0.00). Likewise, a significant negative relationship was found between state anxiety and trait anxiety and academic performance (-.191 -.199 p<0.01) and a significant negative relationship between maladaptive perfectionism and academic performance (-.182 p <0.01).

Medical Students, Anxiety, Perfectionism

Impact of the online propaedeutic course of the students of the Faculty of Engineering of the Autonomous University of Campeche, during the last 5 years.

Impacto del curso propedéutico en línea en los alumnos de la Facultad de Ingeniería de la Universidad Autónoma de Campeche, durante los últimos 5 años.

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Abstract

The use of virtual learning environments has been introduced to schools for a long time, however, in recent years due to the confinement due to the COVID-19 pandemic in 2020, higher education (and at all levels educational) suffered a change too fast and therefore the use of these virtual platforms was accelerated to comply with the confinement regulations implemented by the governments of the world. For this reason, the implementation of the online preparatory course to enter engineering and level their knowledge, considering the previous situation, becomes significant as it impacts the training of the engineer. To apply the online propaedeutic course, a survey was carried out before and after it in Google Form with the aim of knowing the perception of the use of this modality of the course. What led to relate what was specified in other studies where it is expressed that today's youth are digital natives, but without a doubt we are also sociable by nature, so we need to interact to learn and relate, which requires the intervention and guidance of a teacher.

College Preparatory Course, On Line Mathematics, Khan Academy

The obscured structure of the number in Preschool Education (pre-symbolic stage). Prime Part

La estructura oscurecida del número en la Educación Preescolar (etapa pre-simbólica). Primera parte

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Abstract

The article highlights certain aspects of the obscured structure of the number, which occur irregularly in the teaching of numeracy in Preschool Education. Its absence, as an effect, leads to the child's misunderstanding of the concept of number. In the pre-symbolic stage, the number is taught through the word. Structural particularities are found in the semantics and phonetics of the number word and are substantial in the processes of speech and listening. The objectives are to make known the obscured structure of the number and its elements and to analyze the nature of the name of the number. It is justified that the basis of the word "ONE" are the first sound manifestations of the infant. It states that there is the same and equal relationship between the acquisition of knowledge of language and speech with the acquisition of knowledge of number through the development of tonal auditory balance. Methodology: the theoretical analysis of the structural parts (semantics and phonosemantics) of the number and the identification of reciprocal correlation between the constructions of the knowledge of spoken numeral word in Preschool Education through the implemented technology. Contribution: the development of the method for learning the concept of number.

Number, Darkened Structure, Word

Social context and Hardiness in selected national athletes of Weightlifting

Contexto social y personalidad resistente en atletas seleccionados nacionales de levantamiento de pesas

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Abstract

The objective of this research is to identify relationships between social context dimensions and hardiness in elite weightlifting athletes. Methods: The design: non-experimental, cross-sectional and correlational, the participants were 20 athletes who belong to the elite as the national team of Mexico, they are between 19 and 28 years of age, M = 22.05 SD = 2.91, 8 men (40%) and 12 women (60%). 2 instruments were used, the first is the Perception of Factors Related to Excellence in Sport (PFED), (Simón, 2009) consisting of 54 items 6 variables, coach, environment and resources, athlete, family, nature of training and characteristics of the training and the second the questionnaire of hardiness in Central American and Caribbean Athletes (PRDCC) (Ponce, 2017; Ponce-Carbajal et al. 2015) of 18 items and three variables, commitment control and challenge. In the procedure, a file was created in google forms and coaches who are in charge of athletes from the Mexican national weightlifting team were contacted. The statistical analyzes used were frequencies, descriptive, reliability, and Spearman's bivariate correlations. Results: Adequate internal consistency in almost all the variables, between .40 and .92 in the 2 questionnaires. In the correlations between variables of the social context and those of the hardiness, relationships were evidenced between the total resistant personality and the nature of the training with an r = .767** and the challenge variable correlated with two, the first is the nature of the training r =.834** and with the characteristics of training r =.671**. Conclusion, the relationships between the variables of the social context and the resistant personality are confirmed.

Challenge, Environment, Stress

Hardiness and coping strategies in selected national diving athletes

Personalidad resistente y estrategias de afrontamiento en deportistas seleccionados nacionales de clavados

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Abstract

The objective is to identify the relationships between resistant personality variables and coping strategies with diving athletes. Methods: The design is cross-sectional, non-experimental, and correlational, the sample consists of 13 athletes from the national diving team, between 18 and 23 years of age, M = 20.31 SD = 1.54, 7 men (53.8%) and 6 women (46.2%). 2 instruments will be used, hardiness in Athletes from Central America and the Caribbean (PRDCC) by Ponce et al. (2015) of 18 items. The other is the Approach to Coping in Sport Questionnaire, ACSQ-1, in the Spanish version (Kim et al., 2003), the questionnaire is made up of 28 items. The procedure was completely online, the link was sent with the instruments to the coaches of the national diving team of Mexico and Colombia. Statistical analyzes were performed on frequencies, descriptive, reliability, and Spearman's correlations. Results: Adequate internal consistency in almost all the variables, between .62 and .92 in the 2 questionnaires. The existence of relationships between the variables of hardiness and approach to coping in sport is confirmed in most of its variables and as a whole. Conclusion, athletes are capable of solving their problems with a certain calm of mind if they let stress influence their decisions.

Stress, Control, Coping

Evaluation of luminance levels. Digital tool or traditional device? Case Study: Alameda Park in Saltillo, Mexico

Evaluación de niveles lumínicos ¿Herramienta digital o dispositivo tradicional? Caso de estudio: La Alameda en Saltillo, México

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Abstract

Assessing luminance levels in outdoor public spaces is relevant for the lighting design of architectural and urban environments. This article compares a digital tool and a traditional device for measuring luminance levels in outdoor settings, aiming to explore the pros and cons of each method and offer guidance to public space designers. The study involves a literature review of luminance measurement techniques and a comparative analysis of the results obtained using Fusion Optix software and a lux meter. Both methods exhibit benefits and drawbacks, with the choice of method hinging on the specific context and evaluation objectives. Generally, digital tools provide a more efficient and precise measurement of luminance levels, while traditional devices contribute to a broader understanding of the lighting environment. It is recommended that a combination of digital tools and traditional devices be employed in luminance assessments to achieve the most accurate and comprehensive results.

Daylight; Luminance Maps, Public Space

Study of lighting and noise levels in a higher education institution in the Lagunera region

Estudio de iluminación y ruido en institución de educación superior de la comarca Lagunera

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Abstract

The study of lighting and noise determines whether the educational institution complies with an accreditation criterion and how they influence the work and school environment, taking into account the physical surroundings for the development of activities within the institution. The research type is descriptive, utilizing a qualitative-quantitative methodology. Data collection tools are based on document review, creating mappings, and measurement points in the environments. Regarding noise, it emphasizes its importance to health, taking into account the environmental regulations of the Mexican Ministry of Labor and Social Welfare. Therefore, the results should ensure compliance and make recommendations for the university community in order to maintain the quality of infrastructure within the standards set by accrediting bodies for noise and lighting, thus avoiding disturbances and health issues.

Lighting. Noise Level, Accreditation, Work Environment

Transcending Boundaries in Architecture: A Transdisciplinary Inquiry into Public Space

Trascendiendo las Fronteras en la Aquitectura: Una Investigación Transdisciplinaria sobre el Espacio Público

MERY-RUIZ, Miriam Elizabeth, LOPEZ-MONTELONGO, Areli, MOLAR-OROZCO, María Eugenia and CARMONA-OCHOA, Gabriela

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Abstract

This chapter offers a comprehensive exploration of architectural public spaces through a transdisciplinary lens, focusing on morphology, security, and daylight. In the context of urban development, these spaces play a vital role in shaping social interactions, fostering community cohesion, and enhancing the quality of life. The transdisciplinary approach adopted in this research integrates insights from environmental psychology, sustainable architecture, landscape design, architectural anthropology, spatial analysis (space syntax), perception theories, and concepts of self-security. This paper illuminates the complexities involved in the design, usability, and impact of these spaces, aiming to bridge existing knowledge gaps. It further provides practical recommendations for architects, urban planners, policymakers, and other relevant stakeholders. By merging diverse disciplinary perspectives, the paper underscores the importance of a transdisciplinary discourse in the design and utilization of architectural public spaces, contributing to a broader understanding of urban life quality and sustainability.

Architectural Design, Daylight, Morphology, Security Perception, Sustainable Architecture

Basic social skills in the training of dentists

Habilidades sociales básicas en la formación de Odontólogos

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Abstract

Objective: To highlight the importance of basic social skills in the training of second-year public university dentistry students.Methodology: Qualitative research with a hermeneutical historical approach that applies the techniques: questionnaire and workshop to 25 students who voluntarily decide to participate in this study. Informed consent applies. Data are categorized and analyzed in Microsoft Excel and descriptive results are reported. Contribution: They recognize how important basic social skills are necessary for good clinical performance and identify which of them were strengthened after completing the "Basic Social Skills Strengthening Program". They realize that these skills are developed in everyday life, acquired from childhood through observation, but that they can also be learned and modified over time. They also realize that they positively influence their interpersonal relationshipsTexto redactado en

Students, Dentistry, Basic social skills, Social skills

Theoretical reflections on curricular evaluation from a critical perspective

Reflexiones teóricas sobre la evaluación curricular desde una mirada crítica

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Abstract

It present the analysis and reflection on evaluation processes in higher education programs, postgraduate-doctoral level, sharpens the position regarding how research is constituted and formalized in and from the educational fact and curricular action within the training of professionals of education in the state of Chihuahua, promoting the improvement of the curriculum not only in initial training but for academic improvement whit a critical vision that guides evaluation in, from and with the design of postgraduate programs aimed at new researchers as generators of knowledge in the curriculum field. Theme object of analysis from the last century and the present. The work consists of an empirical analysis based on the content analysis methodology focused on research training and academic performance during the last year of the Doctorate in Education, based on the review, critical argumentation to enhance prospects for improvement for the next generation or generations.

Evaluation, Processes, Doctorate

5 Social Sciences

Market research for internet sale´s in the municipality of Landa de Matamoros

Investigación de mercados para la comercialización de internet en el municipio de Landa de Matamoros, Querétaro

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Abstract

The purpose of the study is to identify the characteristics of market behavior in the context of Internet distribution in the municipality of Landa de Matamoros, this, in order to provide an overview that allows companies that wish to enter the area to make decisions. and that also makes it possible to make decisions about the business portfolio that can be derived from the characteristics of the clients, their levels of consumption and their loyalty to existing brands.237 surveys were applied in the towns of Lagunita, La Vuelta and El Aguacate, this in a random sampling to people ranging from 16 to 50 years old who were in their homes or businesses at the time of its completion, attending to the sociodemographic profile variables, user experience, type of service, brand loyalty, current evaluation. It was identified that the Federal Institute of Telecommunications provides national and municipal information that allows identifying a macro panorama of market behavior, the contribution of this research being at the micro data level, contributing to the analysis of the micro environment of small and medium-sized companies in the turn in analysis.

User, Internet, Behavior

Didactic strategies to strengthen soft skills in the graduate profile of the Industrial Maintenance Engineer

Estrategias didácticas para fortalecer las habilidades blandas en el perfil de egreso del ingeniero en Mantenimiento Industrial

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Abstract

Currently, organizations give greater importance to soft skills as part of the profile of those who integrate into their organizations and not only that they have the necessary technical knowledge to develop their jobs. The program of the Industrial Maintenance career is made up of technical, training and administrative subjects, but the latter two are not recognized as important by the enrollment of students. The graduates of the engineering in Industrial Maintenance have a recognized level of hard skills according to what the industry requires, by comments of the same students at the time of entering the labor field, they realize how necessary it represents to have an effective and efficient performance in companies integrated not only with technical knowledge but also with soft skills The objective of this research isto propose and implement didactic strategies to strengthen soft skills in the graduate profile of the Industrial Maintenance Engineer. It consists of a bibliographic and / or documentary and field research through interviews and surveys to teachers, students and graduates to determine the importance of soft skills in the graduation profile of engineering students in Industrial Maintenance of the Technological University.

Skills, Didactic, Graduates

Attitude, Behavior and Financial Knowledge of young university students in Mexico

Actitud, Comportamiento y Conocimiento Financiero en jóvenes universitarios en México

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Abstract

Financial literacy, which includes the dimensions of attitude, behavior and knowledge, is a condition for individuals to achieve financial well-being.In the population of young university students, it is a relevant aspect since they begin the financial life cycle, with a forecast of medium and high income, but whose generation of wealth will depend on decision making.Therefore, the objective of this paper is to measure the level of financial literacy of students at the Universidad Autónoma del Estado de México, in order to identify areas of opportunity and gaps to address.For which an instrument designed in Ecuador was applied, for the Latin American context, which meets the necessary psychometric levels. The sample consisted of 521 participants from various programs and educational spaces that were close to graduation. Analysis was subject to central and dispersion measures as well as non-parametric group comparison tests.Among the results, it was identified that most students are at a high level of financial literacy, although the lowest score was obtained in the knowledge dimension. Significant differences were found in gender, by educational program, academic space and employment status.

Financial Knowledge, Financial Behavior, Financial Attitude, Financial Literacy, University students, Comparison

Sensitization about the importance of the timely properties' succession for family protection

Sensibilización sobre la importancia de la sucesión oportuna de bienes para la protección familiar

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Abstract

The objective´s study is to sensitize the administrative staff, the managerial staff and the teaching staff of the Universidad Tecnológica del Sureste de Veracruz (UTSV) about the importance of the timely succession of movable and immovable property for a family protection. Quantitative research was carried out, with a statistical analysis, nonexperimental, a descriptive and cross-sectional scope. The data collection technique is the survey; the instrument is a questionnaire with twenty-nine items and a comment section. Derived from the COVID-19 pandemic, the surveys are applied through digital media, Google Forms was used, with 111 surveys in total. It is observed that sensitization of this topic is important so that our relatives are protected and can make use of the movable and immovable property of the owner as soon as he dies. The fact that the owner determines how his properties will be distributed and under what legal procedure, will make it possible that, upon the death of said owner, those relatives or designated persons have the right to make use of the bequeathed assets.

Succession Of Properties, Legacy, Family Protection

Digital literacy: a current view to understand its impact on education and learning

Alfabetización digital: una visión actual para comprender su impacto en la educación y en el aprendizaje significativo

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Abstract

The integration of technology in our society has generated significant transformations in how people communicate, learn and share information. The wide availability of digital infrastructure has impacted both the labor market and education, thus conceiving the term digital literacy. Digital literacy is often associated only with the development of skills and use of information and communication technologies (ICTs), which limits their understanding of their role in education. This article presents qualitative research with the purpose of analyzing the holistic vision of digital literacy to understand its importance, impact and relevance in the different areas of current academic life that lead to meaningful learning. The methodology used for the study is based on the phases of systematic mapping. Mainly addressing the elements, characteristics and key criteria of digital literacy to understand its scope in the development of digital skills of student academic work in obtaining new knowledge. Finally, it can be concluded that ICTs are an indispensable tool in teaching-learning activities and significantly promote meaningful learning.

Digital literacy, Technology, Education, Systematic mapping

Technology applied in inventory control, case study: department of measurement, connections and services of the federal electricity commission

Tecnología aplicada en control de inventarios, caso estudio: departamento de medición, conexiones y servicios de comisión federal de electricidad

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Abstract

The use of technology represents making processes more efficient and obtaining better results in their control. For government institutions such as the Federal Electricity Commission, it represents benefits in the optimization of resources and improvements in the services provided to the users of the organization, likewise it implies savings due to the good performance in the use of the materials that uses this department, focused on providing services to users, since costs are lowered. The study has been carried out through a diagnosis to know the real causes of the problem in the area, various instruments have been used to collect information to later process through tools that allow us to know the root cause of the problem. The analysis was carried out through the SWOT matrix to find opportunities for improvement, to end with the strategic proposal as well as the relevant actions, and the importance of having a contingency plan that allows controlling the strategic actions designed.

Technologies, Process Efficiencies, User Services, Optimization Of Resources, Improvements In Customer Service

Ludic didactic strategies for meaningful learning in undergraduate students

Estrategias didácticas lúdicas para el aprendizaje significativo en estudiantes de pregrado

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Abstract

The interest in achieving meaningful learning in undergraduate science students, as well as the emergence of new teaching-learning theories, inevitably lead teachers to generate various strategies that allow them to transfer and create knowledge in undergraduates. In this sense, the objective of this article was to evaluate the implementation of ludic didactic strategies in the learning of chemical nomenclature in undergraduate students, that is, how both variables are related. This research was quantitative and qualitative, descriptive and correlational, cross-sectional and the sample population by convenience of 104 students of the Bachelor's Degree in Pharmaceutical Chemistry and Biology. A measuring instrument with 15 items was used, validated by expert judgment and by means of Cronbach's Alpha Index. Data were analyzed with descriptive statistics and hypothesis testing. The findings show that the implementation of ludic didactic strategies by teachers favors learning in chemical nomenclature in undergraduate students. This contributes directly to the state of the art, although there is an evolution in the teaching-learning theories, there are still knowledge gaps in their applicability for educational benefit.

Chemical Nomenclature, Constructivism, Gamification

Evaluation of perceived usability of an App for planning tourist destinations based on experiences

Evaluación de usabilidad percibida de una App para planificación de destinos turísticos basados en experiencias

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Abstract

The purpose of the present investigation was to evaluate the perceived usability of an App for planning tourist destinations based on experiences, taking the Masiaca community as a case study, which allows generating the tourist and visitor profile appropriate to user preferences and providing a space for interaction for service providers. For this, a study with a quantitative approach was developed, the design was non-experimental, of a correlational type and transversal, the study subject was tourists, visitors and service providers from the Masiaca community, the study sample was non-probabilistic by convenience, the technology acceptance model instrument was applied to determine the level of perceived usability of the App, later the data was collected and analyzed, resulting in that the level of perceived usability of the App was high and will be a tool which comes to strengthen the way of using technology to transform the tourism sector, currently considered one of the most relevant and growing sectors for the countries, it will also promote the development of communities and the opportunity to display their cultural patrimony in the world.

Evaluate, Acceptance, Perceived

Culture of data protection, service and quality is cybersecurity in SMEs

Cultura de protección de datos, servicio y calidad es ciberseguridad en MyPyMES

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Abstract

The purpose of this paper is to develop a strategic model to establish the best cybersecurity mechanisms and standards, mediating the protection and care of product and service information, emphasizing the importance of creating a culture of data care in order to deal with the challenges of global competition. A methodology was develop integrating tools such as PMI, SDLC, Kaizen and NIST framework, in order to establish responsibilities scope, times and resources, acquiring or adapting existing resources. The proposed model makes efficient use of Internet tools and new technologies to guarantee sustainability, cybersecurity, speed, flexibility, privacy of the information processed and energy backup, in order to promote change in favor of the development of competitive advantages in SMEs. The results allowed, through a collegiate work between the members of the interdisciplinary team, the construction of a Cybersecurity Model that supports SMEs, better safeguarding the data, although with a residual risk associated with routines due to updates and/or needs changing.

Industrial Evolution, Technologial Adaptation, Industrial Project

Identification of key factors for the implementation of a planning culture in micro and small businesses

Identificación de factores clave para la implementación de una cultura de planeación en la micro y pequeña empresa

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Abstract

Planning as a business tool allows specifying and establishing the objectives to be achieved, as well as the operational processes that must be followed to achieve them. However, the main factors that cause failure or mortality in micro and small enterprises (mses) in the Mexican territory are mainly attributed to three factors: the absence of a planning culture, the problems derived from the management of the organization and resistance to change. The objective of this research was the identification of factors that positively influence the implementation of a planning culture in the mses of the Texmelucan region, through the development and application of a measurement instrument with a Likert-type scale. As a contribution, they highlight four key factors to consider; organizational structure, human capital, production and planning, as organizational development tools, in order to maintain competitiveness and permanence of these.

Factors, Planning Culture, Mses

Analysis using the intelligence cycle and the Hoshin Kanri methodology in an organization

Análisis utilizando el ciclo de inteligencia y la metodología Hoshin Kanri en una organización

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Abstract

The lack of planning is not only a local problem, but of a global nature, the consequences reflect the lack of monetization, growth and strategic alliances that allow the expansion of them. This research proposes to develop the intelligence cycle and the Hoshin Kanri methodology in an organization as a factor of change in Mexican organizations. A current problem in every organization is the lack of planning, it is not a local problem but a global one. Taking into account the following factors such as: Returns and delays in delivery within the organization, the results are encouraging, going from 27% to 12% of returns and from 26% to 10% in the reduction of delays. Through the cycle (PDCA) the actions will be fed back together with senior management seeks to feed back the actions together with the management through a strategic approach and inclusion of all the personnel of the organization.

Intelligence Cycle, Hoshin Kanri, PDCA

Design and validation of an instrument to assess the quality of life of university students in the state of Sonora

Diseño y validación de un instrumento para evaluar la calidad de vida de estudiantes universitarios del estado de Sonora

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Abstract

The design and validation of an instrument to assess the quality of life of university students in the state of Sonora is shown. Made up of 32 items, on a Likert scale, divided into three dimensions: Quality of student life, university identity and academic performance, which was validated with a sample of 531 randomly selected subjects. With a non-probabilistic sample, since the information is collected at the convenience of the study based on previously established selection parameters, of a quantitative type, with a non-experimental design and descriptive scope. Validity was carried out through three types of: content, criteria and construct. Where the first refers to the development of the instrument capable of measuring the quality of university life, to develop a focus group of specialist teachers in the area of research, experts in the subject to assign and request their validation with respect to the clarity of content, making reference to the accuracy of each item. For construct validity, an exploratory factor analysis type evaluation was used, with simple Varimax rotation, with the KMO Test. The general Cronbach's α value was 0.957, validating the internal consistency of the instrument.

Validation, Probabilistics And Validity

Risk factors associated with arterial hypertension in university students in southern Sonora

Factores de riesgo asociados con hipertensión arterial en estudiantes universitarios del sur de Sonora

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Abstract

The aim of this study was to identify the risk factors associated with hypertension (HT) using a logistic regression model in university students from southern Sonora. A total of 296 students took part (60.1 % female sex, 18.7 ± 0.8 years, 69.5 ± 12.5 kg) who had their blood pressure evaluated for preclinical (≥120-140/<90) and clinical (≥140/≥90) range classification and were administered the risk factor questionnaire participated. The association between explanatory factors and HT was performed by stepwise binary logistic regression. The model developed indicated that the probability of preclinical and clinical HT was 4.65 times in overweight and obese students, 7.94 times those who reported one to two histories of chronic noncommunicable diseases (NCD), 8.29 times those who indicated three to four family histories of NCD, 2.66 times those who indicated intermittent sleep, and as a protective factor a lower probability of 2.89 times those who drink coffee regularly at breakfast. It is concluded that overweight and obesity in combination with family history, poor sleep quality, and non-consumption of coffee are risk factors for HT in university students.

Hypertension, Risk Factors, Regression

Educational Marketing for High Schools

Mercadotecnia educativa para escuelas de nivel medio superior

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Abstract

Educational marketing is a key tool for institutional positioning and attracting new students in upper secondary schools. In addition, it allows the offering of quality services adapted to the educational needs of students and potential applicants. The objective of this study was to design an educational marketing plan for this educational level, using a mixed research approach. Systematic, empirical, and critical processes were applied, as well as quantitative and qualitative data analysis. The data collection instruments were addressed to the target population, that is, third-grade students from seven secondary schools in the city of Tulancingo, Hidalgo, and their parents. Based on the results obtained, positioning, loyalty, and attention strategies were proposed for the applicants and the students of the campus where the research was carried out. These strategies can be used by other educational institutions of the same level.

Education, Marketing, Strategy

Analysis of impulse buying and its relationship with psychological variables in a sample of population from the South of the State of Sonora

Análisis de las compras impulsivas y su relación con variables psicológicas en una muestra de habitantes del Sur del estado de Sonora

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Abstract

The purpose of this proposal is to analyze the behavior towards impulse purchases and its relationship with psychological variables in a sample of the inhabitants of the city of Navojoa, Sonora, this study was born from the historical analysis of consumption, an analysis was carried out to contrast the hypotheses proposed, in addition the most significant correlations were sought and an analysis was made through the Statistical Package for Social Sciences (SPSS) program. This in order to identify the factors that affect the impulses towards purchase, its influence with gender, in order to identify with the support of the literature the psychological causes that could affect consumer behavior. The results indicate that self-esteem is significantly linked to impulse purchases, a low level of self-esteem implies making impulsive purchases more frequently, in this sense there are no significant differences by age or gender.

Impulse Buying, Self-Esteem, Materialism

Situational analysis to increase the competitiveness of the artisanal sector of San Antonio la Isla, State of Mexico

Análisis situacional para incrementar la competitividad del sector artesanal de San Antonio la Isla, Estado de México

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Abstract

Mexico has distinguished itself as a country of enormous cultural wealth, it is important to contribute to the growth and consolidation of the aspects that identify us, one of them is the production and marketing of handicrafts, which are also representative of the regions of our country. , the objective of this research work is to carry out a situational analysis of the artisans of San Antonio la Isla, State of Mexico and by determining the strategic balance to identify the areas of opportunity and risk. The methodology used is non-experimental research of a descriptive transactional type since it seeks to investigate the technological competence of the artisans through the application of surveys, which is obtained as a result of the evaluation of the variables mentioned below: Differentiated and exclusive products, Value-added process, Mastery of technology, Capacity for Innovation, Strategic assets difficult to imitate, Productive flexibility, Quality System. Derived from the situational analysis, the FODA matrix was carried out where risk and opportunity factors are identified and strategies are proposed to increase the competitiveness of the artisanal sector.

Situational Analysis, Handicraft, Competitiveness

Job satisfaction of teachers of the Electronic Engineering career in a Public Higher Education Institution

Satisfacción laboral de los docentes de la carrera de Ingeniería Electrónica en una Institución de Educación Superior Pública

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Abstract

In the present investigation, the level of satisfaction that exists between the base academic personnel and the honorary personnel who are working as teachers in the electronic engineering career in a Public Higher Education Institution was determined. Using a descriptive study, using the descriptive transectional design and applying a data collection instrument created from the Job Satisfaction Scale proposed by Warr, Cook and Wall (1979). On the scale, the intrinsic factors that were considered are: freedom to choose one's own work method, recognition obtained for a job well done, assigned responsibility, the possibility of using one's own abilities, possibilities of promotion, contract conditions and the variety of tasks. that are done at work. Regarding extrinsic factors, there were: physical conditions of work, co-workers, immediate superior, salary, relations between management and workers in the company, management, work hours and job stability. The participating population was 22 people, which represents the entire academic plant that is in the study program. The results showed that the fee-based staff is satisfied in 69% with the intrinsic factors and 57% with the extrinsic ones; while those of base are satisfied 49% for the first and 24% for the second.

Work Satisfaction, Teaching, Public Sector

Job satisfaction in a clothing manufacturing company

Satisfacción laboral en una empresa de confección de prendas de vestir

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Abstract

Considering job satisfaction as one of the most important elements in business life, the objective of this research was to determine the level of satisfaction of the employees of a garment manufacturing company, in the production area. It is conceptualized with respect to the subject, two dimensions were determined for the realization of the study; the one dimension Extrinsic variables that considering the following indicators: company policies, supervision, relationship with supervision, working conditions, salary and interpersonal relationships; and two dimension intrinsic variables considering the following indicators: personal self-realization, professional recognition, work itself as a positive stimulus, responsibility, and opportunities for growth and promotion. A survey with the Likert scale was applied to a population of 26 collaborators from the production area. It was found in terms of extrinsic satisfaction, that 38% indicate feeling indifferent, 35% indicate being dissatisfied, likewise, 19% indicate being satisfied, 7% feel totally dissatisfied and finally, only 3% indicate be fully satisfied. Regarding intrinsic satisfaction, it indicates that 35% are indifferent; 31% say they were dissatisfied, 22% said they were satisfied, 8% said they were totally dissatisfied and 4% said they were totally satisfied.

Job Satisfaction, Extrinsic and Intrinsic Variables

The impact of the environment on MYPES companies a comparison Mexico-Colombia

El impacto del medio ambiente en las empresas MYPES un comparativo México-Colombia

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Abstract

Micro and small enterprises (MSEs) play a role of great importance in the development of any economy due to their relationship and impact on the generation of employment and economic growth, and generally worldwide, represent on average 80% of the businesses of an economy. The results determined that Colombia and Mexico should reconcile the objectives of trade and environmental policies in order to achieve the most efficient use of natural resources, the reduction of environmental damage and the most efficient use of market instruments. In the end, it was concluded that the entrepreneurs of the MSEs should attach greater importance to the construction of the reputation and prestige of their company in the market, and achieve the support and acceptance by the community, in achieving greater dynamism. Likewise, and given the importance of the knowledge, skills and abilities of employees, these companies must work to improve the low educational level of their employees and increase their professionalization.

Environment, Impact, Companies

Environmental performance as a factor of social responsibility in higher education

El desempeño ambiental como factor de la responsabilidad social en la educación superior

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Abstract

The objective of this work is to perform a trend analysis of the indicators and evaluate the actions taken during the period from 2012 to 2022, to make decisions based on facts and establish improvement actions that increase the environmental performance of the Instituto Tecnológico de Chihuahua II; Considering that the environment is an axis of sustainability and social responsibility that every organization or institution must have, with the purpose of increasing the management of natural resources, implementing innovative solutions and contributing to sustainable development. This project is based on the analysis of historical data collected during the period to be considered, observing general trends that show positive environmental performance, with significant decreases in electricity consumption and drinking water, regardless of the atypical behavior observed during the COVID-19 pandemic. It is sought that the results obtained from the analysis carried out, allow to establish new strategies that lead to increase the environmental performance of the Institute, as well as to show the relationship between environmental performance and social responsibility of the institute, taking into account the axes established in the Network of the Global Compact of the United Nations 2013.

Environmental Performance, Social Responsibility, Global Compact 2013

Methodological Proposal for a Feasibility Study for the Implementation of a Vertical Warehouse for a Manufacturing Company in Southern Sonora

Propuesta Metodológica Para Un Estudio De Factibilidad Para La Implementación De Un Almacén Vertical Para Una Empresa Manufacturera Al Sur De Sonora

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Abstract

Inventory management has become a critical element in modern supply chains. Globalization has led products and services to travel longer distances at faster speeds, resulting in extreme variations in demand and putting pressure on production organizations to produce more and faster. This research proposes a methodology to guide the implementation of a vertical warehouse for a manufacturing company in southern Sonora. The organization aims to reduce material handling travel times, have materials closer to the point of use, and improve production efficiency. The methodology involves the combination of methods and tools such as ABC inventory classification, the use of the PUGH matrix, and the Analytic Hierarchy Process (AHP) to select the option that is technically, economically, and environmentally feasible for the project. The study also includes a review of the literature on vertical warehouses and their benefits. The practical implications of this work are that it provides a methodology for selecting a vertical warehouse that meets the needs of an aerospace manufacturing company. The proposed methodology can be used by other manufacturing companies to determine the feasibility of implementing a vertical warehouse and selecting the most suitable option based on their specific needs and requirements.

Vertical Warehouse; Logistics; Manufacturing

Participation of women in engineering and technology careers at the National Technological Institute of Mexico in the state of Oaxaca

Participación de las mujeres en las carreras de ingeniería y tecnología del Tecnológico Nacional de México en el estado de Oaxaca

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Abstract

This work presents an analysis of the participation of women in engineering and technology careers at the National Technological of Mexico, [Tecnológico Nacional de México] (TecNM) in Oaxaca, the state has eleven federal and two decentralized technological institutions. Statistical data was obtained from the National Association of Universities and Institutions of Higher Education [Asociación Nacional de Universidades e Instituciones de Educación Superior] (ANUIES) from the period 2010 to 2021. The careers of the following subareas were considered: "engineering, manufacturing and construction" and "Information and communication technologies". To determine the influence of TecNM, were analyzed the State University System of Oaxaca [Sistema de Universidades Estatales de Oaxaca] (SUNEO), the Autonomous University of Oaxaca Benito Juárez [Universidad Autónoma Benito Juárez de Oaxaca] and other universities with fewer students, both public and private. It was found that even when the total of student enrollment has increased at the state level, the difference in student enrollment between men and women has not changed much over the years, as well as the participation of women by discipline. The TecNM has the greatest influence in the academic training of female engineers in the state of Oaxaca, while in the Technology area it keeps up with other institutions.

Engineering, Technologic, Women

Burnout and health personnel in Morelos

Burnout y el personal de salud en Morelos

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Abstract

This research aims to identify the existence of burnout syndrome in a sample of 124 nurses from a health organization in Morelos. The instruments used were the Maslach Burnout Inventory (MBI) and a questionnaire to measure the sociodemographic and employment profile of the study subjects. We sought to measure the existence of the syndrome in three subscales measured by the MBI: emotional exhaustion, depersonalization, and personal fulfillment at work, and relate them to sociodemographic and occupational variables. A descriptive statistical study and an inferential analysis were carried out using the statistical package SPSS version 26. The main results found were the following: Nurses present low levels of burnout according to the results obtained in its three dimensions: emotional exhaustion (9.62), depersonalization (3.31) and personal fulfillment at work (41.87). There are no significant differences between the three dimensions of burnout and the sociodemographic and occupational variables. Although the results indicate low levels of Burnout, it is pertinent to replicate the research in other groups of nurses susceptible to suffering from the syndrome, as well as to carry out interventions, providing them with strategies that allow them to face the demands of their activity.

Burnout Syndrome, Nursing Staff, Occupational Stress

Reading comprehension through ICTs and neurodidactics

La comprensión lectora a través de las TICs y la neuro didáctica

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Abstract

The purpose of this study was to implement a reading comprehension intervention project through the use of ICTs based on neurodidactics to strengthen communicative competence in secondary school students. It is a mixed-cut investigation, through the convergent design, using a reading comprehension test (pretest and posttest) designed by Samarén (2020) and with a Cronbach's Alpha of 0.846. The main findings were the development and intervention of a course to improve reading comprehension based on diagnostic inputs and the result of a t value of 5.046 with 23 degrees of freedom, indicating a bilateral significance of 0.001 between the pretest and posttest. As a conclusion, after the application of the pretest and posttest, a bilateral significance of 0.0001 was found for a significance level of (α= 0.05), which means that the intervention based on neurodidactics and ICTs managed to strengthen reading comprehension. in secondary school students, achieving the main objective of the research.

Reading Comprehension, Neuro Didactics, Tics, Secondary Education

Feasibility and Relevance Study for the Opening Educational Programs at the Bachelor's Level of the Technological Institute of La Paz

Estudio de Factibilidad y Pertinencia para la Apertura de Programas Educativos a Nivel Licenciatura de Instituto Tecnológico de La Paz

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Abstract

It’s important to mention that the study was carried out under two aspects: Field and documentary research. It contains three fundamental items that make up the evaluation criteria and help to elaborate a diagnosis and evaluation of the environment of the Technological Institute of La Paz. These three items, as central core, for the feasibility and belonging of the opening of a new educational program are: Socioeconomic Factors, Institutional Factors and Development Perspectives. The methodology consisted of a quantitative research of a descriptive type, whose objective was to detect the demand of High School students, ITLP Graduates and the Productive Sector of the State of Baja California Sur. Of the options of Educational Programs in which the three interest groups coincided - gastronomy, Management Engineering, Mechatronics Engineering, Biomedical Engineering, Biotechnological Engineering, Chemical Engineering, Nanotechnology Engineering, Renewable Energy Engineering, Tourism Degree- , any of them would contribute to the 6 strategic areas of the TecNM in which the lines of research are concentrated.

Feasibility, Pertinence, Educational Programs

Proposal for measuring the impact of the quality of work life on business competitiveness: Expert Panel Method

Propuesta de medición sobre incidencia de la calidad de vida laboral en la competitividad empresarial: Método de Panel de Expertos

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Abstract

Objetive Validate an instrument for determining the quality of work life factors that affect business competitiveness, taking several companies in the industrial sector as a case study through the Content Expert Panel method. Methodology The research approach is quantitative, the aim is to contrast the theory found with the empirical evidence in the field. As the research developed, 3 research techniques were used in order to comply with methodological rigor: 1) Documentary technique. Reference materials: books, database, techniques and studies. 2) Bibliographic technique. Those used as support were: bibliographic and electronic files. 3) Field Technique, structured interviews for the Expert Panel. Contribution In the literary review, it was found that there is statistically significant evidence on how improving the quality of life of the members of the organization has a direct impact on its performance, which is why, the better the quality of life, the employees can become more competitive. For future research, other validation techniques of the proposed instrument could be implemented, as well as the analysis of other theories related to quality of life and competitiveness.

Measurement, Quality of life, Competitiveness

Commercial model to optimize supply chains in local markets

Modelo mercantil para optimizar cadenas de suministro en mercados locales

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Abstract

Today, inventory management is a highly studied and interesting topic to optimize the cost of managing them. Traditional inventory models generally tend to block inventory optimization, but the more the years have passed, the concept of "supply chain" has been implemented, where the satisfaction of the needs of the final customer is achieved through material flows, information and financial, which are established from the original suppliers to the last consumer, requiring a certain level of cooperation and integration between the participants in the chain.That is why through the present the design of a sustainable model to optimize supply chains in local businesses in Jerez, Zacatecas is investigated, proposed, and exposed. In this paper, the optimization of inventories is studied, creating an effective model that combines the traditional with the current and that reflects the advantages of this approach in the total inventory costs in the chain, that is, the optimization.

Supply Chain, Optimization, Business

Study of Psychosocial Risk Factors in Companies in Cd. Obregón, Son. Mexico

Estudio de Factores de Riesgos Psicosociales en Empresas de Cd. Obregón, Son. México

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Abstract

The study of organizational and psychosocial aspects and their relationship with occupational health is not new, although it has acquired importance and recognition in recent years (Houdmont and Leka 2010; Näswall, Hellgren, Sverke, 2008). The objective of the study was to determine the level of exposure to severe traumatic events and psychosocial risks in local workers. The methodology is based on (Herrara, Medina, & Naranjo, 2010) and the Prevention Technical Note 702 (INSST, 2005). As a result, it was obtained that medium-sized companies present a low risk level with 43.48% and 39.13% medium risk, on the other hand, large-sized companies obtained mostly low risk with 30.51% and medium risk with 25.42%. Of the people surveyed, 14.29% present severe traumatic factors and require clinical evaluation (8.99% men and 5.29% women). The conclusion of the study is that the size of the company does not have a direct influence and that the factors with the greatest influence and highest level of risk in both cases are related to the workload and the organization of time to carry out the work.

Psychosocial, Safety, Health

Evaluation of the perception of a virtual learning object with activities to promote study habits in the subject of differential calculus

Evaluación de la percepción de un objeto de aprendizaje virtual con actividades para fomentar hábitos de estudio en la asignatura de cálculo diferencial

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Abstract

The study and understanding of Differential Calculus are essential for Engineering, providing the bases for the topics in the development of Competences of Integral Calculus, Vector Calculus, Differential Equations and physics subjects. This study proposes to evaluate the perception of a virtual learning object with activities to promote study habits in the subject of differential calculus. The proposal consists of analyzing the perception of a virtual learning object about Functions of the Differential Calculus subject, which includes activities of study habits, obtained from a group of students of the second semester of engineering level. The results are encouraging since the students identified as positive aspects the dynamism of the object, the usefulness of using technological tools to strengthen learning.

Learning objects, Study habits, SCORM

Logistic plan to exportation of Mexican Oregano to Turkey and United States

Plan logístico de exportación de orégano mexicano a Turquía y Estados Unidos

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Abstract

Oregano is one of the most popular aromatic herbs in the world, used in the preparation of a wide variety of dishes, Mexico being one of the main producers worldwide, with an annual production of more than 80 tons. According to article with article 102 of the customs law, it mentions that "the definitive export regime consists of the exit of merchandise from the national territory to remain abroad for an unlimited time" (p. 67) During the execution of the project, opportunities for growth in the United States-Turkey markets were analyzed, from the necessary legal export documentation to implement the project, to the determination of the tariff fraction. The research responds to a quantitative approach, carried out under descriptive researching of 5 phases method the objective of creating a record of exporting oregano in the Durango region to markets in Turkey and the United States, since it is a product of first quality and for which demand has increased in these countries. From the implementation of the export plan, it is looking for stablish to establish strategic alliances with oregano producers that meet quality standards.

Exportation, Mexican Oregano

Bibliometric Analysis of Publications on the Use of Artificial Intelligence in Digital Marketing

Análisis Bibliométrico Sobre Publicaciones Del Uso de la Inteligencia Artificial en el Marketing Digital

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Abstract

This study analyzes the evolution of research on machine learning in marketing from 1991 to November 16, 2022. The search was carried out in several databases and the terms "machine learning" and "marketing" were used. 2,358 articles were found, from which important indicators were obtained: 2021 has been the year with the highest publication activity with 234 articles. The most productive authors are from various fields, including computer science, marketing, and data analysis. The most cited article focuses on the application of deep learning in the fashion industry. The results suggest that research on aprendizaje automático in marketing is growing rapidly and has the potential to transform marketing practices. The need for more research is highlighted to assess the quality of the research and its impact on the scientific community. Bibliometric analysis is a tool that allows the researcher to carry out bibliographic searches effectively, since it generates an overview of the trends in research on the subject

Strategies for early detection of students at risk of dropping out

Estrategias de detección precoz del riesgo de abandono escolar

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Abstract

Dropout in Higher Education Institutions is a widespread phenomenon that was exacerbated by the Covid-19 pandemic. With the return to the new normality, some institutions continue with high dropout rates and even low enrollment, which harms their indicators. The goal of this study is to know the factors that allow identifying at an early stage, students who are at risk of dropping out, which will allow applying strategies to reduce this phenomenon. Initially, a process of detecting students at risk began by monitoring their academic performance. The results are promising, since they allow generating a profile of the student at risk of dropping out of their studies.

Dropout, Students At Risk, School Dropout

Consumption condition of Chihuahua type cheese: Case study

Condición de consumo del queso tipo Chihuahua: Estudio de caso

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Abstract

This study consists of obtaining information regarding the conditions of consumption of Chihuahua type cheese in Río Grande, Zacatecas, México (analysis unit), due to the fact that currently in the municipality in question the information is scarce, so it is it is necessary to know what the characteristics are (age, sex, socioeconomic level, among others); your consumption and purchase habits; your knowledge of the competition, brands, etc.; in addition to their consumption and purchase habits. The background of the unit of analysis is described, as well as the study of current concepts and research regarding consumption conditions; the type of social, economic, cultural and academic repercussions. Also, a comparative analysis is made with another unit of analysis, which in this case is the colony La Honda, Miguel Auza, Zacatecas, Mexico, establishing the reasons that led to said confrontation. The final result is the profile of the consumer of Chihuahua type cheese in Río Grande, Zacatecas, México, prepared with the case documentation obtained from the analysis of the consumption conditions through the present study, which will support further investigations for the generation of marketing plans, strategies and tactics that will support the producers of Río Grande, Zacatecas, México. The purpose is to establish the bases of the analysis of the consumption condition that exists among the consumers of Chihuahua type cheese in the municipality of Río Grande, Zacatecas, Mexico from the comparative analysis.

Consumer Profile, Chihuahua Type Cheese, Strategies, Consumption

Gestión Financiera en PyMes de dos municipios de la Zona Norte del Estado de México

Financial Management in SMEs of two municipalities in the North Zone of the State of Mexico

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Abstract

Financial management is vital to the growth and development of small and medium-sized enterprises (SMEs). Therefore, an adequate implementation supports financial decision-making, allowing opportunities for monetary sustainability. Therefore, the present work aims to analyze some financial management variables in SMEs in two municipalities in the north of the State of Mexico to detect those financing alternatives they use for development and consolidation. The main results show that SMEs in Atlacomulco and Ixtlahuaca opted for external financing, leaving internal financing in the background.

Financial Management, Financing and SMEs

Recruitment of personnel in companies using the 4.0 technique in times of covid-19

Reclutamiento del personal en empresas utilizando la técnica 4.0 en tiempos de covid-19

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Abstract

Recruitment is part of staffing in the area of human resources to integrate the right people into organizations. However, technological platforms have been implemented in this type of process thanks to industry 4.0. That is why this research of non-experimental design, retrospective research, qualitative method aims to analyze the results obtained in recruitment 4.0 as a result of its implementation by the COVID-19 pandemic in Mexico. Considering for this articles and theses that talk about this.

Recruitment 4.0, Human Resources, Staffing, COVID-19

6 Agricultural Sciences and Biotechnology

Kinetics and diversity indices of phytoplankton in T´zonot type watery in Kopomá.

Cinética e índices de diversidad de fitoplancton en T´zonot tipo aguada en Kopomá.

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Abstract

The cenotes, made up of a mixture of karst soil, fresh and salt water, provide ecosystem services: water, climate, landscape, and headquarters for religious and recreational activities. They are niche species that are part of the trophic chains and conserve valuable genetic information product of their evolution and adaptation to the ecosystem. It is important to know them before they can be lost due to anthropogenic activities. The objective of this work was to study the spatiotemporal biodiversity of phytoplankton in the Chen Ha Cenote. Monitoring activities included spring, summer and winter seasons. Environmental variables were monitored with a multiparameter probe. Classification of microorganisms by microscopy. The pH was slightly alkaline in all monitoring results. Temperature varied from 28.7 to 32 ° C, dissolved oxygen ranged from 2.4 to 3.2 ppm. Conductivity was 2.962 during spring and 2650 microS.cm2 in winter time. 41 species were identified in spring, 27 in summer and 29 in winter. During the spring and winter seasons diatoms predominated. *Navícula, Coelosphaerium* and *Nitzschia* were the dominant species in spring, summer and winter periods, respectively. In accordance with the Jackard similarity index, greater similarity was observed between spring and winter showing a value of 0.458, compared to summer with a value of 0.3877.

Biodiversity, Karst, Microorganisms

Development and physicochemical evaluation of a snail protein-based worcestershire sauce (*helix aspersa*)

Desarrollo y evaluación fisicoquímica de una salsa inglesa con proteína de caracol (*helix aspersa*)

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Abstract

The garden snail, *Helix aspersa*, is a common species and its flesh is rich in high biological value proteins that provide all the essential amino acids for nutrition. Based on this, the aim of this study was to utilize snail protein in the development of an English-style sauce to add value. The formulation was developed and the physicochemical and microbiological characteristics of the resulting product were evaluated, ensuring the quality and safety of the process. The obtained results indicated that, once the English-style sauce with snail protein was standardized, the physicochemical parameters of pH, ºBx, and acidity did not show significant differences compared to the control sauce. This suggests that consumers accustomed to consuming commercial English-style sauce will not perceive differences when trying the sauce made with garden snail. In conclusion, the development of an English-style sauce with snail protein has the potential to add value to the product, taking advantage of the high protein quality of the garden snail. This may be of interest to the food industry in product diversification and the promotion of unconventional food consumption.

Helix, Physicochemical Parameters, Microbiological Evaluation

Evaluation of microbial cellulose obtained by SCOBY (symbiotic colony of yeasts and bacteria) as a possible food additive

Evaluación de la celulosa microbiana obtenida por SCOBY (colonia simbiótica de bacterias y levaduras) como posible aditivo alimentario

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Abstract

The objective of this project was to elaborate and evaluate a food additive based on microbial cellulose (MC) for its possible use as a thickener in a spoonable yogurt. The MC was obtained by fermentation of fruit peel residues with the SCOBY microbial consortium (symbiotic consortium of bacteria and yeasts). The food additive was evaluated by means of a physicochemical analysis of solubility in water and in acid conditions (similar to those that occur naturally in yogurt) as well as a sensory analysis in which the acceptability of the final product was studied.

Microbial Cellulose, SCOBY, Yogurt, Additive

Rosmarinus officinalis extract, complementary testing for quality control as active ingredient for formulations

Extracto de *rosmarinus officinalis* y sus pruebas complementarias para el control de calidad como principio activo para formulaciones

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Abstract

Today contemporary alternative medicine continues to increase significantly around the world. Taking the above into account and given the need for new pharmaceutical formulations, techniques for the extraction of bioactive compounds from plants have been developed, such is the case of the extract of rosemary (Rosmarinus officinalis). The purpose of this work is to evaluate, through official and unofficial tests from the Pharmacopeia of the United Mexican States, a rosemary extract tablet. The extract was obtained by maceration in methanol and a simple distillation. Subsequently, using the direct compression method, prepare tablets and then evaluate them and determine the identity, disintegration, dissolution, titration and dose uniformity tests established by the Pharmacopeia of the United Mexican States (from spanish Farmacopea de los Estados Unidos Mexicanos, FEUM) for this type of pharmaceutical presentations. The results show that the tablets comply with the determinations of the pharmacopeial tests, which indicates that the tablets prepared in this work are of good quality, from a manufacturing point of view and can pass the validation process, so they could be used in the clinic.

Rosemary Extract, Rosmarinus Officinalis, Unofficial Tests From FEUM

Silver Nanoparticles as Germination and Growth Promoters in Zucchini (*Cucurbita pepo*), Maize (*Zea mays*) and Barley (*Hordeum vulgare*)

Nanopartículas de Plata como Promotoras de la Germinación y Crecimiento de Calabacita (*Cucurbita pepo*), Maíz (*Zea mays*) y Cebada (*Hordeum vulgare*)

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Abstract

Nanoparticles (NPs) have attracted a lot of attention due to their potential applications in biology, solar cells, and optoelectronic devices including cosmetics, biomedical science, optical devices, pharmaceutic genes (Manesh et al., 2010). Unlike other synthesis options, when obtaining nanoparticles by Green Chemistry, a plant extract is used as a reducing agent, often said extract can come from vegetable residues called lignocellulosic. Recent investigations have evidenced the relationship between vegetable development and nanostructured materials, identifying that a certain number of them can act as promoters of germination, seedling growth and the development of complete plants, positioning themselves as an alternative to improve agricultural production (Lopez, 2022). Therefore, the objective of this study is to develop a sustainable proposal for the production of silver nanoparticles (Np's Ag) and their application as promoters of the germination of zucchini (*Cucurbita pepo*), maize (*Zea mays*) and barley (*Hordeum vulgare*) crops in which their production, consumption and economic impact are of great importance for the Estado de México State; considering this methodological proposal as an alternative for development in agribusiness, through Bio and nanotechnological processing of products with industrial value.

Germination, Nanoparticle, Promoter, Agricultural

Evaluation of the adsorption capacity of glyphosate in a microbial cellulose composite

Evaluación de la capacidad de adsorción de glifosato en un compuesto de celulosa microbiana

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Abstract

The objective of this project was to develop a composite based on microbial cellulose (CM), chitosan (Qs) and citric acid (AC) as a crosslinker at two different concentrations (4 and 6% w/v). The CM was obtained from the fermentation of fruit residues with a SCOBY (symbiotic consortium of bacteria and yeast). The composites were morphologically characterized by SEM and spectroscopy techniques (FTIR-ATR) as well as UV-VIS spectrophotometry with ninhydrin were used to evaluate the composite as an adsorbent for glyphosate in water; in the spectra obtained by FTIR, the representative vibrational bands of the functional groups belonging to chitosan and microbial cellulose were observed; for cellulose and chitosan composites with 4% citric acid in 1579 cm-1, 1386 cm-1, 1046 cm-1 and 853 cm-1; and for the 6% cellulose-chitosan-citric acid composite at 1573 cm-1, 1380 cm-1, 1056 cm-1 and 503 cm-1, thus attributing cross linkage between the biopolymers. Post- adsorption FTIR-ATR analysis revealed significant changes possibly attributable to the adsorption of glyphosate in the cellulose composites. Further research is still being conducted to better understand this interaction and the involved mechanism; the goal is to comprehend how microbial cellulose can effectively adsorb glyphosate, which could have practical and efficient applications in the remediation of environments contaminated with this herbicide.

Glyphosate, Microbial Cellulose, Composite

Evaluation of substrates for biopolymer processing

Evaluación de sustratos para procesamiento de biopolímeros

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Abstract

The substitution by biodegradable plastics through the implementation of lignocellulosic polymers based on lignocellulose represents a potential idea to reduce their impact and take advantage of these wastes, decreasing their cost for final disposal and the environmental damage they generate. In this project, substrates based on banana and mango peels were evaluated for *pseudomona* to obtain a biopolymer with the objective of determining which substrates generate a greater amount of polymers by comparing mango, banana and potato peels with known growth media. The process is composed of a mechanical pretreatment and acid hydrolysis, for the delignification of the peels, compared with the basal medium and the LMC for the culture of *pseudomona* at 35°C under sterile conditions, neutral PH and the addition of some elements of the basal medium, cell extraction by centrifugation and a method of extraction of the polymer based on chloroform. Obtaining that the biopolymer produced in gr/L 25.86, 19.53, 6.63, 4.55, 15, for Mango, Banana, Potato, LMC and Basal medium, having better yields than the commercial media.

Biopolymers, Lignocellulosic residues, *Pseudomona*

Morphological evaluation of *Dioscorea sparsiflora* and *D. alata* minitubers irradiated by gamma rays

Evaluación morfológica de minitubérculos de Dioscorea sparsiflora y D. alata irradiados con rayos gamma

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Abstract

Dioscorea genus comprises underground tubers with economic-nutritional importance. Plagues affect its production, and as in Mexico, there is no established farming system, so its utilization is limited. Using biotechnological tools, like *in vitro* culture and genetic improvement, has led to the development of varieties with important agronomic characteristics. *In vitro* propagated plants of *D. sparsiflora* and *D. alata*, acclimatized to greenhouse conditions, were radiated with different gamma ray doses (0, 10, 20, 30, 40, 50, and 60 Gy) to improve their genetic characteristics. Minitubers were measured and weighed to identify differences between treatments. *D. sparsiflora* plants resisted all doses those with the biggest sizes were obtained when radiated with 30 Gy and higher radiation treatments. *D. alata* plants radiated with 50 and 60 Gy did not survive, and the highest number of tubers was obtained when radiating with 10 Gy. The biggest sizes were obtained when radiating with 20 Gy. These morphological changes in the minitubers could be considered variations, allowing for greater crop utilization.

Dioscorea, Minituberization, Camote De Cerro

Design of a thermal process applied to hummus (chickpea) dip

Diseño de un proceso térmico aplicado al hummus (dip de garbanzo)

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Abstract

A thermal process was designed in three different flavors of hummus dip using the Ball method. To guarantee commercial sterility, the sustaining times of 3 and 5 min were evaluated, a thermal death time ($F_{proceso}$) greater than 2.5 min was obtained, for natural hummus (HN), with chipotle (HC) and with olives (HA), the values were 3.4, 3.4 and 2.8 min, respectively. A treatment was designed with a heating time ($t_{B)}$ using $F_{proceso}$ = 2.5 min, for *Clostridium botulinum.* The experimental t_B obtained for HN, HC and HA were 14.8, 14.1 and 13.2 min, with these values were obtained the exact times of holding in the autoclave of 1.7, 1.8 and 2.6 min in HN, HC, and HA, respectively, suitable for commercial sterility. This method allowed to know the lethality of the sterilization process for hummus dip.

Thermal Process, Ball´S Formula Method, Lethality, Sterilization Of Foods, Clostridium Botulinum

Prevalence of thrombocytopenia in canine with clinical signs of ehrlichiosis in Poza Rica, Veracruz

Prevalencia de trombocitopenia en caninos con signos clínicos de ehrlichiosis en Poza Rica, Veracruz

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Abstract

The objective of this study was to determine the prevalence of thrombocytopenia in dogs with clinical signs of canine Ehrlichiosis in the city of Poza Rica, Veracruz. It was used 32 blood samples from dogs with clinical signs compatible with canine ehrlichiosis. A platelet count by hematic biometry and the Uranotest Quattro test based on the immunochromatographic technique were used. To analyze the data, the Chi-square test of the statistical software SPSS 20 Windows was used. The results showed 43.8% positives samples for *E. canis* and the prevalence of thrombocytopenia was 81.3%. The statistical analysis carried out determined that the gender of the dogs was not a predisposing factor for the disease. Likewise, by age group, no statistically significant difference was shown. In addition, six animals positive for *Anaplasma* were detected, which represented 18.75% of prevalence in the sampled animals, of which five also presented thrombocytopenia and two of them were positive for both *Ehrlichia* and *Anaplasma*. Therefore, thrombocytopenia presented in canines may be due to other causes or other rickettsiae.

Prevalence, Thrombocytopenia, *Ehrlichia canis, Anaplasma*

Bioinformatic practical applications in biotechnology, medicine, environmental and agricultural sciences

Aplicaciones prácticas de la bioinformática en biotecnología, medicina y ciencias medioambientales y agrícolas

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Abstract

The new massive sequencing technologies of nucleic acids (DNA and RNA) have allowed a great advance in health, biology, environmental, agricultural, and biotechnology sciences. However, the gigantic amount of data (big data) obtained from each experiment requires increasingly demanding computational power or perhaps increasingly experimented computer scientists. Therefore, the field of bioinformatics, or the use of computing applied to the understanding of biological systems, requires specialized analysts who have an understanding of both biology and computational systems. In this chapter, we set down examples of bioinformatics around the study of a) microorganisms, b) food science, c) health studies concerning the immunological repertoire, and d) studies in agricultural sciences.

Metagenomics, Transcriptomics, Metaprofiling, Microbiomics, Omics Data Science

7 Engineering

Diagnosis to determine the root cause of unproductive times in the release of ascorbic acid as a raw material

Diagnóstico para determinar la causa raíz de tiempos improductivos en la liberación de ácido ascórbico como materia prima

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Abstract

The present work was carried out in a company dedicated to the elaboration of medicines and food supplements, in which a diagnosis was made in the raw material release process, specifically, in ascorbic acid; where the critical points of the release process that presented a difference in time (unproductive time) were detected in the analysis of the parameters of each test of the raw material with respect to the established time. The objective of this work was to determine the root causes of unproductive times that affect the release of raw material; the methodology used was a study of times and movements, process flow diagrams and route diagrams. During development, the proposal for traceability formats of the characteristics of the raw material was designed.

Study Of Times And Movements, Process Diagram, Unproductive Periods

Structural and optical properties of metal-organic frameworks of lanthanides

Propiedades estructurales y ópticas de marcos metalorgánicos de lantánidos

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Abstract

In this work, the synthesis of luminescent metal-organic frameworks (LnMOF) was studied at room temperature using different lanthanides ions as metal centers. LnMOFs are materials that can emit light by absorbing energy from other radiation and have been used mainly as sensors in medicine, optics, electronics, and the chemical industry. The synthesis was carried out by stirring at room temperature and with a stoichiometry of 1:1, using trimesic acid as an organic linker. Structural characterization of these materials was carried out using DRX, FT-IR, and SEM. Synthesis of isoreticular MOFs with Eu, Tb, Dy, Nd, and Er with crystal sizes between 24-64 nm was possible. Regarding the optical properties, these were determined by photoluminescence spectroscopy. The MOFs that presented intense emission and excitation bands were those of Eu, Tb, and Dy, being the most intense of Tb. With the results obtained, it is possible to obtain 3D luminescent MOFs using a simple and easy methodology, which does not involve high-frequency processes such as ultrasound or microwaves, or post-synthesis procedures, which are very frequent and considerably increase the synthesis time or the expense of solvents for material washings but above all a high energy consumption.

Frameworks, Emission, Lanthanides

AutoDrip: Automated Irrigation System for Efficient Water Use in Agricultural Cultivation, Using Renewable Energy in the Sierra Region.

AutoDrip, sistema de riego automatizado para el uso eficiente de agua en el cultivo agrícola, haciendo uso de energía renovable en la Región Serrana.

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Abstract

In the state of Queretaro, the application of technology in the agricultural sector has become increasingly widespread in recent years, allowing local farmers to improve productivity, reduce costs, and increase efficiency in their crops. Among the most common technologies implemented in the agricultural sector in Queretaro are the use of automated irrigation systems, sensors to monitor soil moisture and ambient temperature, drones for crop analysis, and the implementation of agricultural production management software. The objective of our project is to improve water use efficiency in agricultural cultivation, reducing waste and using renewable energy to increase sustainability and minimize environmental impact through IoT technologies. This will contribute to the development of farmers in the Sierra Gorda with vegetable plots of one hectare or more, who are investing in technological innovation with the use of clean energy, and hoping that the Agricultural Secretariat of the State of Queretaro and the Secretariat of Agriculture and Rural Development will support the project to implement strategies that address the Sustainable Development Goals of the 2030 Agenda.

Irrigation, Agriculture, IoT

Implementation of an inventory control system in the snack company.

Implementación de un sistema de control de inventarios en la empresa de botanas.

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Abstract

This engineering research consists of improving the control of inputs and outputs from the warehouse; Optimize the operations that are carried out to streamline the flow of the process towards production, using equipment (Racks, pallets, among others) and content that provides added value to generate a continuous flow within the company. These improvements will make it possible to devise a control system in the warehouse area that allows the user to carry out a verification of what enters and leaves the warehouse. In such a way, that it constantly reflects the fluctuating needs of the consumer. This will allow the company to better position itself in the market, translating this into an increase in sales and optimization of its resources (raw material and finished product).

Inventory System, Continuous Improvement, Work Measurement, ABC Inventory

Design of experiments (DOE) of parts manufactured in 3D printers using composed filaments of PLA and Aluminum

Diseño de experimentos (DOE) de piezas fabricadas en impresoras 3D utilizando filamentos compuestos de PLA y Aluminio

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Abstract

The Department of Mechanical Metal (Mechatronic Engineering) of the Technological Institute of Nogales was one of the first national degrees to offer in its study plans the specialty of plastic injection molding (IMCE-MIP-2017-01), with the eager to continue innovating and evolving in this area, we present the following research work, with which we experimented and generated knowledge to determine the mechanical properties of parts manufactured in 3D printers, with polymer composite materials (PLA) and metallic powders (Aluminum). In the first place, the filament formed by a matrix of PLA and an ALUMINUM reinforcement was created, which was extruded in a molding machine manufactured inside in the molding laboratory of this Institute, taking as consideration that the reinforcing material in this case aluminum the following percentages will be 0% and 20%. Placing these filaments in a suitable printer for the manufacture of 3D parts with composite materials to which an analysis of experiments was performed to determine what percentage of composite material has better mechanical properties.

PLA Filament, Composite Material, Design of Experiments (DOE).

Europium organic metal networks: chemical and optical properties

Redes metal orgánicas de Europio: químicas y ópticas

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Abstract

This project presents the results of synthesizing five metal-organic frameworks (MOFs) of europium with luminescent properties using a stirring methodology at room temperature. The materials were obtained using the organic linkers benzene dicarboxylic acid (BDC), benzene tricarboxylic acid (BTC), naphthalene dicarboxylic acid (NDC), amino benzene dicarboxylic acid (BDC-NH 2) and hydroxybenzene dicarboxylic acid (BDC-OH). XRD and FTIR determined structural and optical properties, and, for three of the materials, SEM. The MOFs obtained have a crystal size of the order of nanometers and presented characteristic functional groups of organic linkers. Optical properties were determined by luminescence spectroscopy, and emission and excitation spectra were obtained. The photoluminescence data of the MOFs showed that the organic linkers were useful for the energy transfer to the lanthanide ion (antenna effect). The material with the highest emission was Eu_2BDC_3, and the one with the lowest was $Eu_2(BDC\text{-}NH_2)_3$. The latter did not present a defined crystalline structure. The $Eu_2(BDC\text{-}NH_2)_3$ and $Eu_2(BDC\text{-}OH)_3$ structures suffered the loss of emission over time. The materials with the highest emission can be used as chemical sensors, cell tracers, and electronic components, including some of their applications.

Metal-Organic Frameworks, Europium, Luminescence

Design of a p-i-n type inverted perovskite solar cell using SiO_x as down-conversion material to improve PCE: Simulation and optimization in SCAPS-1D

Diseño de una celda solar de perovskita tipo p-i-n utilizando SiO_x como material de energía de conversión descendente para mejorar el PCE: Simulación y optimización en SCAPS-1D

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Abstract

In this research work, an inverted p-i-n type perovskite solar cell: ITO/PEDOT:PSS/CH3NH3PbI3/PCBM/Au has been simulated and optimized in SCAPS-1D. The optimized parameters in SCAPS-1D that improved solar performance were: perovskite thickness, the total defect density of perovskite, the total defect density of interfaces, series and shunt resistances, and device operating temperature. As a result, the efficiency (PCE) increased to 18.33%. Subsequently, when the silicon-rich oxide (SiOx) material was implemented in the simulation as down-conversion energy material on the outside of the cell, a power conversion efficiency (PCE) of 23.7% was obtained. The SiOX film obtained experimentally by sputtering obtained good photoluminescence, absorption coefficient, band gap, and transmittance characteristics before and after thermal annealing. These characteristics have been considered for the proposed device. It is indicated that the inverted perovskite solar cell of type p-i-n: SiOx/ITO/PEDOT:PSS/CH3NH3PbI3/PCBM/Au has better J-V output values and EQ quantum efficiency than the perovskite solar cell without SiOx.

Perovskite, Efficiency, Simulated

Artificial vision techniques at the frontiers of video surveillance

Técnicas de visión artificial en fronteras de la video vigilancia

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Abstract

The present work addresses the task of identifying a predatory behavior of robbery of homes or businesses. The proposed objective is the detection of blunt elements used in the commission of the crime, limiting the context to barrettes, covered faces, people and gates (doors or windows). The proposal addresses the task of object identification applying Single Shot Detectors (SSD). Due to its versatility and the physical resources applied, the structure of SSD ResNet50 V1 FPN 640x640 has been chosen from the TensorFlow Model Zoo to train and validate the classification. This has been built in five classes, for the training and validation set, an average of 50 annotations per class have been processed. Additionally, a support function was worked on in the detection of human activity. The evaluated model obtained a mAP=69% in the detection of objects and in the identification of criminal behavior it showed a performance of 69%.

Predatory Behavior, Attention Mechanisms, Deep Learning

Analysis of the properties and geometric characteristics of machined parts using computer vision

Análisis de las propiedades y características geométricas de piezas maquinadas mediante visión por computadora

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Abstract

In milling contour profiles, tools create minute surface variations known as roughness. An algorithm is proposed to analyze the profile dimensional variation in milled parts by an artificial vision and Fourier descriptors as a measurement technique. The proposed method is based on the Fourier spectrum to analyze three profile signatures extracted from an image of a milled part with the aim of measuring the variation in three materials. It is found that when performing the profile machining process, the combination of the parameters: spindle speed, feed rate, cutting depth, and coolant fluid influence the dimensional variation of the part. The proposed approach concludes that this inspection method is faster and more efficient to guarantee the quality of parts manufactured by machining.

Artificial Vision, Fourier Descriptors, Inspection, Geometry, Milling

Development of a web application for hotspot token vending machine administration

Desarrollo de aplicación web de administración para máquina expendedora de fichas hotspot

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Abstract

This article describes the features of a web application to manage the availability and acquisition of wireless internet access credentials of vending machine, it followed the OOHMD agile software development methodology, for the implementation we used the client-server architecture, the JavaScript programming language, the JavaScript runtime environment of Node. js JavaScript runtime environment, Express web development framework for Node.js, Sequelize ORM, MySQL relational database management system, Passport authentication middleware, EJS open source template engine, Bootstrap CSS framework, JSON data interchange format and Visual Studio Code IDE. As a contribution, there is a web application that allows the synchronization of available tokens and the sale of a wireless internet access credential vending machine, which connects through the internet. The methodology used allowed to have an adequate development process to obtain a quality product that resulted in a web application that efficiently provides the available access credentials and manages the access credentials acquired from the vending machine.

Methodology, Application, Development, Synchronization, Credentials

Polyvinyl alcohol and fluorescein electrospun fibers

Fibras electrohiladas de alcohol polivinílico y fluoresceína

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Abstract

Electrospinning is a technique that allows obtaining new fibrous structures from synthetic or natural polymers for the development of materials used in the pharmaceutical and biomedical industries, among others. However, the low production rate of electrospinning has limited its industrial application, forcing the development of new injectors that allow higher productivity. In this work, a coaxial injector was designed to develop products encapsulated in polymeric fibers. For the demonstration of the encapsulation of one fiber included in another, fluorescein was used as internal compound in a polyvinyl alcohol solution, and polyvinyl alcohol was used as external fiber. It was obtained that the encapsulation process is possible by using this coaxial injector.

Nanofibers, Coaxial Electrospinning Coaxial Injector

System for inspection of fuel level sensor

Sistema para la inspección de sensor de nivel de combustible

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Abstract

This document describes a project developed for the company BorgWarner S. de R.L. de C.V. Chihuahua plant, which is dedicated to the manufacture of gasoline modules. The gasoline modules are made up of three main elements: the gasoline pump, the gasoline filter, and the fuel level sensor. When a fuel level sensor is found to be defective during manufacturing and testing, it is sent to the quality department for inspection. The root cause of the failure must be found in order to improve production processes or determine if the materials that make up the product are adequate. A system for the inspection of fuel level sensors implemented in the quality department of this company is presented. The developed system generates graphs of the sensor resistance depending on the position of the float, which allows detecting failure points in it.

Variable Resistor, Gasoline Module, Fuel Level Sensor

Characterization of additive manufactured specimens for tensile testing using finite element

Caracterización de probetas elaboradas con manufactura aditiva para el ensayo de tracción utilizando elemento finito

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Abstract

Nowadays, additive manufacturing (MA) and computational simulation are essential in the technological development for the validation of materials, thus assimilating the requirements and properties of a material before being used for specific applications, so in this work the characterization of the specimen for tensile tests is carried out, which is made in ABS material, using additive manufacturing through 3D printing and then FEM (Finite Element Method) is applied, in order to obtain a database regarding the physical properties of the material when subjected to a simulation that represents the tensile test in plastic materials. This seeks to implement new areas of development that involve innovation in the characterization of materials used in additive manufacturing, increasing the use of computational tools with engineering simulators. The use of the data will be available to the academic and research community in order to enrich FEM applications.

Additive Manufacturing, Characterization, Computational Simulation

Artificial Intelligence as a tool for analyzing cognitive and thinking problems: Rubik's Cube

La Inteligencia Artificial como herramienta de análisis de problemas cognitivos y de pensamiento: El Cubo de Rubik

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Abstract

There is a wide variety of artificial intelligence (AI) algorithms today. The use of these algorithms can be carried out in different areas or fields of action, in turn, with different levels of efficiency. The objective of this article is to carry out an analysis of the impact of artificial intelligence algorithms and the various implementation mechanisms that can be used specifically in problem solving. The study proposes a documentary investigation, exhibiting a problem-solving case study known as Rubik's Cube, which is a mechanical puzzle that requires logical and spatial thinking skills. It is demonstrated that the application of AI algorithms is successfully used to reach a faster and more efficient resolution of the aforementioned puzzle, and that teaching its resolution contributes to the development of cognitive and logical thinking skills in students. It is expected that this contribution to the academic-scientific society will generate a new line of research in the development of cognitive skills and logical thinking with the use of AI to solve various problems in any area.

Artificial Intelligence, Algorithms, Logical Thinking

Low-cost Schlieren system for flow visualization in transparent media in the wind sector

Sistema Schlieren de bajo costo para visualización de flujos en medios transparentes en el sector eólico

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Abstract

The Schlieren technique is frequently used for qualitative visualization of flow around an object. Temperature and density change can also be obtained with this technique. In this project, the aim was to develop a low-cost Schlieren system starting from easily available materials and commercial equipment. Cell phone holders were used as supports to position the concave mirrors. A light-emitting diode (LED) lamp was used as the illumination source, while a knife, a condenser lens, and printed parts in PLA (polylactic acid) plastic were key to the prototype development. Preliminary results showed an effect with limited visual perception due to the low temperature change in the objects under examination. In later experiments, qualitative visualization with a better degree of visual perception was observed due to the higher temperature range reached in the test. The images that were obtained were satisfactory and they allowed validation of the prototype development. Its main application points to the visualization of transparent flows that are formed in the airfoil of a wind turbine blade.

Schlieren, Flow, Blade, Aerodynamic Airfoil

Educational Software for Teaching Mathematics to First Grade Primary School Children with Hearing Impairment in .NET Framework

Software Educativo para la Enseñanza de las Matemáticas en Niños de Primer Grado de Primaria con Discapacidad Auditiva en .NET Framework

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Abstract

This article presents the results obtained from the development of an educational software made as a desktop application in .NET Framework for first grade children with hearing impairment to strengthen the learning of mathematics through the use of Mexican Sign Language; the research contributes to the SDG 5 Sustainable Development Goal of quality education and SDG 10 Reducing inequalities, sustainable development goals proposed by the United Nations. The agile software development methodology XP Extreme Programming was followed for project management, it was implemented with .NET Framework technologies, IDE Visual Studio and C# programming language, which allowed to obtain a quality software easy to implement and maintain.

Educational software, XP, .NET Framework, Visual Studio, C#

Effect of dye on the efficiency of grätzel cells

Efecto del colorante en la eficiencia de celdas grätzel

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Abstract

Renewable energies are playing a critical role in reducing emissions in the energy generation sector. Photovoltaic technologies have reduced their cost due to the improvements in conversion efficiency, the cost of the materials, the economies of scale, and the investments made in research and development in the private and public sectors. The Grätzel cells are part of the third generation of photovoltaics. This generation of photovoltaics looks to achieve photovoltaic devices with great efficiency while keeping low costs using thin layer processes and non-toxic materials. One of the main features of these solar cells, also known as dye-sensitized solar cells (DSSCs), is that the spectrum of absorbed light depends on the dye used and can be tuned, which have a big effect on the performance of the cell. This feature grants this device great versatility, which gives this technology a great potential to give energy to devices in indoor illumination and as Building Integrated Photovoltaics (BIPV). The relevance and working principle of the Grätzel cells are presented in this text, as well as the steps that were required to build these solar cells in a laboratory setting.

DSSC, Solar Energy, Grätzel Cells

Web site layout for the sale of handicrafts from the municipality of Naupan, Puebla

Maquetado de sitio web para la venta de artesanías del municipio de Naupan, Puebla

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Abstract

Currently the artisans of the municipality of Naupan, Puebla sell their handicrafts directly in their homes and little has been done for the use of information technology to increase sales, profits and reduce costs. This paper describes the research methodology that was followed with a qualitative process to present the layout of the website for the sale of handicrafts in the municipality of Naupan, Puebla. With this layout, a new form of commercialization or market niche is created that allows the reduction of the abandonment of the elaboration of products in the handicraft sector and contributes to preserve the culture and identity of the municipality.

Handicrafts, Methodology, E-Commerce

Design of a mechanism for applying sensitive films to gas sensors based on quartz crystal resonators

Diseño de un mecanismo para aplicación de películas sensibles a sensores de gas basados en resonadores de cristal de cuarzo

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Abstract

Gas sensors based on quartz crystal microbalance (QCM) are used to measure mass changes through frequency shifts, using the piezoelectric principle. These sensors are employed in odor detection and are essential for the development of electronic noses. For optimal performance, a sensitive film is applied to the surface of the crystal electrode, which is compatible with a specific compound. There are different methods of film deposition: ultrasonic atomization, spray coating, and casting. The casting method, which involves the manual application of sensitive films using a micropipette, is the most commonly used. However, it is not reproducible. To improve the casting method, a mechanism is proposed as a preliminary platform for a sensitive film application system. The objective is to achieve reproducibility in the construction of gas sensors by applying ethyl cellulose sensitive films onto the sensor surface, thereby reducing the margin of error. Tests were performed on the mechanism to verify the capabilities of the system for the deposition of sensing films using joysticks based on the resistance change principle.

Mechanisms, QCM, CAD

$Sn_3Sb_2S_6$ thin films for photovoltaic applications

Películas delgadas de $Sn_3Sb_2S_6$ para aplicaciones fotovoltaicas

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Abstract

Tin antimony sulfide semiconductor thin films have been extensively investigated due to their potential application as absorber in thin films solar cells, to convert solar radiation into electricity (A. Gassoumi, 2011; A. Larbi, 2014; Auttasit Tubtimtae, 2021; D. Abdelkader, 2014; N. Ali, 2015; Nisar Ali S. H., 2013a; Nisar Ali S. H., 2013b; Sebin Devasia, 2020); this is due to the excellent optoelectronic properties and due to abundance of the constituent elements on the earth crust and low toxicity. In this research we studied the effect of heat treatment temperature on the formation and optoelectronic properties of $Sn_3Sb_2S_6$ thin films prepared by the heating of multilayers glass/ SnS/Sb_2S_3 chemically deposited, the results show the formation of the ternary phase at temperatures above 250 °C, increasing the crystallinity of the phase at 325 °C. $Sn_3Sb_2S_6$ thin films show an indirect optical transition with band gaps around 1 eV, and absorption coefficient ~ 10^5 cm^{-1} in the visible range. $Sn_3Sb_2S_6$ thin films show conductivities in the range of 10^{-7} – 10^{-6} Wcm^{-1}, showing an increase in conductivity as the temperature increased. The good optoelectronic properties of this material make it suitable for photovoltaic applications.

Optoelectronic, Semiconductor, Properties

Sizing of the photovoltaic system for a house located in the Presa la Concepción subdivision in Santiago Cuautlalpan, State of Mexico

Dimensionamiento del sistema fotovoltaico para una vivienda ubicada en el fraccionamiento Presa la Concepción en Santiago Cuautlalpan, Estado de México

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Abstract

To cover the needs of the human being, either electrical or thermal energy is used, which causes greenhouse gases due to the origin of the energy, since most of it is generated by burning fossil fuels. It is necessary to change the source of energy for others that are not polluting, that is, for renewable energies. In a house, energy consumption is in electrical appliances, lighting, air conditioning, entertainment equipment, stove and boyler. In a previous study, strategies were proposed for the passive air conditioning of a house in the Fraccionamiento de Presa la Concepción located in Santiago Cuautlalpan, State of Mexico, considering the bioclimate of the place. In the present study, the photovoltaic system required to cover the energy demand of that house is proposed. The characteristics of the home are briefly described (location, installed load and the bi-monthly consumption reported by CFE), the methodology to be followed for the sizing of the system and its application. A proposal of solar panels, inverter and battery to be used with their respective costs is given.

Photovoltaic, Energy Saving, Passive Systems

Design and Manufacture of a Forelimb Prosthesis Prototype for a Dog

Diseño y Manufactura de Prototipo para Prótesis de Extremidad Anterior para un Can

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Abstract

The objective of this writing is to develop a methodology for the design and selection of materials that allows for the manufacturing of a canine prosthesis prototype based on anthropometric measurements, element simulation, and finite analysis. The canine prosthesis aims to restore mobility to a missing limb of a dog due to amputation and/or congenital malformation. The methodological approach for this study has been determined based on the analysis of a series of parameters, such as the dimensions of the animal leg, as well as its weight and the location of the amputation, to mention just a few points. As a contribution, a prototype of an exoprosthesis is proposed for a missing front limb, where it should fit within the range of the leg length, from 35 cm to 45 cm, and its weight should range between 30 kg and 40 kg. Additionally, the amputation should be located starting from the elbow region, and the optimal design should be able to adapt to different anthropometric measurements and the needs of the dogs.

Design, Prosthesis, Amputation

Use of virtual classrooms to support teaching in the mixed modality, of the subjects of Ecological Engineering and Air conditioning and refrigeration

Empleo de aulas virtuales como apoyo a la enseñanza en la modalidad mixta, de las asignaturas de Ingeniería ecológica y Aire acondicionado y refrigeración

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Abstract

To help reduce the problem of remote knowledge imparting, such as not having access to a computer during class time, not being able to rent an hour of internet or not having Wi-Fi, the authors of the article generated the project PAPIME with PE100222 code, which aims to Generate new didactic resources to improve the teaching-learning process of the aforementioned subjects, so that it can be used in the online and mixed modality. As a first stage, they created virtual classrooms in Classroom and Moodle where they included didactic material such as class videos, notes, support texts, infographics, mind maps, word search, crossword puzzles and practical activities that can be done from home for each subject of the project. . This article presents the actions carried out as the second stage of the project, which includes the adjustments made to each virtual classroom based on the opinions of the students who used them and the generation of virtual classrooms to include support material for the presentation. of the extraordinary ones of the subjects involved.

Moodle, Classroom, Mixed teaching

Mechanism validation after stress concentration analysis mathematical calculated with safety factor requirements using dedicated software with friction factor mate

Validación de mecanismo después del cálculo matemático análisis de concentración de esfuerzos con requerimientos de factor de seguridad utilizando software dedicado por factor de fricción

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Abstract

It is feasible to use Computer Aided Design (CAD) and Finite Element Analysis (FEA) numerical simulation to validate the mathematical results obtained. Testing mechanisms in real world situations, prior to manufacturing, results in optimal designs and more reliable products. Simulation software tools evaluate the behavior of a system, improve the quality of data interpretation, and even increase product innovation. The present work shows the calculation of a simple mechanical system in two dimensions, involving the mechanical properties of the materials used, obtaining the maximum allowable load due to a required safety factor. The behavior of a mechanical element while in a stress concentration is shown along with the results obtained mathematically and with the dedicated software. Once the validity of the theoretical behavior (simulation) is known, the original design will be submitted showing the assembly with non-coincident meshing, the results obtained by the friction factor, the ISO clipping showing the volumes involved in a real situation, and the acquirement of the safety factor. The designer is shown a reliable method for decision making in the development of new equipment, modifications or even changes in the geometries and materials involved.

Analysis, Calculation, Motion study, Interpretation

Experimental and numerical calibration in a critical flow venturi of close to sonic flow

Calibración experimental y numérica en un venturi de flujo crítico de flujo próximo al sónico

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Abstract

This work introduces a new study in discharge coefficient performance in CFV when the throat flow is close to sonic regime Ma ≈ 1 and the throat strangulation is not fully developed. Thus, two CFV of 0,56 and 2,24 mm diameter were experimentally calibrated by applying the volume averaging method; experimental calibration allowed to estimate Cd and measure uncertainty, for 2,24 mm diameter Cd is 7,34% higher than for 0,56 mm diameter when Ma global is 7,30 % higher. Based on experimental calibration results and CFV geometries, numerical experiments were realized to explain how Ma ≈ 1 flow deviates Cd from the theoretical value, concluding compressibility affects thickness scrolling relation since it is 35,92% smaller for 2,24 mm diameter than 0,56 mm, giving a better approximation for Cd to the theoretical value for this throat diameter. Finally, numerical Cd models were obtained to evaluate the deviation these flow conditions produce in respect of empirical and numerical models, finding the numerical model's maximum error is 6,68% and the empirical model's maximum error is 1,64% under identical stagnation conditions.

Critical Flow Venturi, Sonic Flow, Experimental Calibration

Importance of the analysis of computer attacks on a LAN network applying the predictive - quantitative method

Importancia del análisis de los ataques informáticos sobre una red LAN aplicando el método predictivo - cuantitativo

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Abstract

In a global scenario, the amount of equipment exposed, the defense tools installed, the user culture and the sub culture of information theft and damage to assets, it is necessary to create predictive stochastic models that can create a quantitative simulation about of a possible attack, and where appropriate the spread of it in an environment.

Security, Models, Predictive

Fuzzy control design to pose mechanical structures used in solar farms

Diseño de un control difuso para posicionar estructuras mecánicas empleadas en granjas solares

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Abstract

Solar panels have problems in terms of the optimal capture of solar energy, reducing their efficiency due to the static position they maintain throughout the year. This article presents the proposal for the development of a fuzzy control to position a mechanical structure, which supports a solar panel seeking to obtain maximum capture in solar farms. The fuzzy control law defines rules that together cause a nonlinear control law by evaluating the performance of the controller through graphics and its simulation in the MatLab Simulink® software. The mechanical structure used has an arrangement of photoresistors at the ends of the surface, which determined the desired elevation angle, generating the control setpoint. Three experiments were developed to validate the operation of the resulting controller, concluding that the diffuse system decreases the position error with respect to the incidence of solar radiation on the photovoltaic cells and the rotational movement of the Earth.

Solar Panel Efficiency, Nonlinear Control Law, Fuzzy Logic

Design of a bidirectional converter for charging/discharging a supercapacitor

Diseño de un convertidor bidireccional para la carga/descarga de un supercapacitor

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Abstract

This article presents the analysis and design of a new converter that combines the current doubler topology and the parallel converter to achieve greater stability and effective reduction of ripple in both voltage and current parameters. Basically, the DC-DC (Direct Current to Direct Current) converter operates with pulse modulators to control the current in the desired charging or discharging direction. Extensive simulations were carried out at nominal values of 48 V and 8.5 A of output, and 100 V of input to confirm the performance of this converter. The approach used has benefits in terms of safety, reduced electrical noise, practical implementation for interconnecting energy sources with high voltage ratios, and increased lifespan of supercapacitors as well as batteries. Simulation results are presented and the advantages and applications of this new configuration are discussed.

Supercapacitor, Bidirectional, Energy

Method to detect faults in the rotor squirrel cage with low load in permanent state using DWT

Método para detectar fallas en el rotor de jaula de ardilla con baja carga en estado permanente usando DWT

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Abstract

Although there are several methods that can be used, the Continuous Wavelet Transform and its discrete version have demonstrated their ability to work with these signals. This article presents a new method to help detect early faults in the rotor squirrel cage of induction motors no-load and operational state, specifically in bars and rings. Using three techniques on the whole as it is the motor current signature analysis (MCSA), discrete wavelet transform (DWT) and multi-resolution analysis (MRA) with a decomposition tree reduced and apply a suitable index that determines the condition of the rotor. A brief description of the case study on which the research carried out is based is offered, which is used here successfully to generate a new alternative to determine the condition of the rotor squirrel cage. The performance of the results is get from the experimentation carried out and determined through comparison between the DWT conventional analysis and the new method, also exposing a brief comparison using the fourier transform. This new method reduces the uncertainty when performing the rotor diagnosis and improves the accuracy to differentiate the condition where it is.

DWT, Fault Detection, Induction Motor

Development of a blueberry sorting machine

Desarrollo de una máquina seleccionadora de blueberry

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Abstract

In the municipality of Zacatlan de las Manzanas located in the Sierra Norte of the State of Puebla, many families are dedicated to grow blueberry, basically at the time of cutting the fruit or harvesting the area is accessed with baskets for collection, then begins the process that focuses on the selection of the fruit by size, this task is very late and therefore tedious especially if it is done without using tools, on the other hand should take care of the handling of the fruit to be kept in optimal conditions. The objective of this article is the development of a blueberry sorting machine from the design of a mechanical-electrical system using CAD software and simulation, to its operation to ensure the correct selection, better handling of the fruit and reduce time and movements, in order to improve the process and scheduled delivery to the customer. With this project it is intended that the blueberry sorting machine has advantages over the manual selection of the fruit in the size classification by means of a simple system for this process.

Machine, Sorter, Blueberry

Identification of an instrumental proposal based on fiber optic sensors of the Bragg grating type for implementation in an experimental platform for dynamic analysis

Identificación de propuesta instrumental basada en sensores fibra óptica del tipo rejilla de Bragg para implementación en plataforma experimental de análisis dinámicos

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Abstract

Recently it has been reported the use of non-invasive methods for the identification and monitoring of vibrational parameters in rotodynamic systems, such as aircraft engines, which require the implementation of innovative detection systems, such as fiber optic sensors, which overcome deficiencies of adaptability to adverse environments such as intense magnetic fields and the impossibility of performing a distributed detection of vibrations, limitations present in the sensors conventionally based on capacitive or piezoelectric principles. Therefore, in the present study, through the use of an experimental platform for dynamic analysis, the best proposal of an instrumental system based on fiber optic sensors with Bragg gratings was selected for its use in vibrational measurement and analysis, through the theoretical study of the different approaches to vibrational analysis using fiber optic sensors with Bragg gratings. The analysis of the results of the study presents a justification of the type of instrumental proposal selected from the characteristics provided by the experimental platform. In addition, the experimental proposal will be implemented in the future and may contribute to the development of other vibrational studies.

Fiber Bragg Grating (FBG), Vibration monitoring, Instrumental system

Bibliometric Analysis of Smart Parking

Análisis bibliométrico del aparcamiento inteligente

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Abstract

For more than a decade, technological advances have been generated to manage the available spaces in a public parking lot to improve the use of the available infrastructure. In this paper, we identify the most relevant contributions to the field of Smart Parking, using Bibliometric analysis techniques, highlighting the technological assistance, the principal authors, publishing houses, countries with greater participation, and the trend of publications from January 1, 2012, to December 31, 2022. The Web of Science identified 1643 publications related to intelligent parking. These involve 5,855 authors and co-authors, with the participation of 154 publishers and 2.178 institutions in 103 countries or territories. Besides, it was considered a sample of the first four months of 2023, reflecting a result of 73 publications, showing fewer publications than previous years. This analysis allows identifying the existence of a large amount of collaborative research on the implementation of technologies to achieve an efficient distribution and management of vehicular spaces, showing a trend in the development area in this field.

Bibliometric analysis, Smart parking, Web of Science

Study of the overcurrent protection coordination for radial and ring fed system

Estudio de la coordinación de protección de sobre corriente para sistema radial y en anillo

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Abstract

The distribution systems are normally protected by inverse time overcurrent protection devices. This is due to the natural behavior to tolerate temporal overloading conditions on the distribution lines and its inexpensive cost. Therefore, both radial and ring fed distribution systems are protected using this protection principle. However, the manual time coordination procedure can be tedious and confusing for the new undergraduate protection students. For this reason, this article presents the overcurrent and directional overcurrent protection coordination study considering two parameter settings: time dial and pickup current.

Directional Overcurrent Relay Coordination, Manual Coordination, Radial and Ring Fed System

Domotic House: Domotic

Casa Domótica: Domotic

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Abstract

The main goal of this project is to develop a smart home that can be controlled through a mobile application built on Flutter, enabling cross-platform functionality. Various technologies were employed, including the AWS (Amazon Web Services) broker, with the MQTT protocol facilitating real-time communication between the Raspberry controller and the mobile device. The Raspberry PI 4 controller, along with multiple sensors and actuators, were utilized to enable interaction. To accomplish this project, it was necessary to use the SCRUM methodology, which allows identifying each stage of the product through a sprint. This work was carried out in 4 stages: In stage 1, called Requirements Analysis: the needs and objectives of the project were determined. A detailed analysis of the functionalities required in the software, the AI and the physical prototype was carried out. In stage 2. System design: the design of the home automation system and the AWS server were developed. The necessary hardware and software components were defined, as well as the system architecture and the integration with artificial intelligence was planned. In stage 3 Software development: the necessary software was developed to control all the components of the house and the implementation of the AWS server with MQTT. In the last stage: 4. Integration of hardware and software and AI: the integration tests of the home component of hardware, software and the integration and training of the AI with the life patterns of the inhabitants of the house were carried out

AI, Domotics, Iot

Obtaining particulate agglomerates from the recycling of multilayer containers and PET/Al/PE

Obtención de aglomerados particulados a partir del reciclaje de envases multicapa y PET/Al/PE

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Abstract

Sustainability makes the final use of waste reconsider, if it is possible to give it a new use and thus contribute to the planet. Therefore, in this work the physical and mechanical properties of particulate agglomerates from the recycling of multilayer containers (EM) and powdered milk (EL) are evaluated, the w/w ratio was varied. Agglomerates with a homogeneous matrix are obtained, hard to the touch, light, they can be cut, drilled, they are fireproof, they all have a prolonged elastic zone, when subjected to a load they do not show rupture, they support loads of 12 MPa. As the amount of EL increases, the density of the agglomerate increases and the apparent density decreases due to the compressibility of the materials, which contributes to reducing the degree of hygroscopicity. There is no relationship between the density and the properties of the agglomerates. The material that complies with the NMX-C-013-1978, ASTM D 1037-12 and NMX-C-036-ONNCCE-2013 standards, is the one with a p/p ratio of 70:30 (A6), it can be used in construction as a false wall; both outdoors and indoors. The other agglomerates could be used as catalytic supports for the degradation of dyes; because they show dimensional stability when in prolonged contact with water.

Sustainability, Particulate Agglomerates, Catalytic Supports

Comparative study of the effects caused by polymers, bubbles and surfactants in a turbulent flow

Estudio comparativo de los efectos causados por polímeros, burbujas y tensioactivos en un flujo turbulento

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Abstract

In this paper, particle image velocimetry (PIV) has been used for measurements of the velocity components in the streamwise and normal direction to the wall as well as obtained average velocity fields, shear stresses on the wall, speed friction, drag reduction and average strain fields , adding bubbles (injected by electrolysis), polymer (polyox WSR-301) and surfactant (cationic) and their combinations, polymers with bubbles, bubble with surfactants and polymers with surfactants at concentrations of 164 and 272 ppm in a turbulent channel (2cm x 10cm x 160cm) flow at a Reynolds number of 5200. These increased levels of drag reduction with combined drag reducing methods were often larger than the drag reductions obtained by the independent methods.

Bubbles, Polymers, Surfactant

Grounding System Design of the main Electrical Substation of stones and minerals breaker plant in Campeche State to comply with the NOM-001- SEDE-2012, IEEE-Std_80-2000, and the Código de Red

Diseño del Sistema de Puesta a Tierra de la Subestación Eléctrica principal de una Planta Quebradora de piedra y minerales en el Estado de Campeche para cumplir con la NOM-001-SEDE-2012, IEEE-Std-80-2000 y el Código de Red

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Abstract

This article proposes the design of a grounding mesh for the main electrical substation of 150 kVA in the Breaker Plant in order to obtain a good path to drain overcurrents due to faults and prevent electrical installations from being a danger to connected equipment and users who use electrical installations, allowing voltage control to reduce the risk of shock to people who may come into contact with live conductors; complying with current regulations NOM-001-SEDE-2012, IEEE-Std-80-2000 and the Código de Red and does not represent a danger of failure for the electrical network supplying CFE. There is a grounding system based on a delta of electrodes already many years after its installation and without maintenance and ineffective that has allowed the passage of overcurrents that have damaged motors. It is intended that the new design of the grounding system be reliable and safe and that, in addition, when an electrical installation verification unit (UVIE) arrives, it provides the Load Center with the Electrical Installation Verification Opinion, signing in agreement that it is complying with the applicable provisions of NOM-001-SEDE-2012, Electrical Installations (use), based on IEEE-Std-80-2000.

Grounding Mesh, Substation, Overcurrent, Verification Unit

Design and development of preventive, corrective and predictive maintenance manager software

Diseño y desarrollo de Software Gestor de Mantenimiento Preventivo, Correctivo y Predictivo

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Abstract

Due to the need to have adequate and affordable software for maintenance management, at the Universidad Tecnológica de Oriental, a preventive, corrective and predictive maintenance management software was designed and developed, the needs of organizations have been analyzed and considered. in terms of maintenance management, designing a conceptual architecture that integrates the maintenance modalities and ensures the modularity and scalability of the software. In addition, key functionalities were validated and early feedback from users was obtained, allowing continuous improvements in successive iterations. The software offers efficiency, productivity, economic gains, production improvements and loss reduction. Thus, the development of maintenance management software meets the needs of organizations, improves maintenance management, reduces costs and promotes a culture of continuous improvement.

Software. Management, Maintenance

Quality Analysis of Electrical Energy

Análisis de Calidad de Energía Eléctrica

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Abstract

This study exposes the measurements of electrical parameters carried out with a power quality analyzer in a transformer. The first measurement taking into account a capacitor bank that was already installed and then taking it out of operation. It presents the results graphed in "Power Log" and analyzed with respect to the standards CFE-L00045, IEEE 519-1992 and the Regulatory Manual of Technical Requirements for the Connection of Load Centers. By disconnecting the capacitor bank, with the data records obtained from the measurement, it is possible to consider adding a harmonic filter that is presented as the proposal for improving the quality of electrical power, since it achieves an increase from 0.73 to 0.98 in the power factor without compromising the permissible values of harmonics in the system. The filter is calculated and simulated in "DigSILENT Power Factory" to demonstrate the feasibility of the proposal.

Harmonics, Power Factor, Quality

Exploratory-descriptive study of the most widely used programming languages in the software industry in Mexico. An educational approach

Estudio exploratorio-descriptivo de los lenguajes de programación más utilizados en la industria del software en México. Un enfoque educativo

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Abstract

Objectives: The objective of this study is to analyze the most used programming languages in the software industry in Mexico and their relevance from an educational perspective, recognizing the importance of training young people in technological and cognitive skills to prepare them for a world driven by technology. Methodology: The study was based on a survey applied to a probabilistic sample of 401 professionals working in the application development industry. The results of the study show that Mexican companies use the programming languages C# (28.3%), JavaScript (21.7%), Java (20%), and Python (10%), which contrasts with surveys at the global level where JavaScript is the most prevalent but coinciding with the top 5 of the most used languages worldwide. Contribution: The results contribute to understand which are the most popular languages in the country and allow to identify the most relevant tools to integrate in the educational programs, adapting to the demands of the labor market and promoting the learning of skills that boost the personal and professional development of the students.

ICT, Software, Education

Preliminary Development of an upgrade of a chamber to measure the response of quartz crystal resonators

Desarrollo preliminar de la actualización de una cámara de medición de respuesta de sensores de gas de cristal de cuarzo

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Abstract

Quartz crystal microbalance (QCM) sensors have been frequently used as weighing devices, since they have proven to be sensitive due to shifts in their resonant frequency due to increments in the mass attached to their surface. These, are normally used as sensor arrays for systems known as "Electronic Noses", to detect and analyze gases, fluids, medical and environmental applications, and biological compounds, among others. For the implementation of such systems, it is necessary to characterize the response of the sensors at different types of compounds, primarily in temperature-controlled environments, which implies the use of control systems with a high cost. This work presents the preliminary design of a static system to measure the response of quartz crystal gas sensors, as a lower cost proposal, using an open-loop controlled temperature environment, through an electronic communication system with the computer and a virtual instrumentation software to monitoring and manipulating the temperature. To observe the effectiveness of the system, real QCM gas sensors with a coat of sensing film of ethyl cellulose were used, applying concentrations of ethanol. In addition, temperatures of 25°C, 35°C and 45°C were adjusted, obtaining typical results of the response of this type of sensors.

QCM, Electronic Nose, Microcontrollers

Design of a model for the correct reporting of unproductive times in production lines

Diseño de un modelo para el correcto reporteo de tiempos improductivos en líneas de producción

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Abstract

The research carried out was conducted in a metal-mechanical company, where there were reporting problems from the operational staff, as well as productivity indicators that did not allow for the reliable analysis of the root cause of unproductive times, preventing continuous improvement in the production area. Therefore, a model had to be defined to prevent certain events that affected productivity. The research conducted was quantitative in nature since the hypotheses proposed were tested through data collection, based on numerical measurement and statistical analysis to establish patterns of behavior and test theories. Data collection focused primarily on the most frequently used unproductive time codes according to the stipulations in the quality management system. Additionally, productivity calculations were made comparing deductive codes with non-deductive ones to have a reference. The collected data was analyzed using descriptive statistics to obtain actions and reach the conclusion of the desired model to implement in the production area.

Statistical Analysis, Quality, Reliability, Root Cause, Deductibility, Indicators, Production Lines, Productivity, Reporting, Quality Management System, Downtime

Comparative analysis of the conversion performance of a grid-connected photovoltaic system

Análisis comparativo del rendimiento de conversión de un sistema fotovoltaico conectado a la red

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Abstract

A performance study of a photovoltaic system installed in an eco-house on the campus of the University of Calgary in Canada is presented. The panels of the photovoltaic array installed on the roof have different azimuth and tilt angles, therefore, the solar energy incident on them is different. The effects of orientation on the efficiency of electrical energy production in individual photovoltaic modules are analyzed. The conversion efficiency is determined by means of measurements of the energy produced by the modules, supported by the RETScreen software, but also independently, it is calculated using the radiation data from the university weather station (WRS). These results are compared with those of a previous study, carried out with PVSyst, where the orientation angles of the system are simplified. Average results of energy produced, and efficiency are shown. It is observed that the efficiencies from the simulations are very similar, although of lower value. The results obtained with WRS are considered more realistic and of greater magnitude.

Solar Energy Production, Solar Radiation Measurements, Simulation Efficiencies Comparison

MATLAB GUI application for failure analysis of electrical power system faults

Aplicación con MATLAB GUI para el análisis de fallas en sistemas Eléctricos de Potencia

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Abstract

This paper presents a computational algorithm in MATLAB with the Guide tool to analyse symmetrical and asymmetrical faults in electrical power systems. Fault analysis is important in the design, planning and operation of power systems, and is used to specify interrupting devices and define operating strategies that do not violate short-circuit levels. It also highlights the importance of good fault detection and coordination of protections to consider the type of fault, where it occurs, the phases involved and the evolution of the fault type.

Symmetrical Faults, Asymmetrical Faults, Fault Analysis

Physical properties of Ag_3SbS_3 thin films for photovoltaic applications

Propiedades físicas de películas delgadas de Ag_3SbS_3 para aplicaciones fotovoltaicas

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Abstract

Ag_3SbS_3 thin films have been prepared by heating multilayers of glass/Sb_2S_3/Ag at different temperatures. Thin film of Sb_2S_3 were deposited on glass substrates using chemical bath deposition technique. Thermal evaporation of silver followed by annealing at 300 and 350°C were carried out to synthetize Ag_3SbS_3 thin films. XRD spectra showed the formation of Ag_3SbS_3 thin films at 300 and 350 °C with a micro-strain and grain size of 1.8 x 10^{-3} and 21 nm, respectively. Electrical conductivity in the range of 10^{-4} – 10^{-5} $(\Omega cm)^{-1}$ and a band gap of 1.3 eV were obtained.

Thin Films; Semiconductor; Absorber Material; Chemical Bath Deposition; Thermal Evaporation, Formation, Substrate, Conductivity

Energy and Exergy analysis at the La Joya Sugar Mill in Champotón, Campeche, Mexico

Análisis energético y exergético en el Ingenio Azucarero de la Joya en Champotón, Campeche, México

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Abstract

An energy and exergistic analysis was carried out on the bagacera boiler of the sugar mill "La Joya" located in Champotón, Campeche, making the following assumptions: the process develops in a permanent state, the mass that flows through the control volume does not suffer variations with respect to time, there are no work interactions of the system with the environment, changes in kinetic energy and potential energy are considered negligible, thermodynamic data were provided by the mill's operation and control center. It was found that by increasing the mass flow of feed water (m˙_water) and decreasing the temperature of the dead state (T0) there was the least destruction of exergy. Simulations were carried out to determine the energy and exegetical efficiencies of the mill as a whole with the help of the Software Engineering Equation Solver (EES). When modifying m˙_water, with T0 at 25 °C, and inlet water (Twater) 90 °C, an increase was observed both efficiencies; the energetic reached a maximum of 88, and the exergetic of 31; It was also observed that the maximum energy efficiency is obtained with the Twater 45°C. On the contrary, the exergetic efficiency at 15.3. It was concluded that it is more important to increase the mass flow of inlet water to increase global efficiencies in mill facilities than its temperature.

Energy and Exergetic Analysis, Energy and Exergetic Efficiencies, Bagasse-Based Cogeneration Plant, Sugarmill

Implementation of a development environment within a virtualization environment in data center

Implementación de un ambiente de desarrollo dentro de un entorno de virtualización en centro de datos

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Abstract

Deployment of a development environment for enterprise workloads in Kubernetes (RedHat Openshift, 2017) clusters using Red Hat Openshift, on top of the oVirt hypervisor virtual machines, ensuring that containers running in this form of deployment can directly access the storage served by the oVirt hypervisor. Carrying out the configuration of the Red Hat Openshift development environment, as well as the execution of the containers on the virtual machines in the oVirt software, to obtain as a result an easy maintenance of virtual machines in bare metals having multiple installation methods (IPI and UPI) and allowing the full use of the hardware. Provide an easy way to implement plugins for Openshift and achieve a web application on top of microservices to demonstrate the working of the containers provided by Openshift, Offering an integrated platform to manage containers in a variety of operating environments and as a consequence, helps to reduce significantly the time it takes to build, deploy, and scale them. As a next generation tool in code virtualization. This publication is the result of a thesis developed at the data center.

Virtualization, Containers, Servers

Fuzzy Modeling of DC Motors Using the Stimulus-Response Method

Modelado Difuso de Motores de CD Usando el Método de Estímulo-Respuesta

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Abstract

In this paper gives a brief review of the traditional modeling of *direct current* (DC) motors using the *stimulus response* method is made and a method is proposed to obtain an alternative model, using fuzzy logic theory. The two models capture the behavior of the DC motor in an acceptable manner. The connotation of acceptable is because some characteristics of the DC motor are disregarded, which do not have repercussions, in practical terms, as error factors in its study. The first model relates the analysis to the classical forms of control theory, through a first-order differential equation. The second model relates the analysis to the principles of generalization of necessary knowledge in reasoning and learning within the area of Artificial Intelligence where fuzzy sets and a series of if-then type rules are used. The fuzzy DC motor model is very convenient, within the control context, when using Artificial Intelligence paradigms but it not limited to this area.

Fuzzy Model, Control, DC motor

MTBF and MTTR implementation for the aluminum can manufacturing line

Implementación MTBF y MTTR para la línea de fabricación de lata de aluminio

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Abstract

This research focuses on a specialized technique that offers benefits in the company that contribute to the reduction of production costs and facilitates technological advancement, the research focuses on data capture in a standardized manner. In conducting the research opportunities were found in the production area currently presents stoppages for various failures and / or breakdowns, but did not have a metric of how long it took to resolve that failure and in what time it occurred between the occurrence of a failure and another, the metrics used in this research were; MTBF is the mean time when the equipment is working properly between failures becomes a very important performance indicator for the most critical assets and this metric does not provide for any scheduled maintenance; the next metric is MTTR mean time to repair represents the average time required to resolve failures and repair the asset since the total maintenance time of an equipment starts when the incident occurs and ends when the asset returns to its normal function.

Repair Efficiency, Reliability, Production

Design of an Electric Vehicle for People with Handicap

Diseño de un Vehículo Eléctrico para Personas con Discapacidad Motora

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Abstract

This article deals with the development of the detailed conceptual design of an electric vehicle, with the main objective of facilitating the transfer of people with mobility problems, and this avoid dependence on someone else to help them move safely; This is aimed at meeting the needs of a growing population with Handicap. An alternative solution is proposed for the transfer-based design methodology, which addresses each of the established requirements. The result of this work, after having evaluated the technical and financial analysis, is an alternative for the functional design of the electric vehicle, which will be used in the facilities of the Polytechnic University of Guanajuato (UPGTO) facilitating the mobility of people who require.

Conceptual, Mobility, Methodology

Gunshot Detection Neural Network Implemented on a Low-Cost Microcontroller

Red Neuronal para Detección de Disparos Implementada en un Microcontrolador de Bajo Costo

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Abstract

Nowadays, criminal activity is on the rise, and it usually involves some type of firearm. There are automated shot detection systems but in the end, they still require human intervention to decide if it is an actual gunshot. Distinguishing between two similar sounds, such as the detonation of a firearm or a firecracker, is not always possible with the naked ear. There are multiple publications on artificial intelligence to identify gunshots; however, they use convolutional neural networks, which, despite being highly effective, require a system with extensive computational resources. This document presents a fully connected neural network implemented on a microcontroller that can identify up to 90% of firearm detonations. This document will be of interest to students or researchers interested in the design of neural networks for sound recognition on embedded systems.

Artificial Intelligence, Mel frequency cepstral coefficients (MFCC), Micropython, Pytorch, embedded systems

Precision Analysis of the Integration Rules Used for Transient Simulation in Electric Networks

Análisis de la Precisión de las Reglas de Integración Utilizadas en la Simulación de Transitorios Eléctricos

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Abstract

The adequate selection of the integration rule and time step is crucial to ensure accurate results in the simulation of an electric network. For this reason, this work has two main objectives: to analyze the distortion of the waves due to the integration rule and integration time step, and to provide guidelines for new circuit simulators' users on how to properly choose an integration rule and a time step according to a desired precision. When discretizing a continuous system, the frequency response of the discrete system can be used to evaluate the precision of the mentioned rule, since a discrete system can be viewed as a filter. However, the frequency response provides the accuracy of the discrete system during the steady state; the transient-state accuracy can be analysed by evaluating the pole distortion due the discretization. This work focuses on the analysis of the steady-state accuracy and the transient-state accuracy of two discrete systems: an RL branch used as a fist order system and an RLC branch used as a second order system. For this analysis, two commonly used discretization rules are considered, backward Euler and trapezoidal rules.

Frequency Response, Integration Rule, Time Step, Backward Euler, Trapezoidal Rule

HabitFun videogame as a tool to support the generation of good hygiene habits in elementary school children

VideoJuego HabitFun como herramienta de apoyo a la generación de buenos hábitos de higiene en niños de primaria

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Abstract

This research addresses the development of a video game in Unity compiled for execution on devices with Android Operating System, said video game as a support tool for elementary school children to acquire good personal hygiene habits. Sometimes, children can be careless when it comes to their personal hygiene, and pediatricians recommend from a very young age the hygiene habits that they should follow daily, thus reducing the risk of contracting any disease. On the other hand, it is sought that the child is more organized, careful and self-demanding with himself. The Unity engine and the agile Scrum methodology were used for the development of the video game. Personal hygiene can be more interesting if it is taught through play, helping to demonstrate its importance, whether in the classroom or at home, children can learn about hygiene and find the right way to stay clean, neat and healthy. Therefore, the video game presents in text and audio, hygiene tips and each level is an area of the home that represents a hygiene challenge that the child must meet in order to move to the next level.

Hygiene, Videogame, Children, Trapezoidal Rule

Destructive Test in 3D Printing

Ensayo Destructivo en Impresión 3D

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Abstract

Today it is essential for any manufacturing company, to be able to have information about the effectiveness of the designs, as well as the quality of its raw materials, due to this, one of the key strategies is the prototyping of parts through additive manufacturing, the objective of this article is to provide information about the structural resistance of a 3D printed component through the effectiveness in the deposition of extruded filament and according to a deposition made, the implicit variables for both cases will be determined, which will be measured by tests. destructive, identifying values of deformation versus effort and will contribute to the determination of advantages and disadvantages of the impression, as well as the position with which the deposition is made.

Printing, Resistance, Test

Design and construction of a solar simulator for characterization of photovoltaic modules

Diseño y construcción de un simulador solar para caracterización de módulos fotovoltaicos

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Abstract

This work comprises the design, development, characterization and implementation of a solar simulator prototype for photovoltaic modules, implementing LED lamp technology as artificial lighting. First, we designed the prototype in AutoCAD, and then we built it using a box (100×100×35cm) made of sheet metal as a cabin. We used a super polished sheet as a reflective surface inside the cabin. Inside the cabin, we placed 8 LED lamps of 200 and 50 Watts in order to have a constant irradiance. An Arduino UNO board and a SPLITE2 pyranometer were used to measure lamp irradiance, along with a MATLAB data acquisition system. As a result, a functional prototype of a CB type solar simulator with an area of $1m^2$ was got with a constant irradiance of 200 W/m^2 at a height of 30cm and with a homogeneity of 98.6 W/m^2 difference between peaks.

Solar simulator, Irradiance, LED technology, Characterization, Prototype

Prototype Design Education for Cinematic learning mechanisms:Aplications to the mechanisms to Conrod Crank with runner

Diseño de prototipo Educativo para la Enseñanza de Cinemática de Mecanismos: Aplicación al Mecanismo de Biela Manivela con Corredera

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Abstract

The present investigation is related to the design, construction and manufacture of a didactic prototype of a rod-crank mechanism with a slider that allows to visualize and understand fundamental principles of its operation as well as its kinematics. Relating the traditional method of kinematics called Velocity Polygon with CAD design, additive manufacturing and automatic control. The objective of this project is to generate a controllable didactic prototype that allows us to visualize and understand fundamental concepts of the mechanism's operation as well as real-time information on the kinematics of its joints (nodes). Through the database generated by a instrumentation created in LabVIEW, movement simulation of the cad design and the velocity polygon graphic method, it was found that the speed of the sliding node coincides in the three methods, thus achieving a device that allows us to offer a more practical approach, in the development of technical skills , resolution of mechanism problems in undergraduate students in mechatronics, mechanics and Industrial

Kinematics, Mechanisms, Instrumentation

Design considerations for the dimensioning of parabolic trough solar thermal plants

Consideraciones de diseño para el dimensionamiento de centrales termosolares cilindroparabólicas

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Abstract

Solar heaters of the parabolic trough type, PTC, are a proved technology that has a wide diversity of industrial applications. The prediction of the thermal conditions in these devices plays a fundamental role in the development and design of thermal plants capable of meeting the heat load requirements. To this end highly complex thermal models have been derived which are difficult to solve and implement. This work puts forward a PTC transient thermal model which was validated using experimental data and compared against other theoretical models existing in the open literature. Along with this model, a novel sequential solution procedure is proposed with which a better follow up of variable outputs is obtained. A parametric analysis was carried out of for the main design variables using the Present Value of the Life Cycle Energy Savings (PVLCES) and Total Integrated Heat (TIH) using daily typical data in the winter and summer seasons for the city of Guanajuato. Due to its transient nature, the model can be implemented in research where optimisation tools are required such as Deep Learning, Machine Learning and Control, which are basic in the dimensioning of thermal solar plants.

Parabolic Trough Solar Collectors, Thermal Design, Thermal Performance, Solar Field Sizing, Solar Thermal Energy

Design of an application for teaching the arduino uno board in technological high schools, case study C.B.T.I.S 86.

Diseño de una aplicación para la enseñanza de la tarjeta arduino uno en bachilleratos tecnológicos, caso de estudio C.B.T.I.S 86.

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Abstract

This work presents the design of a mobile application that serves for teaching the management of Arduino UNO electronic cards, it proposes the implementation of the teaching methodology based on projects, which consists of guiding the user, through a series of activities, to the development of a project ranging from the analysis of a programming algorithm, through the development of the main program and ending in the connection of the circuit through a virtual animation model, in addition it will be possible to keep track of each user. The design is intuitive and the user will be able to navigate in a simple way, avoiding the saturation of information on the screen, the architecture of the application is simple to understand as it consists of a system that guides the user through each window of the application. The design of the App is validated by performing a test on the Figma platform, which helps to simulate its behavior and obtain the real reactions of the users. The design and teaching methodology is based on surveys to the students of the Centro de Bachillerato Tecnológico Industrial y de Servicios (C.B.T.i.s) No. 86 to obtain an objective analysis of their navigability and interaction with the App.

Teaching, Arduino, Mobile app

Design of a Chamber for the Characterization of Gas Sensors in Dynamic Flow

Diseño de una Cámara para la Caracterización de Sensores de Gas en Flujo Dinámico

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Abstract

In the present work, the description of a design is presented, as a proposal, for the evaluation or characterization of gas sensors. The proposed design allows the introduction of gas into a chamber at one end and its exhaust at the other, so that a flow of this is generated during the evaluation of the sensors. The gas to be evaluated in the first instance is ethanol. On the other hand, the use of peltiers was contemplated to heat the chamber at different temperatures, with a series of heatsinks and fans for its regulation, for which the use of a temperature sensor and a humidity sensor were incorporated. In total, eight gas sensors manufactured specifically with QCM crystals and an ethyl-cellulose film are contemplated. So, also, the corresponding electronic circuit is shown. Finally, the results of the simulation, in Abaqus, of the temperature distribution inside the chamber for a certain value in the peltiers and the variation of the gas flow along the duct inside the chamber are shown.

Gas, Dynamic flow, Sensors, Design, Peltiers

Effect of coloring covers on the electrical parameters of a photovoltaic module

Efecto de cubiertas colorantes sobre los parámetros eléctricos de un módulo fotovoltaico

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Abstract

The efficiency of a photovoltaic module can be affected by different factors, including irradiance and temperature, so the environmental conditions to which it is subjected have a great impact on photovoltaic generation. The present work deals with the analysis of the electrical parameters of a photovoltaic module when it is exposed to the elements and the cells are covered with a layer of plastic material, in this case cellophane, characterized by being thin and having some transparency. The analysis was carried out with pink, red, orange, yellow, lemon green or light green, green, blue and purple cellophane. In addition, a nano-ceramic gray coating was added to the tests to polarize gray colored crystals. This with the purpose of observing if a coating is capable of filtering light for the convenience of the module's operation, improving its performance. The results obtained show that the pink coating is the one that has the least impact on the parameters, while the nano-ceramic gray film has the greatest impact.

Photovoltaic Energy, Transmittance, Coating, Parameters

Meteorological parameters monitoring system using free hardware and software with data storage and display on Nextion screen

Sistema de monitoreo de parámetros meteorológicos utilizando hardware y software libre con almacenamiento de datos y visualización en pantalla Nextion

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Abstract

A portable station was designed and built to measure weather conditions using open-source hardware and software, aiming for versatility and low cost. Data acquisition and storage from climate variable measurements are carried out, allowing for interaction through a graphical interface built on an open-source software display. Additionally, there is access and control of the data using an Internet of Things platform that, like the HMI itself, enables real-time monitoring of variable measurements and s torage of the monitored data. The designed station, being portable and having internet access, can serve as a support tool for monitoring weather conditions in a photovoltaic systems station, for example. This is highly useful because such conditions interfere with system performance, impacting the energy conversion process. This data collection and storage, for instance, allows for generating forecasts to determine the suitable energy generation type based on the installation location's conditions and foreseeing the potential impact of weather conditions.

Environmental Conditions; Internet Of The Things; Photovoltaic Energy

Manufacturing Cell Reengineering for teaching Mechatronics Engineering

Reingeniería de celda de manufactura para la enseñanza de Ingeniería Mecatrónica

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Abstract

Next, the reengineering of a manufacturing cell is presented, as a didactic intervention in the teaching of Mechatronic Engineering, this redesign is proposed from a previously proposed cell and in which a FANUC R-2000iA/210F industrial robot is incorporated. And with this modification to the cell, students are expected to develop linkage projects with the industrial sector of the State region. The results obtained by the teaching work team are the reengineering, simulation and proposal of educational intervention practices in which students reinforce the expected skills during their professional training and thus achieving the physical integration of the teams, bringing future engineers to the real contexts of professional development. The impact and relevance of reengineering is based on the fact that the graduation profile of mechatronics engineering establishes the synergy of mechanical, electronic, control and automation elements, to technologically improve companies in the region.

Manufacturing Cell, Mechatronics, Reengineering

Consideration of fouling by scaling in the sizing of flat plate solar collector networks

Consideración de ensuciamiento por scaling en el dimensionamiento de redes de colectores solares de placa plana

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Abstract

In this work, the effects of fouling on the performance of flat plate solar collector networks that operate with water as the thermal fluid are studied, and design considerations are put forward to be used in the sizing of these systems from the thermal and hydraulic points of view. The quantification of the effects produced by Scaling is carried out through a mathematical model that predicts the deposition on the walls of the tubes. The model considers that $CaCO_3$ is the only compound present in the fouling layer. Results indicate that for a volumetric flow rate of 3.78 l/min and assuming a CaCO3 concentration of 250 ppm, in a period of six months, the maximum outlet temperature that can be obtained in a day falls 1.5 °C and the pressure drop increases four times. It is shown that it is advisable to design a network of solar collectors considering Scaling. The case study indicates that to supply a total flow rate of 48 l/min at a temperature of 70 °C, the design considering Scaling requires 220 collectors and a volumetric flow rate of 4.8 l/min per line with a total annualized operating cost of $343,300 Mx

Design, Flat Plate, Solar Collectors, Networks, Thermal-Hydraulic Performance, Scaling, Pressure Drop, Mathematical Model, Fouling Prediction

Eleven level multi-level inverter simulation platform

Software para simulación de inversores multinivel de 11 niveles

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Abstract

Finding the optimal firing angles that minimize the amount of harmonics in a multilevel inverter is an optimization problem. However, since these values are available, testing them in an inverter is not something that can always be done since there is not always a physical inverse to carry out the tests. This paper proposes the development of a Simulink script that allows, from the input angles, to determine the typical ladder output waveform, as well as the harmonic content of an 11-level triphasic multilevel inverter. This will be done by designing the inverter by implementing Simulink IGBTS modules in a configuration of 5 H-bridges in series per phase. Furthermore, Fourier analysis of these waves is carried out in order to characterize the harmonic content of the generated signals.

Multilevel Inverter, Simulation, Harmonics

Lattice design made with recycled polymeric concrete for the facade of a single-family house

Diseño de celosía hecha con concreto polimérico reciclado para fachada de vivienda unifamiliar

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Abstract

There has been an increase in the generation of urban solid waste and special handling waste in Mexico in recent years; today there are not enough final disposal sites to dispose of the waste that is generated. Urgent measures that reduce the number of waste that enters these sites through proper reuse and recycling. For this reason, this article shows how–through an appropriate recovery–materials and elements can be re-purposed for the construction of single-family homes. For this, a lattice for an exterior facade was designed from a recycled polymer concrete in order to improve the range of thermal comfort and mitigate energy consumption inside a single-family home in the municipality of Cuautla Morelos. An experimental and descriptive methodology was carried out where the elaboration of molds was carried out to later obtain the lattice and finally mechanical, thermal tests and digital simulations of the wind tunnel. Favorable results were obtained from the geometry applied to the lattice and the performance of the material in a hot climate.

Lattice, Recycled Polymeric Concrete, Facade

Comparison and Interpretation of Solarimetric Station Data (Diffuse Solar Radiation, UVB Radiation, Temperature, and Relative Humidity) from January 2017 to November 2018 in Zacatecas

Comparación e interpretación de los datos de la estación solarimétrica (radiación solar difusa, radiación UVB, temperatura y humedad relativa) del periodo enero 2017 a noviembre 2018 en Zacatecas

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Abstract

In this research work, the data from the solarimetric station in Zacatecas during the period from January 2017 to November 2018 are compared and interpreted. The main objective is to analyze the climate and solar radiation characteristics in the region and identify possible correlations between variables.The methodology involved data collection using the solarimetric station and data processing in Excel. Hourly, daily, and monthly averages were calculated for diffuse solar radiation, UVB radiation, temperature, and relative humidity. In addition, graphs were generated using Excel,and two R codes were developed: one to obtain correlations among the analyzed variables and another to visualize the UVB index. This study provides a detailed analysis of climate data and solar radiation patterns in Zacatecas. The obtained results are relevant for the design and implementation of solar energy systems in the region and in areas with similar climatic conditions. In summary, this study compares and interprets the data from the solarimetric station in Zacatecas, aiming tounderstand the climate and solar radiation characteristics. The conducted analyses contribute to the development ofsolar energy strategies in Zacatecas and similar regions. solar radiation, climate analysis, Zacatecas.

Solar Radiation, Climate, Correlations

Web system for the control of the forest fire process in eastern Michoacán

Sistema web para el control de proceso de incendios forestales en el oriente de Michoacán

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Abstract

During the last decade, web mapping systems or geographic information systems have had a great advance in development, being widely used today, this project shows the main elements for achieving the objective of generating a geographic information system for the organization and Fire registry management, which facilitates all of its management processes for the fire command centers in the Eastern region of Michoacán. Web mapping systems have become easier to use by having data management compatibility with normal database managers and/or spatial data and expanding its use in various platforms such as mobile applications. In the development, the implementation of open source maps prevails, obtaining geospatial data, registration and user permissions, drawing and modification of polygons, consultation for documentation of preliminary reports and editing of final reports, with future growth, since with this system, it is possible to have better control and quick management of action on the areas affected by fires, as well as saving time and better management of resources by the different companies associated with this project.

Geospatial, Generator, Facilitates Management

Prototype of a Sustainable Electricity Generation System in an Indigenous Mazahua Community

Prototipo de un sistema generador de energía eléctrica sustentable en una comunidad origen mazahua

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Abstract

This study proposes the design and development of a prototype electrohydraulic microgenerator to provide a sustainable energy source for the community of Manzanillos, Michoacán. Specific objectives include analyzing the state of the art of similar systems in Mexico and the community, as well as identifying requirements in accordance with the UN's 2030 Agenda. The methodology encompasses various stages: analyzing requirements and hydraulic resources, preliminary design considering technical and environmental aspects, compliance with regulations and standards, community involvement for feedback and adjustments, prototyping, and testing to evaluate performance and efficiency. An agile modeling approach is adopted, allowing for iterations and improvements based on feedback. The study falls within the scope of an exploratory applied research and aims to align with the Sustainable Development Goals of the 2030 Agenda, contributing to energy efficiency, renewable energy, and equitable access to energy. In collaboration with the San Juan Zitácuaro council and the Zitácuaro Technological Institute, the project seeks to create a prototype that addresses the community's energy needs in a sustainable and viable manner in the long term, while promoting community participation and local development

Electrohydraulic microgenerator, Energy sustainability, Energy needs

Dry cleaning analysis for photovoltaic modules

Análisis de limpieza en seco para módulos fotovoltaicos

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Abstract

For a photovoltaic module to work in optimal conditions, it is necessary a correct cleaning, as electrical power losses due to dirt on the module´s surface are estimated to be as high as 30-40% in dry and sandy climates. In this work, the design and construction of a dry cleaning system was made using a cylindrical brush with nylon bristle of 100 cm in length and 12 cm in width, the bristle have 0.3 mm diameter. The angular speed of the system is 10.58 π radians per second. The objective is to analyze the impact of the cleaning system on the electrical properties of a photovoltaic module. For the experimental analysis, the brush was adapted to a conventional electric motor, and the cleanings was on the frontal cover of the photovoltaic modules. The module was exposed to the environmental conditions of a desert climate, to perform periodic cleanings and record temperature and irradiance variables. The result of the research shows the analysis of the electrical properties of the module to determine the influence of the type of cleaning and its impact on the conversion efficiency.

Photovoltaic Energy, Dry Cleaning, Electrical Parameters

Obtaining the parameters of an RC model to know the insulation condition of a distribution transformer

Obtención de los parámetros de un modelo RC para conocer la condición del aislamiento de un transformador de distribución

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Abstract

Because it is a topic of great interest in the study of the insulation system of oil immersed Transformers, methods have been sought to determine the moisture content and aging of the pressboard, paper and dielectric oil from Transformers, measuring the response of the dielectric materials, which are characterized by known polarization phenomena. One of these techniques is dielectric spectroscopy in the time domain, measuring the polarization-depolarization currents, with this the parameters of an equivalent RC circuit (Debye model) are determined. Using the Debye model (T. K. Saha, P. Purkait y F. Muller, 2005) and obtaining the polarization current through the insulation resistance test, the parameters to establish the condition of the transformer oil-paper insulation system will be determined, using exponential curve fitting of the data obtained from the insulation resistance test with the high vs. Low connection plus tank, the parameters of the time constant τ, the resistance R and the capacitance C of the equivalent circuit are obtained and with this information, the condition of the transformer insulation system is evaluated and decisions are made regarding maintenance actions.

Spectroscopy, Polarization, Depolarization, Resistance, Domain, Dielectric, Parameters

Total Harmonic Distortion Optimization in a Seven Level Multilevel Inverter by the Random Search Heuristic Algorithm

Optimización de la Distorsión Armónica Total en un Inversor Multinivel de Siete Niveles Empleando un Algoritmo Heurístico de Búsqueda Aleatoria

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Abstract

In this article, the random search heuristic optimization algorithm is proposed to guarantee that the voltage synthesized by a seven-level multilevel inverter contains the lowest possible total harmonic distortion. The algorithm in this work is presented as an alternative, simple, and easy-to-implement method for solving a set of transcendental mathematical equations of multilevel inverters. The obtained results demonstrate the algorithm's capability to solve the mathematical formulation that minimizes the total harmonic distortion. It is important to highlight that the algorithm was implemented in Matlab®, and the obtained results were validated in a simulation conducted in Simulink®. Equally and not less important, the results were physically implemented in a laboratory prototype of three integrated circuits with H-bridges containing insulated gate bipolar transistors.

Algorithm, Optimization, Multilevel-Inverter, Total Harmonic Distortion

Numerical and experimental analysis of the bodywork of a Formula SAE 2023 type vehicle

Análisis numérico y experimental de la carrocería de un vehículo tipo Formula SAE 2023

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Abstract

In the present study, the aerodynamic characteristics of a bodywork for the Formula SAE 2023 competition were analyzed. Based on the requirements of the international competition regulations and the ISO 10521 standard, a numerical evaluation procedure was defined based on a CFD (Computational Fluid Dynamics) analysis. A bodywork model is presented and essential aerodynamic parameters were taken into account for the definition of the flow analysis models, where the k-omega model was used in the turbulent flow analysis. Additionally, an experimental analysis assembly was prepared through a wind tunnel at the University facilities, using a model of the bodywork by 3D printing at a scale of 1:43 with thermoplastic polyurethane material. Results of pressures, flow lines around the different elements of the bodywork were found, as well as drag coefficient values from 0.42 to 0.55, the latter were compared with others obtained by other Formula SAE teams, they found similarities in the results obtained. Additionally, with the wind tunnel, the comparison of the current lines was obtained, which showed similarities in the experiment and is expected to be improved in future studies.

Formula SAE, CFD, Aerodynamics , ANSYS

Study of the termal and mechanical properties of the magnetite/polypropylene composite

Estudio de las propiedades térmicas y mecánicas del composito magnetita/polipropileno

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Abstract

Currently, innovation in materials is a highly explored area, due to the requirements to satisfy the industrial needs for intelligent materials that arise mainly with an improvement in physical and mechanical properties. Within the classification of intelligent materials are composites and in this work it is proposed to combine a very versatile and low-cost polymer such as polypropylene and the important mineral called magnetite. By manual injection, three compounds are obtained and evaluated the effect on the thermal and mechanical properties of the polypropylene (PP) composite reinforced with different concentrations of mineral magnetite (5%, 10% and 20%) is evaluated. The three composites obtained (MP5, MP10 and MP20), were characterized by thermogravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC) and Dynamic Mechanical Analysis (DMA). A favorable effect with MP20 composite is achieved on the thermal properties of polypropylene, managing to extend the thermal stability up to 420°C and improve the storage modulus up to almost 2 GPa.

Composite, Magnetite, Reinforcing Agent

High Voltage Direct Current Transmission (HVDC)

Transmisión de Alta Tensión en Corriente Directa (HVDC)

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Abstract

High Voltage Direct Current (HVDC) transmission links are currently in operation throughout the world. Until a few years ago, what has limited the use of this way of transmitting power has generally been its cost, but with the advances in power electronics in reducing costs in thyristors: higher rated voltage and current, and simplification of the tripping and protection circuits, with more compact converter stations, with the use of GTO thyristors and with the cooling of the thyristors by liquid freon instead of water, a new panorama is beginning to be had to use this technique. The purpose of this article is to familiarize the reader with the fundamental concepts of High Voltage transmission in Direct Current, since this is an alternative for the transport of energy, it is analyzed and evaluated in many of the transmission expansion projects in the world.

HVDC, Direct Current, Direct Current Transport

Ergonomic evaluation of work sites in an aerospace maquiladora company

Evaluación ergonómica de sitios de trabajo en una empresa maquiladora de giro aeroespacial

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Abstract

Ergonomics is a discipline that contributes to the quality of life of people, through the study and understanding of interactions between humans, the environment that surrounds them and the profession. The practice of ergonomics in man-machine-environment systems is essential to eliminate risk factors associated with the presentation of musculoskeletal disorders (MSD), the reduction of occupational diseases and comply with current regulations, this being the objective of the present study. During the investigation, an exhaustive analysis of the different jobs was carried out and the ergonomic risk factors present in each of them were identified (inadequate postures, repetitive movements, excessive forces and unfavorable environmental conditions) and their level at through a specific evaluation method. Finally, specific intervention measures were proposed and applied to eliminate or reduce the level of risk. These measures included the redesign of work stations, the modification of equipment, tools, the implementation of active breaks and the training of staff in ergonomic practices. In conclusion, the results support the importance of incorporating ergonomics as an integral practice in work environments, in order to protect the health and well-being of workers, as well as improve the efficiency and productivity of organizations.

Ergonomic, Factors And Risk

Virtual instrumentation on CAN network for process monitoring

Red CAN de instrumentación virtual para monitoreo de procesos

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Abstract

Virtual instrumentation has experienced significant advancements in recent decades, providing efficient and reliable solutions for the connection and communication of electronic devices in various applications. This article explores the most relevant developments in the field, focusing on the integration of Controller Area Network (CAN) networks and microcontrollers in distributed sensor projects. The article also presents a case study in which a CAN network is implemented along with the ESP-Wroom32 microcontroller in a distributed sensor project for alcoholic beverage production. The sensors used in each stage of the process, such as ultrasonic, load, water level, and motion sensors, are described, highlighting the importance of redundancy in monitoring critical parameters to ensure safety and proper process operation.

CAN, Virtual Instrumentation, LabView, Esp- Wroom32

Prediction of thermal infrared radiation using an artificial neural network applied to the projection and design of processes in renewable energies

Predicción de radiación infrarroja térmica, utilizando una red neuronal artificial, aplicada a proyección y diseño de procesos en energías renovables

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Abstract

This work aims to predict thermal infrared radiation in geographical areas where the necessary measurement devices are not available, through the design of an artificial neural network (RNA). The RNA uses the following variables as input data: specific humidity, relative humidity, ambient temperature, wind speed, and atmospheric pressure, it is important to mention that the sample of space of time is from, (1990 - 2019), they are data from Mexico City, as it is a metropolis with an extensive air quality database, which are obtained from two online tools developed by the National Aeronautics and Space Administration (NASA). In addition, thermal infrared radiation data from NASA are included, to validate the prediction made by the algorithm. Matlab was used to implement RNA, a multiplatform software that offers an integrated development environment with its own programming language. It is recognized for its computational ability and is considered a suitable tool for this purpose.

Irradiance thermal infrared, Artificial Neural Network, Prediction

Smart solar hydroponic system simulation

Simulación de sistema hidroponico solar e inteligente

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Abstract

This project "Simulation of Intelligent Solar Hydroponic System" aims to provide a possible alternative for the generation of food resources that can be consumed in the University community and in the town of Altamira Tamaulipas. The project schedule was divided into three stages, Stage 1: involved research and training, Stage 2: followed by simulations and research formats. stage 3: consisted of refining the details and planning the presentation virtually. In this way, the evaluation and feedback of the project was carried out, it involved the review of the objectives and goals of the project, the simulation test to ensure adequate functionality, the analysis of the project methodology, the review of the contributions of the project team. and the analysis of the costs and benefits of the project. Constructive feedback was provided to the project team, including specific areas for improvement on the job. The development of this project "Smart Solar Hydroponic System Simulation" contributes to society as a promising alternative to generate food resources, using emerging technologies and mechatronic engineering knowledge. The project was developed through effective project planning, management risk management and communication with stakeholders, and the evaluation and feedback process helped ensure the success of the project.

Photovoltaic System, Renewable Energy, Hydroponic System, Rainwater Capture System, Simulations, Refining, Evaluation, Objectives, Analysis, Contributions, Alternative, Virtually, Functionality, Constructive, Development, Promising, Generate, Technologies, Effective

Comparative Study for a Conventional PID Controller Implemented with Three Different Component Sets

Estudio Comparativo para un Controlador PID Convencional Implementado Con Tres Conjuntos de Componentes Diferentes

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Abstract

In this work the ideal PID control structure was considered. This automatic controller was implemented by means of operational amplifiers using three different sets of values in its external components, but obtaining the same gains in each case. With each of these three sets of different components, three tests were carried out, adjusting the reference point to control an electric oven at a desired temperature of 140°C, 150°C and 160°C, the above was done experimentally to check if there is any change when varying the values of the components or if this does not affect the operation and performance of the PID controller. The plant in which the experiments were carried out is an electric muffle, which heats its interior using electrical resistances with a working voltage of 127 V and a power consumption of 12 A. It was found that the performance of the PID controller is not the same by using different sets of values in the components external to the operational amplifiers that make up the electronic PID controller, although these have the same gains K_p, K_i and K_d, one of the sets of components performs better than the other two, the above in two test cases considered.

Comparative Study, Control Systems, Performance Analysis, Energy Efficiency, Experimental Evaluation

Measurement of solar energy parameters project in the facilities of the Technological University of Altamira

Proyecto de medición de parámetros de energía solar en las instalaciones de la Universidad Tecnológica de Altamira

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Abstract

The objective of this research is to develop and design an experimental prototype, that allows the capture and storage of irradiance data in real time. Access to this data is through public Mathworks web servers allowing entry from any device. The prototype includes an ESP32 development board, a photovoltaic cell, two temperature sensors and a current sensor, the main function is to measure irradiance, this being the amount of radiant energy received per specific area. This is achieved through the use of a photovoltaic cell, which transforms solar energy into electrical current, the current sensor provides an indirect measure of irradiance by recording the current produced by the photovoltaic cell. Temperature sensors are used to compensate for measurement differences caused by temperature changes in the environment. To get accurate readings, these sensors are strategically placed near the photovoltaic cell. The prototype is connected to the internet, which allows access to irradiance data, showing a practical solution for collecting and monitoring in real time, being useful in applications design and combination of technologies, such as a board of solar energy systems and in precision agriculture.

Irradiance, irradiation, temperature sensor, current sensor, photovoltaic module, solarimeter, ESP32 and ThingSpeak

Electronic prototype for data collection in situ at the facilities of the Technological University of Altamira

Prototipo electrónico para la recopilación de datos in situ en las instalaciones de la Universidad Tecnológica de Altamira

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Abstract

Evaluation of renewable energy sources requires detailed and accurate information, as well as the analysis of natural parameters to discover and leverage new energy sources. This information is obtained through electronic devices. These parameters are crucial for developing policies and strategies, and for using and leveraging sustainable or clean energies. With the aim of collecting real-time weather data, a prototype weather station has been created. This prototype uses the ESP32 Nodemcu card and features Wi-Fi and Bluetooth functions to transmit data to MathWorks' "ThingSpeak" platform. In addition, various sensors have been incorporated to measure different climatic parameters, such as ambient temperature (DS18B20 sensor), humidity percentage (DHT22 sensor), barometric pressure (BMP180) and wind speed (anemometer based on a Hall effect sensor). The data collected can be analyzed with the main goa of gaining an accurate understanding of the climate in a specific region. Therefore, this prototype weather station provides a useful solution for obtaining real-time data on weather conditions.

Weather station, ThingSpeak and Esp32

Reconstruction of the rotor output signal of a direct current motor using numerical approximation

Reconstrucción de la señal de salida del rotor de un motor de corriente directa utilizando aproximación numérica

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Abstract

In many areas of technology and research, who study behavior process have increasingly relied on mathematical models. Most of the time the mathematical model is used, representing the important aspect of a dynamic system. Sometimes the mathematical model does not have an appropriate structure and it can be loss the relevant information, nevertheless output signal characterization based on an input signal using laboratory measurements in real time can keep the relevant information, which it is not contemplated in the mathematical model because they involve losses or disturbances. In this work the speed of the rotor magnetic field with respect to the stator magnetic field for a dc motor in real time is showing, the data will be processed and a polynomial approximation is depicting and can effectively trigger with the mathematical model. Finally, a stability analysis is present, it shows the regions or system stability points (pre-fault, fault and post-fault), and the direction from which stability is reached through time

Numerical integration, Stability analysis, Phase plane portrait

My digital business: Domy case

Mi negocio digital: Caso bordados domy

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Abstract

In Mexico, the backbone of the economy is found in Micro, Small and Medium Enterprises (MSME). According to data from Forbes, there are about 4.2 million MSME, which contribute around 52% of the Gross Domestic Product (GDP) and generate 70% of formal employment (Guzmán, 2022). The objective of this project is to create a guide for entrepreneurs using the SOSTAC methodology, and information and communication technologies to connect and accompany Micro-enterprises in their digitization process. In the development of the project, the SOSTAC methodology (Chaffley, 2022) was considered, consisting of six phases that are: situation analysis, objectives, strategy, tactics, actions and control. As a result, a collaboration agreement was obtained with a Microenterprise called "Bordados Domy". In this work, a guide for entrepreneurs was created through strategies for the use of information and communication technologies to connect with their clients, promote their products, even with the fears that this implies or the digital divide in the use of ICTs.Objetivos

Entrepreneurs, Technology, Mipymes

Industrial robots programming based on augmented reality posture estimators

Programación de robots industriales a partir de estimadores de postura con realidad aumentada

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Abstract

Given the high level of training required to program robots, their utilization has historically been confined to high production volumes. In response to this challenge, several efforts have been made to simplify the programming process. One particularly notable approach involves the use of *Augmented Reality* (*AR*) to present both information and interactive virtual objects, thereby facilitating more intuitive programming. Building on this, the present paper introduces a method for calibrating posture estimators using *AR* on mobile devices. It also presents an interface that allows users to define, view, and execute welding routines on a robot. This method enhances the accuracy of the posture estimators and reduces the error when compared against a reference. Consequently, it achieves a level of accuracy closer to the one required in practical applications. The results of this work can be used to develop *AR* interfaces that enable *in-situ* robot programming.

Augmented Reality, Robotics, Programming, Interfaces, Mobile, Calibrate, Accuracy, Production

Development of processes for the distribution system of the tomato cold supply chain

Desarrollo de procesos para el sistema de distribución de la cadena de suministro de tomate en frío

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Abstract

This research project aims to propose a technological solution to the problems faced by the tomato cold chain; Based on different investigations, it was found that the problems that should be paid more attention to are within the processes of storage, transport and customer service. The research question of the project was: What are the best logistics practices in the storage, transport and customer service of the tomato cold chain in the Southern region of Sonora? the objective: to develop the best logistics practices in storage, transport and customer service of the tomato cold chain in the southern region of Sonora in order to improve the operational efficiency of organizations. To meet the objective, a methodological route was generated where different regulations are identified to establish a dashboard of key performance indicators. As main results, the objectives and the most important key processes to be carried out in the cold distribution process were found according to different authors, the procedures for each process (storage, transport and customer service) were established, in the same way a control board was generated with key performance indicators according to each key process.

Cold supply chain, Processes, Efficiency

Comparative study of the years 2017, 2018 and 2019 of pm10 particle sampling of the frontera, comalcalco and paraíso municipalities

Estudio comparativo de los años 2017, 2018 y 2019 de muestreos de particulas pm10 de los municipios frontera, comalcalco y paraíso

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Abstract

Air pollution is currently one of the greatest health risks. Among the effects that have been associated with atmospheric pollution are increases in respiratory and cardiovascular diseases, which are generated by fixed and mobile sources. One of the main pollutants in the atmosphere is particulate matter, which is a complex mixture of substances in a liquid or solid state that remains in suspension for a certain period of time. Due to this, the following work was carried out to evaluate the periods of highest concentrations of PM10 particles of the years 2017, 2018, and 2019 and compare them with meteorological data; temperature, and humidity of the municipalities of Centla, Comalcalco, and Paraíso. To achieve the development of this research, the data from each of the meteorological settled stations were downloaded, in order to give each one a previous treatment of the data in Excel by averaging the sampled days. For the treatment of the data, an Excel database was created to later manage them in the Minitad software to obtain the scatter plots where the concentrations of each of the municipalities were compared. In conclusion, we can say that the only municipality that exceeded the Metropolitan Air Quality Index (IMECA) was the municipality of Comalcalco where 11 dates were presented that exceeded the LMP, with values ranging from 76 µg /m3 to 110 µg /m3 . In graphs 4, 5, and 6, we can say that despite having ascending regression lines and positive correlations ranging from r= 0.1 to 0.4, we could not interpret that there is a correlation between both variables. As graphs 7, 8, and 9 show, we could also observe ascending and descending regression lines with mostly negative correlations ranging from r= -0.1 to -0.4, so we could say that their correlation is inverse, that the higher the increase in relative humidity, the lower the concentration of particulate matter.

Air quality, particulate matter, Maximum Permissible Limit (LMP), Atmospheric pollution

Pedestrian detection system for automobiles using computer vision and artificial intelligence using Raspberry Pi 4 and webcam

Sistema de detección de peatones para automóvil mediante visión por computadora e inteligencia artificial empleando Raspberry Pi 4 y cámara web

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Abstract

Traffic accidents involving pedestrians have increased in recent years, causing a large number of deaths worldwide, some of the main causes being: distracted drivers or pedestrians, car blind spots, adverse environmental conditions among others. With the advent of autonomous driving systems at different levels, the development of pedestrian detection systems has become a priority task. In this work, an economical and easy-to-install pedestrian detection system for automobiles is proposed, which uses the Raspberry Pi 4 card, webcam and an LCD screen as hardware. In the software part, a computer vision system with artificial intelligence is implemented using the TensorFlow Lite library for the classification of people in real time, Python and Open CV as programming language and computer vision library. The aim is for the system to visually alert the driver about the presence of pedestrians on both sides of the road or that get in the way of driving in order to avoid possible accidents.

Pedestrian detection, TensorFlow, Raspberry Pi

Processing and recognition of EMG signals through CNN networks for the control of electric vehicles

Procesamiento y reconocimientos de señales EMG mediante redes CNN para el control de vehículos eléctricos

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Abstract

The increase in autonomous driving technologies, as well as biometrics using biosignals from vehicle drivers, provide information that can be used for the development of personalized biosecurity and driving systems for each user. Currently, studies are being carried out on the extraction and classification of driver characteristics with great precision, to generate intelligent systems that are auxiliary and that help to safeguard the integrity of people while driving vehicles. This work presents the recognition of 5 hand gestures to control the driving actions of an electric vehicle using the EMG signals from the MYO™ bracelet, these signals have also been used to detect users and thus allow the use only of the people registered in the application. To perform gesture recognition, a convolutional neural network was trained and implemented for the classification of actions. Finally, a cross-validation was carried out to validate the reliability of the proposed system, obtaining 99.2% accuracy during the classification.

Convolutional Neural Networks, Biosecurity, Autonomous

Duplex solar cooker with selective evacuated tube and compound parabolic concentrator

Cocina solar duplex de tubo evacuado selectivo y concentrador parábolico compuesto

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Abstract

In the present work, an indirect solar cooking proposal is shown. The proposal combines three technologies: evacuated tubes, selective absorber, and compound parabolic concentrator (CPC). The absorber used is an evacuated glass tube, with a highly selectivity inner surface. The temperature reached by the solar cooker is approximately 160°C, enough to cover the cooking needs of all types of food; Irradiance, wind speed, ambient temperature was measured, food cooking tests were carried out, using an evacuated tube and a parabolic solar concentrator; as well as evacuated tube without parabolic solar concentrator. A compound parabolic concentrator was designed with an acceptance angle of 15 degrees, the base of the solar cooker was made with acrylic, the concentrator was made with simple reflection mirrors, the clips were printed on a 3D printer, the trays were made with food grade stainless steel, food cooking tests were carried out, recording the weather variables every 15 minutes. The development of this evacuated tube duplex solar cooker project is not only important because it involves the achievement of an academic purpose, but also involves a social purpose. It is intended to provide an efficient and economical solution that is attractive to multilateral organizations capable of supporting its manufacture, industrialization and distribution to achieve the massification of the product with a real and lasting impact.

Solar Energy, Cooking Food, Solar Cookers

Removal of disperse blue textile dye 56 from water using a metal-organic framework of erbium

Eliminación del colorante textil azul disperso 56 del agua mediante una estructura metalorgánica de erbio

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Abstract

The disperse blue dye 56 (AD56) is of the anthraquinone type and is considered an important source of water pollution due to the discharges generated by the textile industry. An efficient way to eliminate it is using porous materials, for example, metal-organic networks (MOF). In this work, the adsorption of AD56 with an Er MOF was studied and synthesized by microwave-assisted method and using 1,4-benzene dicarboxylic acid (BDC) as an organic ligand. Physicochemical analysis of the Er_2BDC_3 was carried out by XRD, FTIR, SEM, and UV-Vis spectroscopy to determine the dye concentration. Due to its high porosity, the results show that the MOF can be reused for up to seven adsorption cycles for the AD56 dye. The adsorption process changed the structure of the MOF, obtaining a more pure and stable material in an aqueous medium. The maximum AD56 adsorption capacity obtained was 33.97 mg/g after seven cycles. This material can be used in consecutive adsorption processes and for other anthraquinone dyes.

Metal-Organic Frameworks, Dyes, Adsorption

Geothermal Energy Harnessing Using a Horizontal Composite Geothermal Heat Exchanger and a Vertical Geothermal Heat Exchanger

Aprovechamiento de la Energía Geotérmica Utilizando un Intercambiador de Calor Geotérmico Compuesto Horizontal y un Intercambiador de Calor Geotérmico Vertical

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Abstract

Heat exchangers in combination with geothermal heat pumps (GHP) have been growing in HVAC and sanitary applications, as well as associated research. Therefore, in this work, a Composite Geothermal Heat Exchanger (CGHE) and a Horizontal Geothermal Heat Exchanger (HGHE) were designed and fabricated Through experimental tests and simulation in ANSYS-CFX, the behavior of the temperature of the refrigerant fluid inside the exchangers was compared. The geometry of the CGHE was based on a Vertical Geothermal Heat Exchanger (VGHE) with the installation depth of an HGHE. Water at different temperatures was used as the cooling fluid with a mass flow equal to 0.26 L/s for the experimental tests and simulations in ANSYS-FLUENT for both the CGHE and HGHE. The CGHE and HGHE were installed within a volume of 3.25 m^3 of ground. The experiments and simulations in ANSYS-CFX showed that the refrigerant fluid inside the CGHE exhibit a greater use of geothermal energy because it increases and reduces the temperature of the refrigerant more quickly compared to the HGHE.

Energy, Geothermal, Exchanger

Implementation of Hydraulic and Sanitary Engineering under the concept Building Information Modeling, in a nine floor intelligent building, Zapopan, Jalisco

Implementación de Ingeniería Hidráulica y Sanitaria bajo el concepto de Modelado de Información para la Construcción BIM, en un edificio inteligente de nueve niveles, Zapopan, Jalisco

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Abstract

Building Information Modeling (BIM) is the way to work in a coordinated manner among the actors involved in the construction project. This modeling includes all phases of the project: Design, Execution and Maintenance, providing real time information on the building modeling. BIM focuses on empowering and facilitating the understanding of the work program of all the actor in the construction process: Engineers, Architects, Owners, Product Manufactures, Subcontractors, etc., ordering and coordinating the information in each phase of the project, in order to make decisions, avoiding the minimum mistakes or unexpected calculations. The goal of this project is the modeling of the engineering hydraulic and sanitary, for an intelligent building of 9 floors, using REVIT software, the results obtained were the sizing of the pluvial water retention tank and the determination of available pressures (high and low pressure). It is concluded that the use of BIM tools allowed to display 3D, evaluating a logical sequence despite the complexity of its use

Building Information Modeling, Design, Execution, Project

Utilizations of recycled glass

Usos del vidrio reciclado

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Abstract

Glass recycling in Mexico accounts for only 12%, making it one of the materials with the lowest percentage in this area. The different applications where recycled glass can be used range from the construction industry, concrete production replacing fine aggregate or cementitious material, ceramic materials, architecture (mortar), glass blocks, road paving and dentistry. Among the sources of discarded glass to be recycled are primarily beverage bottles and window glass; however, there are a wider variety of glass items to be investigated for use as recycled material, as well as their use in these and other applications. From the review carried out in the research work presented here, a different panorama was obtained with respect to other sources of waste glass that can be recycled, without losing sight of the fact that this will contribute to reducing the environmental impact, in a first stage of the area surrounding the Educational Institution in which the work is carried out.

Recycled Glass, Concrete, Cement

Experimental and numerical modal analysis of CFM56-3 Oil tank

Análisis modal experimental y numérico del tanque de aceite CFM56-3

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Abstract

To determine the dynamic behavior of components which is performed through the mechanical vibration analysis. The Experimental Modal Analysis (EMA) is the process to determine the modal parameters i.e. of natural frequencies, mode shapes, and damping. The Experimental Modal Analysis (EMA) of the CFM56 oil tank was performed using an impact hammer and a laser vibrometer. Finite Element Modeling (FEM) software, ANSYS APDL 19.2, was used to performed numerical modal analysis of the same oil tank. Thus, the results obtained for natural frequencies and mode shapes is presented in this document. It will contribute to the demonstration of the component functionality and to the validation of the proposed analysis methodology.

Modal Analysis, Oil Tank, CFM56-3

Responsive website based on QR Code as a promotion strategy for the Gastronomic fair

Web responsiva basada en código QR como estrategia de promoción de Muestra gastronómica

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Abstract

The project develops a web application that uses QR codes, thereby promoting regional dishes during Santiago de Anaya´s fair and attracting more visitors. It relies on Scrum methodology for the verification of the hypothesis, the quantitative research methodology of correlational type and the Chi square statistical method were used. The results obtained show the following: first, a responsive web application that can be accessed by reading a QR code via a smart mobile phone; secondly, it was statistically proven that there is a significant relationship between the use of QR codes and the promotion of the dishes of the gastronomic fair of Santiago de Anaya. The contribution is, the web application that promotes and disseminates the regional dishes of the gastronomic sample, with the aim of inviting more people to learn about the experience of this event; Taking advantage of the portability and lightness offered by smart mobile devices, the visitor needs a simple way to access information while moving from one side of the gastronomic fair to the other.

Aplicación Web Responsiva, Código Qr, Difusión, Muestra Gastronómica, Regional

Evaluation of rural communities for the planning of renewable energy projects: a SWOT-AHP methodological framework

Evaluación de comunidades rurales para la planificación de proyectos de energías renovables: un marco metodológico FODA-AHP

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Abstract

Historically, we know that renewable energies have been a key element for the development of rural communities and have addressed social problems. If we talk about the implementation of renewable energies with the objective of solving social problems, these technologies will be understood as the means of intervention to improve a social, economic or environmental good of a region. The use of methodologies in project management has the benefit of organizing and providing tools to reduce the risks of projects to be implemented in a region. The purpose of this article is to test the suitability of an innovative methodological framework that integrates multicriteria for decision-making and analysis tools (SWOT-AHP). SWOT allows planners to gather relevant knowledge from local stakeholders (Uhunamure & Shale, 2021), while the AHP-Hierarchical Analytical Process allows the prioritization of alternatives. This in order to prioritize the needs to be met in the community, promotes social acceptance of the technology and contributes to the development of rural areas.

Methodology, Renewable Energies and Hierarchical Analysis

Optimizing Solar Dryer Design: A Multicriteria Decision Making Approach for Hybrid Systems

Optimización del Diseño de Secadores Solares: Un Enfoque de Toma de Decisiones Multicriterio para Sistemas Híbridos

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Abstract

Solar dryers are a sustainable and efficient alternative for preserving agricultural products, offering numerous benefits for both the environment and the agro-industrial sector's economy. The objective is to develop a decision-making methodology based on environmental, economic, and social criteria, allowing the acquisition of data for the design of solar dryers using alternative energy sources to achieve the hybridization of one or more energy sources. The Analytic Hierarchy Process (AHP) methodology is based on breaking down a complex problem into a series of simple and manageable problems. This methodology evaluated alternatives based on different criteria and factors to consider. The AHP methodology was divided into three stages: the first was to define the problem to be solved, the second was to determine the criteria, and the third was to analyze the possible alternatives. This research provided information for the design of a solar coffee dryer in San Antonio el Porvenir, Chiapas. The solar dryer's design was based on criteria proposed by the producers, such as ease of repair, the product not being in contact with the ground, and ensuring safe operation due to the presence of children and women near the drying process.

Sustainable, Agricultural, Methods

Maintenance Administration System for the infrastructure of a Higher Education Institution

Sistema de Administración de Mantenimiento a la infraestructura de una Institución de Educación Superior

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Abstract

This research was carried out in a Higher Education Institution and addresses the need to develop a preventive maintenance program, since corrective maintenance is only carried out with an institutional log where complaints are addressed in the families of Refrigeration, Lighting, Hydraulic -Sanitary, Electrical System, Building Conservation, Painting, VIALTA, Miscellaneous, Locksmith and Waterproofing, which are sent by users on a day-to-day basis, correcting failures in the institution's infrastructure in a reactive manner and frequently without adequate training of the technicians. That is why this research aims to carry out improvement actions, through the 5QS methodology, to have a relevant maintenance and training program. The procedure consists of five phases that are: diagnosis, design, implementation, measurement and improvements, its development generated as a result a preventive maintenance program, in the Pool, Library, Comprehensive Center for Information Technologies of Extension and Culture, Center for Strategic and Business Studies, Management, Acquisitions, Aquaculture, CIIBAA, CEVE, A100, A200, A300, A400, A800, L500 and L600. With the application of this methodology, the stated objective was achieved since the preventive maintenance and training programs were obtained

Infrastructure, Maintenance, Administration

Sustainable development models strategies analysis in the dynamic railway industry linking technological transformation

Análisis de estrategias de modelos de desarrollo sustentable en la industria dinámica ferroviaria vinculando la transformación tecnológica

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Abstract

Currently there is a global need to generate a sustainable development model that optimizes the functioning of the dynamic railway industry and that can be updated along with technological transformations. The objective of this research was to analyze the strategies of sustainable development models in the dynamic railway industry, linking technological transformation to ensure its long-term operation. On the other hand, railway systems that operate with well-structured sustainable development models have ample possibilities of long-term persistence, however, railway systems that lack this are destined to fail before the economy that can generate subsidies detonates. The methodology was carried out by a mixed analysis for it, it was relevant the application of quantitative and qualitative methods of parameters of sustainable development in train systems based on control variables such as economic, social, environmental, equity, areas. socio-economic-environmental, stability, viability and ecological. The technical data obtained from different sources of scientific information were the basis for decision-making that contributed to the formulation of a sustainable development model in railway systems. The characterization and optimization of the model will be the subject of future work.

Railway Systems, Sustainable Development, Subsidies

Long-term supportable development programs for railway systems

Programas de desarrollo sostenible a largo plazo de los sistemas ferroviarios

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Abstract

Supportable programs were embodied in 17 Supportable Development Goals and approved in the 2030 agenda of the United Nations Organization, to avoid environmental degradation and establish a more prosperous world, with peace and justice in the eradication of poverty. The objective of this research was to characterize the different stages of supportable programs for railway systems in the long term, considering the useful life of the railway infrastructure and the dependence on subsidies. However, the long-term supportable programs of rail systems supported by subsidies have the possibility of reaching a stage of maturity at the same time as the economic explosion of the environment, on the other hand, the long-term supportable programs of rail systems that do not have subsidies are intended for inoperability and lack of reinvestment. A mixed methodological analysis was carried out to identify the subsidy. parameters used by the supportable development programs in railway systems in their different stages of the project. Sources of formal and informal scientific, technical, and empirical information were the basis for identifying the strategic sources of subsidies that generate stability and quality of service.

Supportable Development, Useful Life Of The Railway, Long-Term Project

Strengthening renewable energies: The crucial role of photovoltaics as backup power

Fortaleciendo las energías renovables: El papel crucial de la energía fotovoltaica como respaldo

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Abstract

Renewable energies emerge as one of the great tools in the fight against imminent climate change. Their variable nature gives rise to the need for backup energy systems. And in that context, photovoltaic energy presents itself as an effective option. Currently, there are simulation studies to evaluate solar energy performance and proposals for storage improvements. However, many of these findings are scattered or disconnected, and the possibility of using photovoltaic energy as a backup solution is often not considered. In this research, a literature review was conducted to synthesize relevant information and create a comprehensive vision on the topic. It was found that by having a hybrid system, it is possible to cover up to 50% of the demand, and when combined with backup storage and a prediction system, this increases significantly. Therefore, this work offers a holistic vision that considers the technical, environmental, and economic factors that enable the use of photovoltaic cells as a backup solution.

Photovoltaics, Renewable energies, Energy backup systems

Influence of the concentration of phosphoric acid (H_3PO_4) on the Ca/P ratio in obtaining hydroxyapatite (HAp) from eggshell

Influencia de la concentración de ácido fosfórico (H_3PO_4) en la relación Ca/P en la obtención de hidroxiapatita (HAp) a partir de cascaron de huevo

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Abstract

The objective of this research was to evaluate the influence of the concentration of phosphoric acid in the impregnation to obtain hydroxyapatite (HAp) from the recycling of the eggshell reduce the residues formed in conventional synthesis; in addition to evaluating the Ca/P ratio in the type of HAp obtained, in order to test the material in the removal of dyes. The material obtained was characterized by Scanning Electron Microscopy, Energy Dispersive Spectroscopy (EDS) to obtainmorphology and elmental composition, Fourier Transform Infrared and Raman Spectroscopy, to determine functional groups and crystalline phases respectively. A carbonated HAp was obtained, increasing the concentration of phosphoric acid (0.5M, 1M, 1.5M, 2M and 2.5M) increases the presence of the phosphate group in the material; therefore, the presence of carbonates decreases. It is important to highlight that by Raman it was not possible to find the presence of phosphates, it is necessary to analyze the material by other characterization techniques. Although, with the other techniques used, it was possible to determine the presence of this in the material.

Green Chemistry, Hydroxyapatite, Impregnation

Redistribution of a warehouse of a flooring trading company using discrete simulation

Redistribución de un almacén de una empresa comercializadora de pisos utilizando simulación discreta

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Abstract

Objectives: To find a new distribution for the warehouse facilities that improves the current flow of the order dispatch process. Methodology. The method was based on Systematic Distribution Planning with the following steps: the relationships were defined, the needs matrix was considered, and later the alternatives were made to be evaluated with the ProModel simulation software. Contribution: The results show an improvement in the redistribution with a time of use of the forklift of 176.49 min compared to 188.30 min of the real distribution and a difference of 14.63 units compared to 11.64 current units in the operations of the forklift.

Dispatch, Distribution, Warehouse

Feasibility and viability analysis in railway system projects

Análisis de factibilidad y viabilidad de proyectos de sistemas ferroviarios

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Abstract

The logarithmic growth of demography generates needs in an ascending spiral for global mobility and places the rail system as the one with the greatest advantages for the coming decades. The objective of this research was to analyze the feasibility and viability factors of the project in its different stages of railway systems in a sustainable development environment, on the other hand, the feasibility and viability analyzes of railway systems are the scientific basis that must be carried out. carried out before decision-making, to materialize it into a reality, however the railway systems with a lack of these, their future is uncertain, and they will not reach the stage of self-sustainability. The methodology was carried out by a mixed analysis, this derives in quantitative analyzes from international databases of the control of parameters of railway systems, in addition, the estimates and predictions were qualitatively analyzed based on reported hypotheses that served as a basis in decision making. The results obtained from this research were a compilation of international analyzes of companies, governments, and experts in decision-making to understand the factors of sustainable development in railway systems and their economic and technological detonation.

Feasible, Viable, Railway

Design and experimental study of systems for the regeneration of aqueous $cacl_2$ solutions using solar energy

Diseño y estudio experimental de sistemas de regeneración de soluciones acuosas de cacl2 mediante energía solar

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Abstract

Desiccants are capable of extracting or releasing water vapor from the air, in relatively large quantities. It is important from the economic point of view the recovery by thermal regeneration of these desiccants. Therefore, the development of a technique for the regeneration of this type of substance is of technical and economic interest. For this reason, in the present work, two equipments for the regeneration of calcium chloride in aqueous solutions were designed, built and experimented with, one with a flat surface and the other with a stepped surface assisted by solar energy as a heating medium. This process was monitored through various temperature and humidity sensors to know the operating conditions inside the regenerators, as well as the environmental conditions throughout the experiments through a climatic and solarimetric station. During the study it was observed that the materials and dimensioning of both equipment are adequate. When comparing the temperatures and amount of water evaporated during the test period, a better performance was obtained in the regenerator with an inclined plane, than in the stepped type, which was corroborated by evaluating the relative density of the solutions.

Aqueous Desiccant, Variable Monitoring, Regeneration

Integration of a malt kilning model and a solar air heater model for its use as a viability estimation tool

Integración de un modelo de secado de malta y de un calentador solar de aire para su uso como herramienta para estimar viabilidad

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Abstract

The current work deals with a model of malt kilning, coupled to the design equation of a solar air heater, to use it as a tool for the estimation of the energy saved through its operation. The kilning model was previously validated by previous works, while the design equation for the solar air heater was obtained by a published characterization of a solar air collector manufactured in Mexico, to use it as a platform to evaluate its behavior in the solar conditions with a known equation. The kilning model was obtained previously by other works, where the malt was characterized, and its drying parameters were obtained, this model was modified to improve its convergence. This coupled model will be used to do experiments on the thermal behavior of the process, being able to predict the behavior of the process and being capable of modifying the heating schemes and reflux fractions, and verifying if the solar heating of the process is viable.

Malt Kilning, Solar energy, Mathematical model

Low-cost conditioning amplifier based on operational amplifier array for Michelson interferometer

Amplificador-acondicionador de bajo costo basado en arreglo de amplificadores operacionales para interferómetro Michelson

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Abstract

A low-cost conditioning amplifier was designed and assembled with four operational amplifiers LM741. The objective of the design was the adequate amplification of electrical signals and with a design that allows the replacement of components if necessary. The performance of the conditioning amplifier was tested with the diode output signal of a Michelson interferometer, achieving an amplification ratio of 1:10 and the removal of DC voltage.

Amplification, Operational Amplifier, Conditioning Amplifier, Electrical Signal Conditioning

Modelling of radiation in natural light pipes applied to an agricultural construction

Modelación de la radiación en tubos de luz natural aplicada a una construcción agropecuaria

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Abstract

Light energy in facilities whose environment is not artificially controlled has depended entirely on the hours of light coming from the outside. To counteract this limitation and increase the luminous flux, it was proposed to develop the study and design of a natural lighting system applied to an agricultural construction, using concentrators to capture, concentrate, redirect and introduce the sun's rays into the space to be illuminated and achieve a reduction in the use and cost of conventional energy. But before wasting time and money building the design, the modeling and simulation allows to generate certainty that the radiation model to be implemented, really meets the necessary characteristics, thus was used the CFD simulation technique using Fluent of Ansys Workbench, which generated confidence that the model to be used is the one required for the installation and activities to be performed within the agricultural construction selected.

Luminous Flux, Agricultural, Reduction, Modeling, Simulation

Structural analysis of transtibial prosthesis

Análisis estructural de prótesis transtibial

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Abstract

The area of prosthetics has as limitation by the high cost of developing prostheses that are efficient and comfortable for people with motor disabilities due to the lack of any of these members. Structural analysis was carried out in the design of a transtibial prosthesis, through the application of reverse engineering and modeling technologies. A specific geometry of lower weight was obtained and that supports a body mass of people between 25 and 40 kg, this with the obtaining of frames per minute, which allowed reducing time when modeling a prosthesis design using FEM analysis (Finite Element Method). For the Static Structural Analysis of the prosthesis, the CAE software from Solidworks and Ansys/Static Structural was obtained, the ABS material (Acrylonitrile Butadiene Styrene) was obtained in order to have an approach in the design of a physical prototype, this allows to reduce the manufacturing time and cost through Reverse Engineering application technologies, modeling and prototyping in 3D printing, with materials that are easy to obtain in the market, in future studies materials with mechanical properties more suitable for optimization will be implemented and analyzed.

Structural, Analysis, Reducing, Implemented, Analyzed, Limitation, Prostheses, Modeling, Technologies, Obtaining, Finite, Static, Acrylonitrile, Approach, Manufacturing, Prototyping, Properties, Prototype, Application

Annual Forecast of Photovoltaic Power Generation Based on MLP Artificial Neural Networks

Pronóstico Anual de Generación de Energía Fotovoltaica Basados en Redes Neuronales Artificiales MLP

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Abstract

The intermittency of solar energy resources presents a significant challenge in balancing power generation and load demand. To enhance system consistency, forecasting photovoltaic solar energy is crucial. Among numerous techniques, Artificial Neural Network (ANN) is an efficient tool that can help simplify this problem and predict photovoltaic power generation based on various inputs such as weather data and panel characteristics. In this paper, we present the results of an annual forecast of photovoltaic power generation based on Multilayer Perceptrons (MLP), which provides valuable insights into the potential of MLP ANN for accurate and reliable prediction of photovoltaic power generation, thereby improving the efficiency and reliability of photovoltaic systems. The results were obtained based on data collected over a year and validated with data from the following year. Mean Squared Error (MSE) was utilized to quantify the error between the predicted and measured photovoltaic solar energy generation. The analysis demonstrated that this annual forecast of photovoltaic power generation is highly accurate.

Photovoltaic energy forecasting, ANN, MLP

Improvement of the Maintenance Administration System for the Official Vehicle Fleet of the Yaqui River Irrigation District

Mejora del Sistema de Administración de Mantenimiento a Flotilla de Vehículos Oficiales del Distrito de Riego del Río Yaqui

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Abstract

This project was carried out in an organization in charge of operating, conserving and managing the canal network, drainage network, roads and hydro-agricultural infrastructure of the Yaqui Valley, in which various problems and delays in the service have been occurring because of failures in the personnel transport vehicles, due to a deficient maintenance process of the fleet, for which the objective was to make proposals for improvement through a procedure based on Reliability Centered Maintenance (RCM), by analyzing the current situation of the area under study, identifying occurred and potential failures, proposing a preventive maintenance program, designing a training protocol and delivering results to the client. Following the procedure described above, resulted in the design of a critical data collection format for the object under study, a list of recurring failures, a maintenance program proposal, and a user training protocol. Thus, the objective established by delivering to the interested parties improvement proposals to the preventive maintenance process of the personnel transport units of the Yaqui River Irrigation District was met.

Vehicle Fleet, Maintenance, Reliability

Lithium-Sulfur battery lifetime prediction, a reliability approach

Predicción de vida de batería Litio-Azufre, un enfoque de confiabilidad

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Abstract

The remaining useful life (RUL) phenomenon of lithium sulfur batteries is characterized by being a nonlinear phenomenon that implies difficulties to determine it; performance tests to evaluate and predict the RUL involve long times and a large sample data that, sometimes, is limited for an adequate characterization due to insufficient data. The present work addresses the problem through a reliability analysis considering a highly censored reduced sample, which allows characterizing is reliability key indicators and RUL through the Weibull distribution and the reduced bias adjustment (RBA) method, considering uncertainty in the estimation. The results show that the method is capable to predict RUL of lithium-sulfur batteries, as well as the usefulness of reliability indices.

Characterization, Reliability, Indices, Uncertainty

Documentation of the post-sales service process in a car dealership in southern Sonora

Documentación del proceso de servicio postventa en una empresa concesionaria de automóviles del sur de Sonora

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Abstract

The company under study started in 1944 as a manufacturer of bicycles and motorcycles. In 1974, it began producing automobiles, in 1986, it began exporting them, and in 1992 it began producing engines and transmissions. Since then, the company has experienced great growth and expansion in the world, offering a wide range of vehicles. Today, it is one of the most popular and recognized car brands in the world. In one of its concessionaires located in the south of Sonora, Mexico, it is planned to carry out the accreditation of an internal audit, necessary for the corporate. In this audit, it is stated that all activities must be carried out in compliance with the quality parameters established by the company in all its concessionaires. For this, a process documentation is proposed and developed to ensure its correct operation in the post-sale area. This area gives you follow-up regarding the maintenance of the cars sold by it. With the process documentation, it was possible to accredit the audit required by the corporate, work instructions were developed that explain in detail the flow of actions to be followed in the different processes to comply with the quality points established by the company.

Documentation, Quality, Process, Service

Web System for the management of linkage projects in the Department of Systems and Computing of the ITO

Sistema Web para la gestión de proyectos de vinculación en el Departamento de Sistemas y Computación del ITO

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Abstract

The Tecnológico Nacional de México implements in the study programs, the subject of Professional Residency where students in connection with a company or organization apply the knowledge obtained during the degree, said companies have an agreement registered in the Department of Technology Management and Linkage. At the Technological Institute of Oaxaca (ITO), Computer Systems Engineering students take their Professional Residency in their last semester. This process begins in the linkage project office of the Department of Systems and Computing. Information systems are a computer tool of great help when there are processes as detailed as the Professional Residence where different departments and users are involved. The Web System for the management of linking projects allows tasks to be carried out efficiently for the benefit of students, using the prototype development methodology that meets the needs of the system. This system contributes to the systematization of processes, to the registration of the draft, to be a residency project, followed by the assignment of reviewers and internal advisor.

Linkage, Technological, Processes

Data visualization tools applied to the analysis of school dropout at higher-level institution

Herramientas de visualización de datos aplicadas al análisis de la deserción escolar en una institución de nivel superior

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Abstract

School dropout at a higher level is a problem that afflicts all higher education institutions in all countries of the world, in Mexico, and in particular in the state of Oaxaca. At the present work, data visualization tools are applied to analyze a data set of students who dropped out of the Computer Systems Engineering career at TecNM/I.T. of Oaxaca, with the objective of finding the relationship that the variables of such a data set have. To achieve this, the data analysis methodology proposed by Google is applied, as well as the Tableau and Orange tools for visualizing trends, relationships between variables, etc. of the data set. This research contributes to the instances that make decisions about the strategies to follow to prevent school dropout to some extent. In the same way, it also contributes as a guide for the application of the tools that exist under a free and not free license to carry out similar analyses, so that those interested can start their own analyses.

Analysis, Visualization, University dropout

Evaluation of the Adherence of Thermoplastic Polyurethane (TPU) as an Alternative Material for the Protection of Solar Cells

Evaluación de la Adherencia del Poliuretano Termoplástico (TPU) como Material Alternativo de Protección de Celdas Solares

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Abstract

At present, the care of the environment as well as the use of solar energy are of great importance. One way to use solar energy for clean energy generation is through the use of photovoltaic modules. The performance of the crystalline silicon PV module is mainly determined by the efficiency of the silicon cells, but the properties of the other components, such as the encapsulant material, also have a high impact. The objective of this study was to evaluate the adherence of Thermoplastic Polyurethane (TPU) as an alternative material for the protection of solar cells, since the encapsulating material most used in solar production to date is Ethylene vinyl acetate (EVA) and it serves as a comparison of possible advantages and disadvantages. The tests carried out were in accordance with the International IEC 61215 and 61345 Standards. The adhesion results were sufficiently good and without optical defects. It is concluded that TPU can be used as an alternative material for encapsulating solar cells**.**

Photovoltaic Module, Encapsulating Material (EVA, TPU), Solar Cell

Web system for automatic irrigation in a Greenhouse

Sistema web para el riego automático en un Invernadero

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Abstract

The irrigation system in greenhouses is a fundamental aspect in crop production since it is responsible for suplaying water to the plants. The San Sebastián greenhouse is irrigated by drip irrigation, the main characteristic of which is to provide the necessary amount of water and nutrients for the crops. The technological development has impacted irrigation systems in protected agriculture, allowing greenhouses to implement irrigation systems to automatically start and finish the irrigation process. This article describes the project based on a web-based system and a desktop application backed from real-time interface module through automated humidity and temperature sensors, with the objective of improving irrigation productivity and product quality. With the development of the Project, the irrigation automation process, the modules of the web system and the results produced by the system are exhibit. For this project, the Prototypes model was used using the PHP programming language.

Web System, Greenhouse, Automatic Irrigation

Data acquisition module for the operation of the web system for automatic irrigation in a Greenhouse

Módulo de adquisición de datos para el funcionamiento del sistema web para el riego automático en un Invernadero

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Abstract

The use of technologies in protected agriculture has impacted the way of improving and transforming cultivation processes. Bastida (2004) mentions that protected agriculture is the one that is carried out under production methods that help to aply a certain degree of control on various environmental factors. In the production of crops in greenhouses, these protect different plants from excess cold at certain times of the year, allowing control of temperature, humidity and other environmental factors that favor plant growth. The drip irrigation system is a fundamental element for the production of greenhouse crops. This work describes the operation of the data acquisition module, which its objective its to collect data on humidity and temperature variables through electronic devices such as sensors and the Arduino, and along an interface it is linked to the web system. showing real-time results of automatic irrigation. This project was based on the model in Prototypes

Data Acquisition, Irrigation, Greenhouse

Design and construction of CanSat educational satellites

Diseño y construcción de satélites educativos CanSat

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Abstract

Artificial satellites play a key role in research and modern communications serving the purpose of gathering data and transmitting it back to Earth. However, due to its complexity and strict quality standards, the design and construction of a satellite can span up to six years, making it challenging to teach this process to university students. Which is why the development of pico-satellites like CanSats provides students with the opportunity to learn the operation and basic systems of a satellite and their common launch vehicles on a small scale and in a short period of time. This paper explains the design and manufacturing process of a CanSat and a model rocket and their launch in the Mexican desert to gather data on the atmosphere throughout its descent, including height, pressure, air quality, latitude, and longitude. Additionally, it gives a brief explanation of the interface and database using Lab VIEW and Excel to plot all the collected variables.

Satellite, Cansat, Launch Vehicle, Model Rockets, Data, Atmosphere, Complexity, Variables, Systems, Communications, Standards, Creation, Drones, Latitude

Design of an automated cleaning system for 79.2 KW photovoltaic power plantpanel

Diseño de un sistema automatizado de limpieza para paneles de central fotovoltaica de 79.2 KW

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Abstract

In summary, the production of energy through photovoltaic panels is an efficient and sustainable technology. Its main objective is to generate electricity in a renewable way, reducing dependence on non-renewableresources and mitigating environmental impacts. As part of the methodology, the analysis of panel efficiency over time is included, highlighting the importance of regular cleaning to maintain optimal performance. A cleaning process is recommended, which includes visual inspection, selecting the appropriatemethod, and a post-cleaning inspection. Furthermore, the design of an automated cleaning system is addressed, considering ergonomic and environment-adaptive aspects. SolidWorks software is used to preciselymodel the system's components and optimize its structureand functionality. Finally, as a contribution, regular cleaning with an automated system can increase efficiency by a range of 2% to 5%, extending the lifespan of the panels and maximizing their performance over time. This impliesthat, with the use of appropriate cleaning systems, panels can regain some of their original efficiency, which is essential for ensuring optimal performance.

Design, Automated system, Photovoltaic panels

Design of a circuit for an automated system used for cleaning the panels of the 79.2KW photovoltaic power plant

Diseño de un circuito para un sistema automatizado utilizado para la limpieza de paneles de la central fotovoltaica de 79.2KW

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Abstract

Solar panel cleaning is an important practice to ensure the performance and efficiency of solar energy systems. This brief description discusses the usefulness of cleaning solar panels and their impact on renewable energy production. The accumulation of dirt and other contaminants on the surface of solar panels can greatly reduce their ability to capture sunlight and convert it into electricity. Therefore, regular cleaning of panels is critical to maintaining their efficiency and maximizing energy production. The benefits of cleaning solar panels are substantial. By removing impurities, better penetration of sunlight is ensured, which translates into higher power generation. This ensures stable performance and increased power generation over time. In addition, regular cleaning prolongs the life of solar panels by preventing damage caused by the accumulation of dirt and other corrosive elements. Clean panels are less susceptible to damage and are less prone to failure.

Educational mechatronics and applied to the design of an automated prototype for obtaining thin films

Mecatrónica educativa y aplicada al diseño de un prototipo automatizado para la obtención de películas delgadas

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Abstract

This project presents the design and development of an automated prototype for the deposit of thin films on glass substrates, using the chemical immersion method (SILAR). The importance of the development of these films lies in their multiple applications such as electronic resistors, thin film transistors and capacitors. One of the objectives of the project is to promote scientific, technological and innovation interest so that higher education students understand real problems, in which solutions can be provided through the development and integration of mechatronic prototypes. The final device has a 500mm vertical axis, a 100mm stroke end piston, a clamp driven by a stepper motor, a temperature control bath, a resistive oven, LCD16X2 screen, its structure is made of aluminum profiles. 4040 extrusion with 10mm acrylic walls and its operation is carried out using software based on the Arduino platform.

Automated Prototype, Arduino Platform, Thin Films, SILAR Method

Mobile laboratory for FVM analysis

Laboratorio móvil para análisis de MFV

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Abstract

Due to its geographical location, different regions are rich in solar energy, which favors the use of solar panels, however, the installation is a process that involves taking different factors into account, and it is a recurring topic of study. In this project, a mobile unit was built for the transport of photovoltaic modules (MFV) and to study in a practical way the factors that affect their efficiency. The preliminary design of the mobile laboratory was carried out taking into account the measurements of a 410 W JaSolar module, from this consideration the pertinent calculations were made to size the laboratory, then the measurements obtained were scaled and a prototype was elaborated through a model to detail the necessary mechanisms and materials. Then proceeded with the construction of the laboratory based on the preliminary design and the prototype. Finally, the functionality of the mobile unit was verified by determining the efficiency of the 410 W JaSolar module at different inclination angles, on different floors, shading vertically and horizontally, and with ventilation cooling. It was concluded that the laboratory is practical and meets the desired characteristics.

Transport, Analysis, Photovoltaic module

Evaluation of Obtaining Biohydrogen by Different Fermentation Methods

Evaluación De La Obtención De Biohidrógeno Por Diferentes Métodos De Fermentación

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Abstract

There are a lot of projects around the methods of obtaining renewable fuels that are less harmful to the environment. In that sea of investigations, one of the less explored and with greater potential to become a principal biofuel is biohydrogen production through fermentations. However, biohydrogen technologies production has limitations such as low productivity, therefore are not profitable yet. Through this project, the search for the evaluation of practice to attain biohydrogen to determine how feasible the development of said technology, as well as the efficiency as a process is the main goal. In this project, development of multiple fermentations, analysis of growth curves in different growth mediums such as nutrient agar, BBM and TAP mediums in addition with microalgae Chlamydomonas, were made.

Biohydrogen; Investigation; Fermentation; Microalgae Chlamydomonas

Pedagogical activity to teach the concepts of renewable energy to Mexican engineering students

Actividad pedagógica para enseñar los conceptos de energías renovables a estudiantes mexicanos de ingeniería

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Abstract

This paper describes a dynamic activity to teach the concepts of renewable energy and evaluates its effects on engineering students in Mexico. The dynamic activity is based on variations of percentages of energy consumption proposed by a teacher and the participants using bean seeds. A total of 92 students of Renewable Energy Engineering from three different periods involved the study. The participants were divided into groups, and presented a report where they demonstrated their level of understanding. Using the One-Way ANNOVA test determined differences between their proposals and the teacher ones and interpreted the level of participants' knowledge acquired. A survey was also implemented to examine the effects of understanding the topic and detect discrepancies between directed questions and their proposals. The results showed that the dynamic activity helps participants with their difficulties in understanding the topic. It was found satisfactory outcomes when the dynamic activity is applied face to face.

Proposal, ANNOVA Test; Energy Sustainability, Energy Consumption

Thermal evaluation of multi-glazed windows under *Aw* Köppen climate classification: an analysis by mean of global energy balances

Evaluación térmica de ventanas de vidrios múltiples bajo el clima *Aw* de la clasificación de Köppen: un análisis por balances globales de energía

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Abstract

Nowadays, researchers have proposed the use of multi-glazed window as a strategy to improve the thermal comfort in buildings. Therefore, in this study the effect on the thermal performance of three glazed configurations: single (SW), double (DW), and triple (TW) windows under *Aw* Köppen climate classification was evaluated. The thermal analysis was carried out starting with the modeling of the window conjugate heat transfer by mean the global energy balance method. In this work, the window thermal performance for the warmest and coldest days of the year are presented first, in order to show the temperature and heat flux trends. Based on these results it was observed that the TW decreased the window energy gains by 36.7 % and losses by 8 %. Subsequently, an annual thermal evaluation of the TW is presented in order to show the advantages and disadvantages of positioning the window in different orientations and its potential on saving energy. The highest energy savings were obtained for the north orientation (2.2 $kW \cdot h \cdot m^{-2}$), followed by west (3.6 $kWhm^{-2}$), south (3.9 $kWhm^{-2}$) and east (4.0 $kWhm^{-2}$). In the north orientation, the solar radiation values are low (<400 W/m^2), so the window energy gains are 50% lower than the other orientations, therefore multi-glazed windows are unnecessary.

Thermal Evaluation, Numerical Study, Heat Transfer, And Multi-Glazed, Thermal Comfort

Determination of the correlation factor to achieve inference with greater certainty in the creation of 3d printed prototypes

Determinación del factor de correlación para lograr inferir con mayor certeza en la creación de prototipos impresos en 3d

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Abstract

3D printing strengthens the manufacturing and design area, since, given the possibility of making product models and prototypes with this technology, it saves on their production and on tests to improve them. The objective of this research is to find the correlation that exists between the models made with 3D Printing and their current materials and the prototype in question. Using a correlation study and physical stress tests, it was possible to obtain a correlation factor that when multiplied by the stress calculated by the SolidWorks Software, a more accurate value is obtained when the prototypes are manufactured.

Correlation Study, Tension Test, 3D Printing Models

Obtaining Biodiesel from waste cooking oil using MOF-Zn-II as a heterogeneous acid catalyst

Obtención de biodiésel a partir de aceite usado de cocina utilizando el MOF-Zn-II como catalizador ácido heterogéneo

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Abstract

The metal-organic structure $[\{Zn(O_2CCH_3)_2\}(m\text{-bpe})]_n$, MOF-Zn-II, was evaluated as a heterogeneous acid catalyst in the production of biodiesel by simultaneous esterification and transesterification of waste cooking oil from a hamburger restaurant. At reaction conditions of 140 °C, 7.5 h, molar ratio MeOH:Oil 24:1 and 1 % w/w catalyst, the yield of methyl esters reaches 94.31 %. The values of the parameters of the obtained biodiesel, such as acid number, viscosity, and density, were among those established in the ASTM D6751 and ASTM D1298 standards. In addition, MOF-Zn-II is a material that can be recovered and reused during three reaction cycles without significantly decreasing the performance of methyl esters. Consequently, MOF-Zn-II can be used as a catalyst in the production process of biodiesel from waste cooking oil, since the obtained biodiesel not only meets the specifications required to be sell, but is also obtained from waste raw materials, besides contributing to sustainability and the protection of the environment.

Metal-Organic Framework, Heterogeneous Catalyst, Waste Cooking Oil, Esterification

Prototype of ergonomic container of polyethylene LD-PE/PEAD for packaging honey from native bees

Prototipo de envase ergonómico de polietileno LD-PE/PEAD para envasar miel de abejas nativas

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Abstract

In the present work, the container prototype for melipona bee honey is shown, characterized by being operational and complying with the characteristics of interactivity, progressive improvement, flexibility for changes and functionality. In the experience of Garcerant (2019) the containers are physical means that preserve the organoleptic characteristics of the products, specifically the exposed model is oriented to contain a sweet liquid (honey), which is extracted from the meliponarios of the Sierra Norte of the State of Puebla and comes from native bees (Tetragonista Angustula), the need for the creation of this packaging arises due to the high packaging costs currently absorbed by regional bee growers, who, when observing high packaging costs, choose to sell honey to intermediaries in larger containers (19 liters) at low costs, significantly reducing their own profits from honey, which is harvested in two seasonal periods (april/august), what is described above brings with it the design of the container which is manufactured with high (Cap)/low (Body) density polyethylene (LD -PE/ PEAD), designed to contain a volume of 500 ml and preserve honey at a temperature ranging from 5°C to 25°C (Room temperature), being resistant to impacts and the introduction of external agents. The design of the container validates ergonomic aspects of use: 1) The opening-closing (flip flop lid), 2) Take-carry (Body shape), this prototype was made in the SketChup software, later it was printed in 3D and validated by technical viscosity tests, finally, the unit cost of the container was calculated, which amounts to a monetary value of $11.09, being 44.85% competitive in the commercial market and low cost for meliponiculturists.

Container, Polyethylene, SketChup, Ergonomics, Honey

Machine learning for sentiment analysis in social networks data: advances and perspectives

Aprendizaje automático para el análisis de sentimiento en datos de redes sociales: avances y perspectivas

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Abstract

Sentiment analysis is a field of study within artificial intelligence aimed at comprehending opinions and emotions expressed in natural language, such as texts published on social networks. Social networks are understood as online technologies, tools, and applications that allow users to generate content, share and exchange information, and create interpersonal and communal relationships through the Internet. The data generated from these sources are highly intricate to analyze, hence the relevance of computational tools. Multiple approaches exist that tackle sentiment analysis through artificial intelligence, specifically through machine learning. In this chapter, a literature review and state-of-the-art analysis were conducted regarding sentiment analysis on social network data, with the objective of identifying technologies that exhibit superior performance in this task; the available methodologies are cited to facilitate the selection of an appropriate method, and the advantages and disadvantages of all reviewed methodologies are enumerated. The guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology were applied and finally, the systematization of knowledge was carried out on 21 articles.

Sentiment Analysis; Artificial Intelligence; Machine Learning; Data From Social Networks; Text Processing

Artisanal production of ink, recycling the waste applied in the softening process of Amate paper

Elaboración artesanal de tinta, reciclando los desechos aplicados en el proceso de ablandamiento del papel Amate

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Abstract

The elaboration of amate paper is a totally handmade process that is carried out in the indigenous communities that inhabit the Sierra Norte of the State of Puebla, within the production process a liquid desire (ink) is obtained, which is discarded in the sewers. and drains contributing to the contamination of rivers and soils of the Otomi indigenous community of San Pablito Pahuatlan. The present work seeks to take advantage of this residue by producing an ink that will be used in the first instance as: a) Input in pens, b) Input in ink injectors for printers, c) Screen printing: Preparation of party cards, thus ending the contamination of stagnant and fluvial rivers, in addition to storing the ink for the decorative painting of amate paper, benefiting the community by not generating excessive expenses in obtaining the same ink, and the environment by not disposing of the residue and providing it with second use. In this way, it seeks to train trained and qualified human capital with the capacity to innovate, adapt and develop new craft methodologies that allow the solution of existing problems in the indigenous community that is dedicated to producing amate paper.

Ink, Amate Paper, Indigenous Community

Solar energy monitoring system using a SEPIC converter for possible application in Nanosatellites

Sistema de Monitoreo de energía solar utilizando un convertidor SEPIC para posible aplicación en Nanosatélites

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Abstract

Nanosatellites are mobile objects that orbit the Earth and are distinguished by their size and solar energy source. They consist of two main parts: the payload, which is the main reason for completing the mission, and the platform, which consists of the subsystems that enable proper operation. The most important subsystem is the electrical system (EPS), which is responsible for distributing power to the various modules and converting the energy produced by the energy recovery system. However, there are also factors that cause conversion losses, so there is an opportunity to develop solar energy monitoring systems using SEPIC converters. In this research, a monitoring system was developed that included multiple stages such as solar cell module, SEPIC converter and PWM control to emulate their behavior individually and collectively. From a certain point of view, we analyzed the parts used in the converter, evaluated the electrical circuit of the solar cell array and the SEPIC converter with variable power and the solar cells through simulation, and then performed tests in a physical environment. The monitoring system uses computer tools to measure the input and output data of the converter, saving the data in Excel software to create performance graphs.

Nanosatellites, SEPIC Converters, PWM Control, Electrical system, **Monitoring system**

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