



SUSTAINABLE DEVELOPMENT GOALS

7 AFFORDABLE AND
CLEAN ENERGY

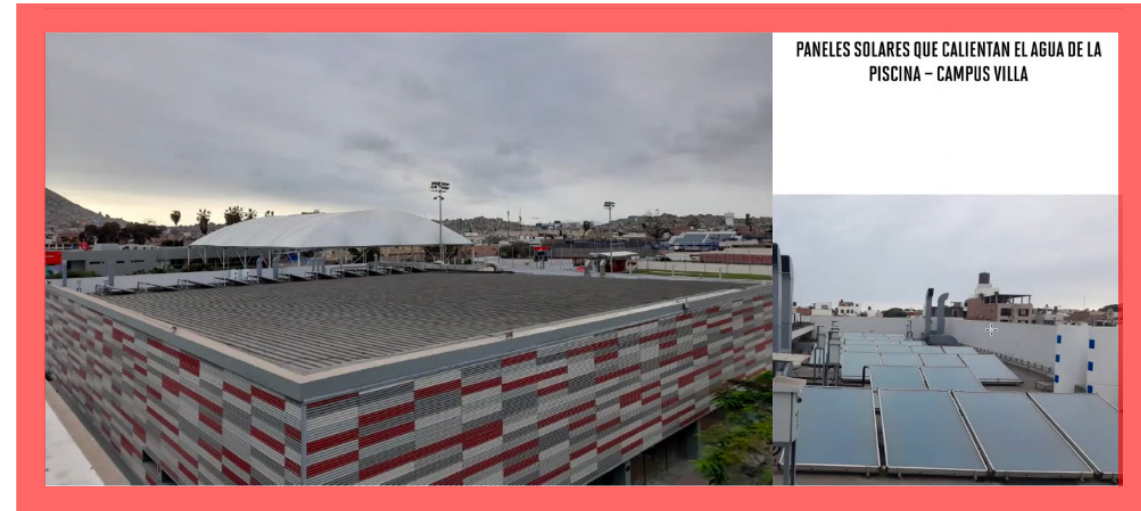


Sustainable campus management: Use of solar panels



Device charger module

Each campus has two solar modules so our students, guests, faculty, and administrative staff can charge their phones, tablets or iPads using clean energy.



Heated swimming pool and electricity in dressing rooms

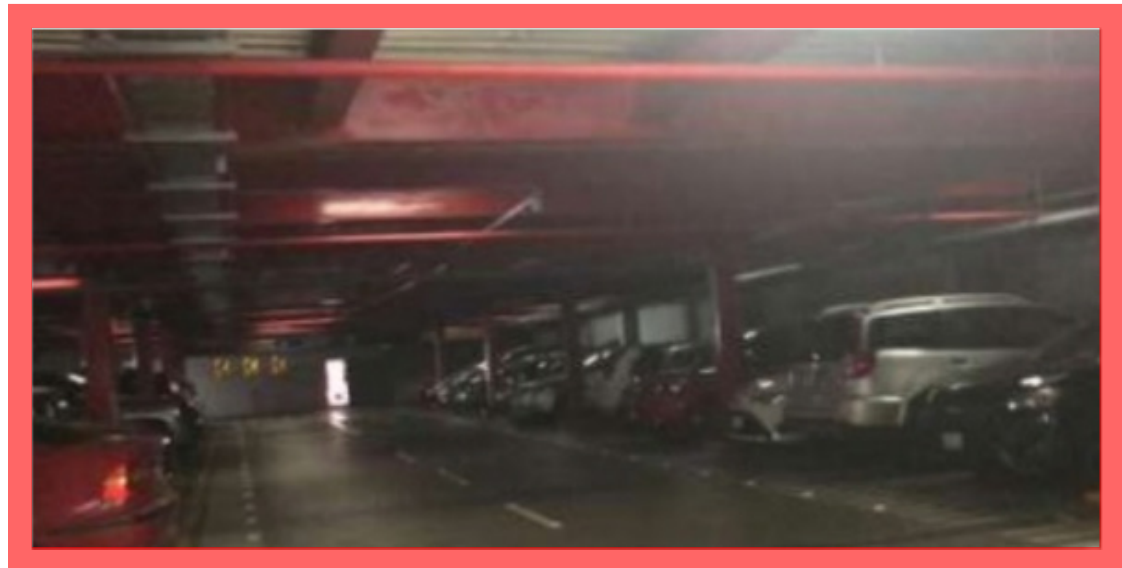
We use solar energy at our campus in Chorrillos (Villa) to heat the semi-Olympic swimming pool and provide electricity for the athletes' dressing rooms.



Sustainable campus management: Parking lot timer system



Each campus has an infrastructure that allows for the efficient management of energy resources. In the Villa campus parking lot, wireless light sensors are activated by movement for 5 minutes and turn off automatically, which allows for significant energy savings.



Design and Simulation of a Test Bench for Horizontal Axis Wind Turbines



Authors: Giraldo, E.; Matos, J.; Vinces, L.; Oliden, J.; Ronceros, J.

Abstract: Currently, the global energy matrix is governed by the generation of energy with non-renewable resources. The downside of these resources is that they take several thousand years to form and cannot be replaced as quickly as they are used today. Peru, due to its strategic location, is a country with great wind potential. However, it is not used enough due to the lack of laboratory equipment that studies this form of energy generation. The present work consists of the design of a test bench for horizontal axis wind turbines that contains an open circuit wind tunnel to generate a uniform wind flow towards the turbine blades. There are fan blades attached to the shaft of a motor, which generate wind inside the tunnel. This tunnel has a nozzle to stabilize the flow and said basin tunnel with the capacity to generate a wind of up to 16 m/s with a 25 HP motor. There is a logic controller that allows 2 types of operation as required by the user. The following article mainly contains the mechanical design of the structure and geometry of the tunnel, a numerical simulation of the fluid inside the wind tunnel, a simulation of stresses in the structure, and a simulation of the controller for the 2 types of operation.

Keywords: Wind tunnel, Wind turbine, Numerical simulation, Electrical energy

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Thermographic image processing analysis in a solar concentrator with hard C-means clustering



Authors: Flores, M.A.; Serrano, F.E.; Cadena, C.; Alvarez, J.C.

Abstract: Thermographic measurements are used to determine the temperatures reached by the focus of a modified Fresnel solar concentrator, where a container is placed to take advantage of this energy. The three steps of this investigation are: (i) the edges of each thermographic image are obtained by means of a Butterworth low-pass filter, (ii) the temperature grid in the solar concentrator is obtained by means of a feature extraction algorithm, and finally: (iii) the classification will be done through a C-means hard clustering algorithm selecting the center of each cluster to accurately find the temperature region to generate the isotherms and extract the temperatures with this algorithm. With the hard C-means algorithm, isotherm level curves and temperature graphs are obtained. Subsequently, two analyzes are carried out to validate that the original unprocessed thermographic images correspond spatially and in their spectrum with the processed images, with the aim of corroborating the acuteness of the digital image processing methodology implemented in this research. Finally, a correlation analysis is performed to validate the temperature matches of the original thermographic images.

Keywords: Digital image processing; Thermographic image; Analysis; Renewable energies; Solar energy; Clustering

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Detection of *Bartonella vinsonii*, *Anaplasma platys* and *Bartonella* *sp.* in *Didelphis marsupialis*, *Pecari tajacu* and *Chelonoidis* *denticulate*: Peru



Authors: Rojas-Jaimes, J.; del Valle-Mendoza, J.

Abstract: Introduction: Evidence suggest that wildlife Infectious diseases related to wildlife are of most importance because of the agents' capacity to spill over into humans from the wild reservoir. Among them, the bacteria *Bartonella* spp. and *Anaplasma* spp. are related to this zoonotic dynamic. Objective: The primary goal of the present study was to determine the presence of pathogenic bacteria in kidney and liver tissues of *Didelphis marsupialis*; spleen, liver, and skin of *Pecari tajacu*; spleen, liver, and skin of *Chelonoidis denticulata*. Methodology: A PCR using universal and specific primers for 16 S rRNA, of *Bartonella* spp. with subsequent genetic sequencing were used. Results: The results in this study indicate that *Bartonella vinsonii* was detected in the liver tissue of *Didelphis marsupialis* using both universal primers and those specific for *Bartonella* sp. *Anaplasma platys* was detected at the liver and spleen level using universal primers. Additionally, *Bartonella* spp. was found at the liver, spleen, and skin level in *Pecari tajacu* using the specific primers. Finally, using the universal and specific primers at the skin level, *Bartonella* spp. was evident in *Chelonoidis denticulata*. Conclusions: The presence of the DNA of the *Bartonella vinsonii* was detected at the liver tissue in *Didelphis marsupialis*. DNA of the



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Anaplasma platys and *Bartonella* spp. were identified at the spleen and liver level. This study also identified that DNA *Bartonella* spp. was detected in *Pecari tajacu* skin. Finally, DNA of *Bartonella* spp. was evident in *Chelonoidis denticulate* skin. The findings of this study suggest that these bacteria are present in these animals and may be responsible for outbreaks.

Keywords: *Anaplasma platys*; *Bartonella vinsonii*; *Chelonoides denticulate*; *Didelphis marsupialis*; *Pecari tajacu*; Wildlife Infectious Diseases; Zoonotic Dynamic; *Bartonella* spp.; *Anaplasma* spp.; *Didelphis marsupialis*; *Pecari tajacu*; *Chelonoidis denticulate*; PCR and 16 S Rrna; *Bartonella vinsonii*; *Anaplasma platys*

BMC Research Notes; Volume 16

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Study of the deployment of wind energy as a source of energy supply for an Offshore Artificial Lift Pump



Authors: Ana Carolina de Souza Alves, Carla Tainá Silva Modesto; Wanessa K. Lima e Silva, Trejo P.C6; Raúl Salinas-Silva, Stefanny Camacho-Galindo, Vando J. C. Gomes, Laura E. Guerrero-Martin, Pedro Paulo de Freitas, Daniel Felipe Restrepo-Linarez, Silvério Sirotheau Corrêa Neto, William Alberto Guerrero.

Abstract: The artificial elevation is done when the productivity index of a well is low. Aiming to improve the flow of a fluid from the reservoir to the surface, a method that best fits the elevation of pressures in this well is applied, consequently making the fluid flow. The artificial lifting method called Progressive Cavity Pumping (BCP) is the second most used in Brazil because it is the most suitable for the production of very dense oils. It presents an electric motor, which promotes the rotation for the operation of the system as a whole. In this way, the implementation of wind energy emerges as the energy generator for this system which contributes to the reduction of operating costs. Thus, this study aims to evaluate the behavior of this energy insertion through the System Advisor Model software.

Keywords: Artificial elevation, energy, wind energy, flow, system

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A route creator algorithm for Sailable drones by comparing a straight-line pseudo route and wind direction



Authors: Córdova, Diego; Vences, Leonardo; Oliden, José

Abstract: Control algorithms for drones are commonly focused on transporting the robot from point A to point B, this type of straight path becomes sufficient in the case of aerial drones, but since it is a Sailable drone (marine drone propelled in a partially or totally by a sail, commonly rigid), straight navigation between 2 points is less than optimal. That is why navigation strategies are used to control vehicles with sails, consisting of the variation of the angle of attack of the sail and the route that the vehicle will follow. This last parameter of the strategy is the one that is sought to be obtained using an algorithm based on obtaining the coordinates in real time of the drone and the destination point, together with the direction of the wind and the inclination of the Sailable drone concerning magnetic North, uniting all this data through analytical geometry equations; to be implemented in an autonomous drone controlled by a Raspberry Pi 4 SBC. In this way, it is sought that the generated routes are similar to those commonly used in sailboat navigation, with the ability to update the route in case it varies from unexpectedly the initial parameters, whether they are the location of the boat or the direction of the wind, to obtain an energy saving greater than 50% to following a route in a straight line. The purpose of this project is to build a route generator with low processing costs for low-resource drones. In this way, it is sought that the generated routes are similar to those commonly used in sailboat navigation, with the ability to update the route in case the initial parameters



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Keywords: sail drone, algorithm, navigation, route generator, autonomous, Raspberry

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<https://dx.doi.org/10.18687/LACCEI2023.11.821>



Analysis of the location criteria used for an optimal location of charging stations for electric cars through ArcGIS



Authors: Angie Ataucuri, Brenny Panduro and Fernando Castro, D

Abstract: The location and capacity of charging stations influence the growth of the electric vehicle industry, since they offer users adequate station locations that consider the shortest distance traveled and maximum service capacity. For this reason, in this article a comparative analysis of location criteria is carried out through ArcGIS, so that, through its parameters obtained as maximum travel distance, minimum travel distance and load capacity, these data can be compared and determine what is the optimal criteria to use. Likewise, a case study is developed in a city with an area of 9.62 km to validate that the chosen criterion is the most appropriate for an optimal location of charging stations for electric vehicles. Finally, when the analysis and interpretation of the results obtained is carried out, it is determined that the maximum capacitated coverage criterion is adequate for an optimal location of charging stations since it presents a minimum travel time, waiting time and recharging time in comparison with other criteria.

Keywords: Charging station, location criteria, minimum impedance, maximum capacitated coverage, electric vehicle, GIS.

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<https://dx.doi.org/10.18687/LACCEI2023.1.1.1488>



Conceptual and Numerical Interpretation of the Hypothetical Failure of Tablachaca Dam Using RAMMS Model-Quichuas-Huancavelica-Peru



Authors: Y. K. Q. Rodriguez, G. E. F. Zerpa and R. E. M. Gutierrez

Abstract: Dams are very useful hydraulic structures nowadays as they allow the generation of renewable energy, such as the case of the Tablachaca dam, one of the largest in Peru, which harnesses the waters of the Mantaro River. This dam is located in the Quichuas-Huancavelica sector and provides a significant amount of energy each year. However, it also poses a significant risk to the surrounding population and the Electroperu camp since it has been observed that this type of structure can fail due to hydraulic, structural, and geotechnical factors, leading to a breach in the structure or affecting its internal functioning, potentially resulting in dam failure. In such an event, it would devastate the downstream population. In this investigation, our focus was to corroborate this hypothesis in order to identify and delimit the most affected areas by the displacement of the flow. We compiled data to validate the hypothesis and used the RAMMS software to analyze sediment flow displacement. Two scenarios were analyzed, each with different time parameters, density, and roughness. According to the simulations, a height of approximately 40 meters was reached, which is sufficient to engulf the Quichuas village and completely devastate a portion of it. Additionally, the tangential velocities of the debris flow ranged from 10 to 20 meters per second, and the forces exceeded 150 Kpa, indicating a highly destructive risk.

Keywords: Meters; Bridges; Strips; Fluids; Dams; Sociology; Hydraulic systems; Dambreak; RAMMS; Inundation; Hidrograph

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A design and analysis of a Darrieus Helical vertical axis wind generator by numerical simulation



Authors: Jorge Carpio; Kevin Banda; Leonardo Vincés; Julio Ronceros

Abstract: This study addresses the problem of pollution and high energy demand in Peru, caused by population growth in the city. It proposes the use of renewable energy as a solution and seeks to analyze and design a vertical-axis wind turbine (VAWT) with variable rotor radius to evaluate its sustainability in Piura, Peru, as a renewable energy option. Climatological data from the Global Wind Atlas and the Capitán FAP Víctor Montes Arias Airport in Talara, Piura, were used. The blades were designed with aerodynamic models from SANDIA laboratories and analyzed using simulation software such as QBLADE and ANSYS FLUENT. The results indicate that the VAWT is efficient ($C_p = 0.58$) when the blades are contracted at 13.4 m/s. A closed-loop control is proposed to adjust the rotor radius with an anemometer. In addition, the airfoil behavior is observed by pressure and velocity plots in ANSYS FLUENT.

Keywords: VAWT, Darrieus, Helical Design, CFD, ANSYS, Renewable Energy, QBLADE, Matlab, Raspberry P, PID, Python

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TOOL For Predicting Plans and Improving Solid Waste Management by Applying Time Series and AWS



Authors: Limber Jaimes; Yudit Garriazo; Jymmy Dextre

Abstract: Currently, the constant population growth in Peru leads to the generation of large amounts of solid waste, most of these originate from domestic sources and are collected by municipalities. The inefficiency in solid waste collection plans generates rework and therefore operational overhead. Likewise, it pollutes the environment due to waste accumulated in the streets and dissatisfaction from the neighbors. Therefore, an IoT tool is proposed, which will have a solar panel, sensor, chip inside the containers that served to train the algorithm and predict solid waste collection plans for decision-making of a municipality using the time series model, arima and Random Forest. This tool has 3 stages: analysis, design, and validation. Stage 1 evaluates machine learning models and IoT architectures. Stage 2 describes the design and software architecture of the tool. And, in stage 3, the deployment of IoT devices in a municipality of Lima was simulated and its operation was validated with the solid waste collection area. The result of the implementation of the tool in a sector of Villa El Salvador managed to increase the efficiency of solid waste collection plans from 81 % to 96 % effectiveness in said sector. In addition, this reduced operational costs by approximately 8 % and increased the satisfaction of neighbors by not having solid waste accumulated in the streets.

Keywords: sensors, predictive algorithms, path, Machine learning, solid waste

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Smart cities and sustainable development in Asia Pacific



Authors: Villanueva Laviña, Sandra Alzu; Castillo Lopez, Viviana Karen; Gamero Silva, Javier Alejandro; Sirlopu Espinoza, Fernanda Patricia; Cancino Ugarte, Ursula Maria; Azabache Morán, Carlos Alberto; Larios Soldevilla, Omar Alexis

Abstract: With the advancement of technology and the need for digitization, the development of smart cities is increasing, and the Asia Pacific region has become a global benchmark. These are cities that seek sustainability, aligned with the preservation of the environment and the improvement of the quality of life of its citizens. This article presents a systematic review of the literature on smart cities and sustainable development in Asia Pacific. First, concepts are explained in relation to renewable energy practices, the suitability of information and communication technologies (ICT), and urban mobility. Then, the various contexts where smart cities are developed are analyzed and compared; the trends that are implemented in relation to renewable energy; the technological advances that are achieved or developed to satisfy the diverse needs of each city; and the obstacles that have been overcome in relation to the current arrangement of urban mobility. Finally, the research trends of smart cities and sustainable development in the Asia Pacific region in the period 2010-2022 are determined, as well as the initiatives and strategies that have been implemented in the process of transformation to smart and sustainable cities.

Keywords: smart city, sustainable development, renewable energy, ICT, urban mobility

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The implementation of Industry 4.0 technologies in the operations of Smart Ports in Asia Pacific during the years 2018 to 2023



Authors: Lucio Joaquin Arenas Cahuana, Deborah Alessandra Cardenas Quintana, Jeferson Sanchez Huaman, Xiomara Vanessa Valenzuela Tenorio, Sandro Elias Villaverde Perez Bonany, Judith Cielo Milla Morale, and Juan Eduardo Acosta Mantaro

Abstract: This research aims to describe the available literature on the implementation of industry 4.0 technologies in intelligent ports or Smart ports in Asia Pacific region during the years 2018 to 2023. This bibliographic review employed three thematic axes (transportation automation, the Internet of Things, and artificial intelligence) to study the available articles published in the Scopus and Web of Science databases. Through a rigorous selection, a total of 30 research articles were chosen and analyzed. On one hand, the results highlight benefits such as the reduction in internal processes costs, a decrease in environmental pollution, and an improvement in Smart Port service quality and green energy implementation. On the other, Some of the challenges encountered were the prohibitively high implementation costs for less developed countries, as well as the increased risk of hacking for information theft in Smart ports.

Keywords: Smart ports, Industry 4.0, Artificial intelligence (AI), Asia Pacific, Automation, Robotics, Technology, Logistics, Ports

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Cybersecurity Maturity Model to Prevent Cyberattacks on Web Applications Based on ISO 27032 and NIST



Authors: Ethan Arenas; Juan Palomino; Juan-Pablo Mansilla

Abstract: During the last years, the number of cyberattacks, especially on web applications, has been increasing. Cyber agents target both large and small companies, which is why it is necessary for organizations to have a tool to help them prevent cyberattacks on their web applications such as a cybersecurity maturity model. The proposed model was built considering frameworks and methodologies such as those provided by NIST and ISO, and it defines four levels of cybersecurity maturity: initial, defined, established, and improved. Additionally, the model includes twelve domains and four categories to be considered as a multidimensional model. The proposed model stands out for incorporating two quality standards, the CSF of NIST and the ISO 27032 standard, and being available as part of a technological solution, a web application. This allows anyone to use the model without requiring assistance from the development team, with a track record of assessments and instant results that include recommendations for each domain on how to improve the maturity level and an assessment history. As a result of the validation, fifteen experts participated in the process where they evaluated a web application of their organization and answered a Google questionnaire. The responses were positive, demonstrating that the model fulfills its purpose of being a useful tool for organizations, enabling a quick and automated evaluation of security in their web applications. This contributes to the prevention of cyberattacks and the protection of the sensitive data of its users.

Keywords: Knowledge engineering, ISO Standards, Computational modeling, Process control, NIST, Market research, Software

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Audit model using controls from ISO/IEC 27002 for the information security of electronic voting based on IoT and Blockchain



Authors: Paredes, Edson; Mendez, Marco; Dextre, Jymmy.

Abstract: In recent years, significant progress has been made in the integration of technologies in voting systems with the aim of improving the transparency of the process. This study proposes an audit model based on the ISO/IEC 27002 standard to evaluate electronic voting systems that make use of Blockchain technology and the Internet of Things (IoT), with the aim of improving security in voting processes. To validate this model, an evaluation of the security control was carried out by applying this international standard to a voting system that integrates Blockchain and IoT. In our analysis of 6 security controls applied to the reality of electronic voting, the system passed all established tests; Therefore, it can be concluded that the risk of compromising system information has been significantly mitigated. This research contributes to the advancement of the security of electronic voting systems and provides a solid foundation for future developments in this field. The combination of emerging technologies and international standards promotes trust, security and therefore mitigates any risk of compromising an electronic voting system by following the best practices of the international standard ISO/IEC 27002.

Keywords: Audit model; Blockchain; IoT; ISO 27002; Security controls; University e-vote

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[10.1109/ICALTER61411.2023.10372915](https://doi.org/10.1109/ICALTER61411.2023.10372915)

