



SUSTAINABLE DEVELOPMENT GOALS

7 AFFORDABLE AND
CLEAN ENERGY



BIOENERGY: Cooking Oil Reuse Project



Students from the Environmental Engineering program at UPC were the beneficiaries of the lecture: “BIOENERGIA, Proyecto de reúso de aceites de cocina”, conducted via Blackboard.

The students learned about the risk management process carried out in projects related to housing, construction, and sanitation.

The objective was to contribute to raising awareness and fostering a culture of environmental care.



Call Pac 5.0: Projecting with Consciousness



In July 2022, the Architecture program held a lecture with the aim of involving UPC students and faculty members in the call for entries for the energy rehabilitation competition based on Sustainable Development Goals.

It was held in collaboration with the company STO from Chile, who organized the competition, which involves intervening in existing buildings by applying sustainability strategies in physical, social, and economic dimensions.

The goal is to carry out energy rehabilitation and promote sustainable development within the community and the practice of architecture.



A model for renewable energy-based product innovation based on TRIZ methodology, exergy analysis and knowledge management: Case study



Authors: Alvarez, J.C., Hatakeyama, K., Carvalho, M., Marçal, R.C., Inche, J., de Melo, N.

Abstract: Eco-innovation is the innovation of products that focuses on the use of renewable energy and meets specific environmental requirements and is essential for energy conservation and environmental protection. There are recommendations and strategies available for general product development, but there are limited studies when focusing on renewable energy products. A proposal for eco-innovation in renewable energy is developed based on exergy analysis, TRIZ methodology, and knowledge management. The model is demonstrated with a specific case study. This study contributes to the analysis and development of products with renewable energy that help mitigate climate change, consistent with the change in the energy matrix. Furthermore, this study is a transdisciplinary effort that integrates concepts from different topics to achieve a comprehensive model.

Keywords: Eco-innovation, Green product innovation, Knowledge management, TRIZ methodology, Exergy analysis

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Comparing the impact of Internet of Things and cloud computing on organisational behavior: A survey



Authors: García-Tadeo, D.A., Reddy Peram, D., Suresh Kumar, K., Vives, L., Sharma, T., Manoharan, G.

Abstract: Cloud computing is about delivery of different computing services involving databases, analytics, software, networking with the use of internet to enhance innovation, incorporate flexibility in resources and broaden profitability. However, Internet of Things (IoT) is an essential system for interrelating computer devices, digital machines, people and others which are offered with unique identifiers where data can be transferred with human involvement and wireless network. 42% of organisations in UK use cloud computing. The problem with cloud computing revolves around security and privacy issues as data is stored by a third party from inside or outside of the organisation leading to broken authentication, compromising of credentials and others. The use of IoT is vulnerable as it provides connectivity to devices, machines and people therefore, it needs to contain more storage that is made from cloud facilities. Survey has been conducted where primary quantitative method has been considered to obtain data from 101 managers of the organisation that has adopted cloud computing and IoT. However, 8 close-ended questions have been asked to 101 managers. Positivism philosophy has been used to make quantifiable observations along with descriptive design and others. The results and discussion will analyse responses of the respondents after conducting statistical analysis. However, research has been revolving around making a comparison between using cloud computing and IoT along with analysing organisational behaviour.



Comparing the impact of Internet of Things and cloud computing on organisational behavior: A survey



Keywords: Cloud computing, Internet of Things, Operating cost, Storage, Return on investment, IoT ecosystem

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An Optimal Blade Design for Mini Wind Generators Mountable on the Spoiler of a Vehicle



Authors: Del Riego, D.G., Gómez, G., Vinces, L.

Abstract: In this work, a mini wind turbine was developed that takes advantage of the kinetic energy of the winds around a moving car. The blades were designed according to inclination angles in order to capture as much energy as possible without greatly affecting the performance of the vehicle. Various proposals are presented according to the inclination of the angle of the blades with respect to the axis of the turbine. Likewise, the behavior of airflow over the blades will be studied using CFD techniques. In addition, it will be possible to obtain various parameters such as the drag coefficient that will serve for the optimal design of the turbines. Finally, experimentation will be carried out to evaluate the electrical energy that said turbine can produce when coupled to a mini generator. The results show that the most optimal design is proposal 2 because it is the one that produces more voltage with less drag force.

Keywords: Blades turbine, CFD, DC generator, Mini turbine, Propeller design, Vehicle airfoil, Wind power

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Influence of the Types of Grass of Green Roofs for the Design of Thermal Comfort in Buildings



Authors: Rodríguez, J., Vilela, K.

Abstract: The main objective of the research was to study the effect of the *Stenotaphrum secundatum* and *Zoysia japonica* grasses on the higher and lower environment temperature and lower relative humidity; the secondary objective was to compare whether the *Stenotaphrum secundatum* grass has a greater impact on the environment parameters of comfort than the *Zoysia japonica* species. Six materials were used for the extensive green roof, each one forming a layer of the system, which were placed on the concrete slab and in an upward direction, including: PVC geomembrane, Polyester asphalt carpet, Pumice stone, Planar geodren, Prepared soil with guano, compost, muss, and Substrate. In order to make measurements of the higher and lower ambient temperature, a digital thermometer and lower relative humidity meter was used. *Stenotaphrum secundatum* and *Zoysia japonica* were used as grass species, as they were the most representative of the grasses used in extensive green roofs. The experimentation was carried out for 2 months from September to October of 2021, having built 3 modules of 1000x600mm roofs, including 1 module of the concrete roof with ceramic covering and 2 modules of extensive green roof with two types of grass: *Stenotaphrum secundatum* and *Zoysia japonica*. The readings of the environment temperature and relative humidity of the higher and lower part were taken in six points of each module to have a greater number of representative measurements.



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The watering of the 2 green roof modules with grass was carried out twice a week, applying 5L of water per module. The results indicate that the *Zoysia japonica* grass is the one that presents a better behavior before the higher ambient temperature and that the *Stenotaphrum secundatum* grass behaves better before the lower ambient temperature and lower relative humidity. The conclusions indicate that the *Stenotaphrum secundatum* grass behaves better temperature and relative humidity; the two grass types exhibit different behavior.

Keywords: Ambient temperature, Extensive green roofs, Grasses, Relative humidity, *Stenotaphrum secundatum* Thermal comfort. *Zoysia japonica*.

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Comparative analysis of GR2M, Temez and HEC-HMS Hydrological Models for runoff estimation in a high Andean basin



Authors: Kate Flores Zuniga, S.; Junior Santos De La Cruz, E.; Santos Hurtado, S.

Abstract: In Peru, high Andean regions have a shortage of hydrometeorological data and monitoring stations, which generates uncertainty for water projects such as hydroelectric power generation, irrigation, among others, in order to satisfy needs for population. For this reason, precipitation-runoff hydrological models represent a way to estimate monthly mean flows based on precipitation, evapotranspiration and temperature data. Accordingly, this paper will develop three hydrological precipitation-runoff models GR2M, Temez and HEC-HMS, with PISCO satellite data provided by SENAMHI to determine monthly average flows. GR2M model shows good results in each one of the sub-basins under study. Furthermore, the Temez and HEC HMS models provide unsatisfactory results in the verification coefficients. GR2M model gave better results with the verification coefficients in each sub-basin: sub-basin 738 (PBIAS=-3.78, NSE=0.78, R2=0.79 and RSR=0.53), sub-basin 747 (PBIAS=-6.63, NSE=0.91, R2=0.91 and RSR=0.32) and sub-basin 773 (PBIAS=-2.79, NSE=0.66, R2= 0.63 and RSR=0.71). In conclusion, GR2M hydrological model has a better fit in selected high Andean basin areas due to its satisfactory verification coefficients.

Keywords: GR2M model; HEC-HMS model; High Andean basin; hydrological models; Temez model
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