



The Annual Student Conference for Engineering and Technology 2022

"Promoting a Sustainable Culture of Research and Collaboration"

June 9-10, 2022 BATANGAS STATE UNIVERSITY The National Engineering University Center for Innovation in Engineering Education Batangas City, Philippines



Nature's Libretto SDG 13: Climate Action

The artwork depicts the nature's eminence with its correlation to existence and complexity of human beings. This connection is set forth by the companionship of fishes and water figures; compelled, inseparable, and dependent. Furthermore, integrates the depths of consciousness, fertility, and the life-giving powers of these two different domains.



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ASCENT '22 The Annual Student Conference for Engineering and Technology 2022

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Dean, College of Informatics and Computing Sciences -BatStateU Alangilan

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CONFERENCE BRIEF

A recurring narrative in human civilization is the desire to reach new heights. Engineering and technology became tools to physically elevate: skyscrapers, airships, and spacecraft. In the spirit of its national identity, BatStateU, the National Engineering University, now cultivates the culture of ascending in areas that will allow it to expand its vision and reach.

ASCENT '22 is a platform for graduate and undergraduate students in engineering and engineering-allied disciplines of architecture, informatics, computer science, industrial technology, agriculture, and forestry to present the fruits of their labor in their capstone projects, final-year outputs, and graduate-level coursework. This conference is the first installation in a yearly activity to sustainably promote the sharing of progress, paving way for collaboration and inclusiveness.

The wings of engineering and technology are broad, and academia holds the power and responsibility to maneuver the flight towards socioeconomic and environmental ends. As the World Federation of Engineering Organizations puts it, engineering and technology are key drivers in the attainment of the UN 2030 Sustainable Development Goals.





Sustainable development is an urgent call for action to address the current environmental and socioeconomic problems we face as global citizens. Our hand in this, as the National Engineering University, is to commit to producing engineers, technologists, and scientists geared with not only knowledge and skill, but also an understanding of the critical role we play in the solutions and means towards sustainability.

As quality education sits at the heart of our university, we direct all our efforts towards this realization and optimize the resources we have at our disposal. The Center for Innovation in Engineering Education (CIEE), being the university's arm for education advancement and excellence in engineering, exercises its mandate to advance the culture of research and collaboration among students, faculty, and research leaders through this Annual Student Conference for Engineering and Technology 2022 (ASCENT '22).

With its agenda of acknowledging the students' achievements in the field of research and encouraging interdisciplinary collaboration, the involvement of the College of Engineering, Architecture, and Fine Arts (CEAFA), the College of Informatics and Computer Sciences (CICS), the College of Industrial Technology (CIT), and the College of Agriculture and Forestry (CAF) is an act to continually bridge the gaps in research disciplines, carrying out our mission to innovate education and promote multidisciplinary research.

I trust that our university will continue to challenge itself to strengthen our collective action to advance the UN Sustainable Development Goals, not just for the sake of achieving them but for leading innovations, transforming lives, and building the nation.

For this great milestone and the next to come, I congratulate everyone. May this conference be a solid stepping stone, and may your next step be a leap, everpushing to excellence, service, and patriotism.

Dr. TIRSO A. RONQUIL

President, Batangas State University, The National Engineering University



As the Vice Chancellor for Research, Development, and Extension Services (RDES), I am grateful to the Center for Innovation in Engineering Education (CIEE) for organizing a conference focused on the students' involvement and anchored in the attainment of the UN sustainable development goals. As pacesetters of our university, we believe the power to design such activities creates opportunities and promotes avenues where students can engage in meaningful ways of learning and honing their craft.

It has always been the aim of the RDES-Alangilan Campus to produce quality research both from the students and the faculty members that will extend beyond the pockets of library bookshelves and serve as tools for community extension—a cause in which ASCENT '22 has helped. With its theme "Promoting a Sustainable Culture of Research and Collaboration," it has ushered in a fresher and broader sense of sustainable research culture and collaboration among faculty and students.

In the same vein, the College of Industrial Technology (CIT), being an allied college to engineering, is also at the forefront of society in this modern age. Through the applications of the various engineering technologies, we train our students to become leading professionals who contribute to sustainability and partnerships. The ASCENT '22 has opened yet another window of opportunity for the CIT students to explore and improve on their research and inter-disciplinary collaboration, setting them forward and upward, enabling the navigation of prospects locally and globally.

None of this would have been possible without the leadership and initiative of your Director, Assoc. Prof. Divina Gracia D. Ronquillo, and the support of her team including Engr. Junix Kaalim. My only hope is that the culture of research and the collaboration among different colleges kindled through this conference be sustained in the years to come.

On behalf of the administration of RDES, and the faculty, staff, and studentry of CIT, my felicitations to the CIEE for a job well done!

Dr. ELISA D. GUTIERREZ Vice Chancellor for Research, Development and Extension Services, BatStateU Alangilan Dean, College of Industrial Technology



With great honor, the College of Engineering, Architecture and Fine Arts (CEAFA) is beyond thrilled to be one of the participating colleges in this year's pioneering event of the Center for Innovation in Engineering Education (CIEE), ASCENT '22. The theme 'Promoting a Sustainable Culture of Research and Collaboration' is much in conjunction with our college's pivotal role in carrying out research and development initiatives for the students to expertly broaden and sharpen their knowledge in facets of engineering.

The incessant need for students and faculty to meet the demands of the ever-changing technological and academic environment drives centers such as the CIEE to spearhead gatherings of student researchers from different colleges in our University that not only develop research capabilities but also advocate competent research culture. In light of the declaration of Batangas State University as the National Engineering University, we firmly believe that this is a remarkable window of opportunity for the delegates to officially share their capstone projects and have them compete in local and international research conferences.

Starting this year, I do sincerely aspire that ASCENT will be held annually in hopes of attaining inclusiveness by inviting more university departments and student researchers to be involved in academic endeavors such as this commendable research conference.

On behalf of the CEAFA, I congratulate the CIEE for trailblazing ASCENT '22. May this pave the way for more undergraduate and graduate research to be recognized by the National Engineering University, thus eventually leading to engaging partnerships internationally.

Dr. REYNATO/A. GAMBOA Dean, College of Engineering, Architecture and Fine Arts



The pursuit of the College of Informatics and Computing Sciences (CICS) to form professional identities through technological competencies and community partnerships, which the Center of Innovation for Engineering Education (CIEE) fruitfully achieved with ASCENT '22, is parallel to the recognition of globally competent student researchers including those from allied and technology programs such as ours. With this, allow me to extend my warmest regards and gratitude to the center for opening the event to all students, faculty, and colleges to respond to the growing collective need for a sustained research culture.

ASCENT '22 laid the foundation to build rapport with our undergraduate and graduate students, eventually allowing them to grow beyond the university and potentially put forward their research at the international level. The virtual setup of the two-day program made it possible for graduate students and other colleges to participate in underscoring the significance of collaborative research; likewise, for inspiring our students and faculty members to develop a sense of courage and confidence to present to the campus community. Having these values reinforced in our college, we can effectively conduct followthrough research and academic activities in the future.

Again, the CICS is immensely grateful for what has been a rewarding experience for the student researchers, graduate students, faculty members, the deans of invited colleges, event organizers, session moderators, and the CIEE. May ASCENT '22 be a bridge to strengthen the CICS-CIEE partnership. Congratulations!

Dr. PRIN MĂRIĚ B. MELO

Dean, College of Informatics and Computing Sciences - BatStateU Alangilan



The Annual Student Conference for Engineering and Technology (ASCENT) 2022 lives to its meaning and purpose of elevating the research works of our students by providing a wider avenue for information-sharing and knowledge promotion. This pioneering student conference organized by the Center on Innovations on Engineering Education (CIEE) pushes us even further beyond guiding our students in the conduct of their research, inspiring them to disseminate and share their knowledge for the betterment of society.

This research conference introduces new insights on other worthwhile activities for the furtherance of the college's academic and research endeavors like demonstration and mentoring, science-based extension and outreach programs, and publication and production.

It is our ardent hope that the motivations and values of this activity will be an integral part of the faculty and students at the college in our pursuit of transcending the knowledge and practices in the field of agriculture and forestry.

Our appreciation to BatStateU - CIEE for the great success of the ASCENT 2022!

Dr. ROMEL U. BRIONES Campus Director, BatStateU Lobo Head, Academic Affairs



The Center for Innovation in Engineering Education developed ASCENT'22 to re-invigorate the spirit of research, collaboration, and community at the Engineering and Technology campus that is BatStateU Alangilan.

Events like ASCENT'22 offer all levels of graduate and undergraduate students of all programs an opportunity to realize their research and project interests for the benefit of the industry, environment, academia, and society.

In addition to having interacted with faculty researchers, professionals, and fellow students of different disciplines, students would have their research abstracts published in this compendium to commemorate their accomplishment.

We express gratitude to the deans of the Colleges of Engineering, Architecture and Fine Arts (CEAFA), Informatics and Computing Sciences (CICS), Industrial Technology (CIT), and Agriculture and Forestry (CAF), as well as the Research, Development and Extension Services (RDES) of BatStateU Alangilan, for supporting the CIEE in this initiative with just as much excitement as we had.

We would like to recognize further the department chairs within each college who took the time to preselect for submissions and inspire participation with their respective students from the get-go up until the end of the conference.

May this be a stepping stone to greater heights for BatStateU Alangilan!

Assoc. Prof. DIVINA GRACIA D. RONQUILLO Director, Center for Innovation in Engineering Education

Conference Chair



It is with pride and honor that we at the CIEE introduce this conference, conceived in response to a very concrete need: to fortify interdisciplinary academic collaboration and effort in this university.

When we were planning ASCENT'22, one of our primary goals was to open up an avenue for students to assume an active role in research while also paving the opportunity to discuss and collaborate on topics and ideas that have applications beyond academia. The vice-chancellors, deans, and heads accepted this proposal with open arms for they too, most significantly, recognize the paths forward for research in BatStateU Alangilan.

Research is the foundation upon which engineering, technology, and design are built; therefore, if to be valuable, must develop from strong undergraduate and graduate programs.

The capstone project is a requirement for the completion of many degrees, but we must not be limited by it, so as to go beyond becoming a be-all and end-all of one's study. We are reminded that knowledge and skills in engineering, technology, science, and design accumulate as we progress in practice and in schooling, thereby increasing our potential to offer solutions to pertinent technological and societal challenges. These solutions are nurtured within the walls of the National Engineering University and then branch outward.

Kudos to the participants of ASCENT'22! Onto the next!

Engr. EDGARDO TITUS M. KAALIM JR. Education and Partnership Officer, Center for Innovation in Engineering Education

Conference Secretariat

Program

Day 1		
9:00 AM - 9:20 AM	Welcome Remarks	Dr. Tirso A. Ronquillo President, Batangas State University Chancellor, BatStateU Alangilan
9:20 AM - 9:50 AM	Plenary Session 1: "Engineering a Sustainable Future"	Dr. Diocel Harold M. Aquino Associate Professor, Institute of Civil Engineering, UP Diliman Fellow, UP Resilience Institute
10:00 AM - 12:15 PM	Parallel Session A Paper and Project Presentation	Respective Breakout Rooms
12:15 PM - 1:30 PM	Lunch Break	
1:30 PM - 4:00 PM	Parallel Session B Paper and Project Presentation	Respective Breakout Rooms

Day 2 Engr. Edgardo Titus M. Kaalim Jr. 9:00 AM - 9:20 AM Synthesis and Opening Education and Partnership, CIEE **Team WONDERPETS** Ghia Luwalhati, Reaner Jacqueline Bool, Plenary Session 2: **Nicole Elizabeth Tan** 9:20 AM - 9:50 AM "Engineering towards **BS Chemical Engineering Students** SDG Attainment" Champion, 1st World Engineering Day Hackathon (WED 2022) "Parallel Session C 10:00 AM - 12:15 PM **Respective Breakout Rooms** Paper and Project Presentation" 12:15 PM - 1:00 PM Lunch Break "Parallel Session D 1:00 PM - 3:15 PM Respective Breakout Rooms Paper and Project Presentation" Dr. Elisa Gutierrez 3:15 PM - 3:45 PM Awarding and Message Vice Chancellor for RDES, BatStateU Alangilan Assoc. Prof. Divina Gracia D. Ronquillo 3:45 PM - 4:00 PM **Closing Ceremony Director, CIEE**

THEMATIC AREAS

One systematic approach to viewing the 17 UN 2030 SDGs through the lens of innovation is via the five critical dimensions of the 2030 Agenda, encompassing People, Planet, Prosperity, Peace, and Partnership; further enriching the core elemental view of social inclusion, economic growth, and environmental protection.

The UN declaration* for each are as follows:

- 1. People: "To end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfill their potential in dignity and equality and in a healthy environment."
- **2.** Planet: "To protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations."
- **3.** Prosperity: "To ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature."
- **4.** Peace: "To foster peaceful, just and inclusive societies which are free from fear and violence. There can be no sustainable development without peace and no peace without sustainable development.
- **5.** Partnership: "To mobilize the means required to implement this Agenda through a revitalized Global Partnership for Sustainable Development, based on a spirit of strengthened global solidarity, focussed in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people."



PLENARY SPEAKERS



DR. DIOCEL HAROLD M. AQUINO

An Associate Professor at the University of the Philippines Institute of Civil Engineering and the current Director of the UP Building Research Service, his educational background includes a Civil Engineering graduate degree at the UP Diliman and a Ph.D. in Civil Engineering at the University of Auckland in New Zealand.

As a fellow of the UP Resilience Institute, an Associate Member of the National Research Council of the Philippines, a Young Scientist Fellow of the Integrated Research on Disaster Risks (IRDR), and a mentor to fellows of the Coalition of Disaster Resilient Infrastructure (CDRI), most of his academic work is centered around the theme of environmental sustainability. An advocate for the awareness and public response to disaster and climate resilience, he has been involved in the review and update of the National Building Code of the Philippines to promote inclusiveness for this cause.

He is affiliated with the Asian Civil Engineering Coordinating Council (ACECC) TC-27 on Interdisciplinary Strategic Foresight as its Secretary, working closely with other members to promote collaborative work toward sustainable development. He continues to serve the people by providing technical assistance in communitybased engineering projects in partnership with civil society organizations and LGUs.

In his talk "Engineering a Sustainable Future," DR. AQUINO focuses on the challenge of advancing urban development with a discussion on balance and sustainability.

TEAM WONDERPETS

A group of students comprising GHIA LUWALHATI, REANER JACQUELINE BOOL, and NICOLE ELIZABETH TAN from the Chemical Engineering Department of the Batangas State University, The National Engineering University

Having accomplished an amazing feat at the UNESCO World Engineering Day Hackathon in March 2022, they are easily one of the many prides of the National Engineering University. The team represented BatStateU and the country in the global competition, being the only Filipino team to compete in the final round, trumping 125 contenders from universities and colleges across 23 countries.

The team has gathered much-deserved attention within and outside the country, among the likes of ANC, Manila Times, and the Asian Scientist, not only for their performance at the competition but also for the representation in research as students and more especially as young, promising women in engineering.

In "Engineering towards SDG Attainment," the WONDERPETS talk about their journey through their undergraduate studies in Chemical Engineering towards their involvement in research and the importance of research alignment with the UN Sustainable Development Goals.



CONTRIBUTING PAPERS

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E-CONNECT: WEB APPLICATION FOR BATANGAS PROVINCE SCHOLARSHIP SERVICES DIVISION

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ABSTRACT

This study developed a web application for Batangas Province Scholarship Services Division. With a huge number of scholarship grantees which are continuously increasing, the administrative found it hard to process application and organize documents which at times, tend to misplace it. Furthermore, the dissemination of scholarship-related information was sometimes inaccessible by some of the scholars. This study provides scholars, applicants, and the administrative staff an online platform to have instant communication.

The developed web application provides coordinators the efficiency in organizing records and storing documents as submitted by scholars and applicants. It is capable of sending auto-generated SMS messages and email regarding the orientation, qualifying examination, and grant distribution schedule and allows administrator, coordinators, and accountant to print necessary record. This also allows applicants and scholars to submit scholarship application and renewal documents without any hassle of going directly to the office. Moreover, scholars can update their contact information any time, view announcements, and ask queries within the system. Lastly, an accountant has an access to organizing payroll records. E-Connect: Web Application for Scholarship Services Division was developed using the server-side scripting language PHP, bootstrap for its front-end framework and MySQL as database.

Included in this paper were the concepts, related literature, and methodology being used by the researchers to serve as their guide in developing the project. To operate well the developed system, software requirements and tools were defined as well as the different tests to evaluate the web application's effectiveness.

The finished project would benefit the intended users in terms of its functionality and usability provided that it also offers security for administrative staff, scholars, and applicants as attested from the assessment and evaluation being done by the researchers.

KEYWORDS

php, scholarship, web application the administrative found it hard to proc

A COVID DASHBOARD FOR BATANGAS PROVINCE

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ABSTRACT

-P1-2

With the continuous existence of COVID-19, it is anticipated that more institutions will engage in implementing and improving the platform, the COVID-19 dashboard with the purpose of getting insights on the COVID-19 pandemic in Batangas Province- where Data Science will significantly take part in. This project has gone through six (6) stages which were based on the project objectives, and these were the following: (1) Data Identification and Acquisition; (2) Data Cleaning and Preparation; (3) Analysis of the Cleaned Data; (4) Batangas Province Mapping; (5) Dashboard Design; and (6) Mapping and Dashboard Integration. The project is python-based and utilized softwares such as the PyCharm, Dash, Heroku, and QGIS. The data were obtained from the DOH Data Drop. These were cleaned and analyzed using PyCharm while Dash, Heroku were utilized for the dashboard design. Lastly, the QGIS was used for mapping of the cleaned data and presenting a temporal map from March 2020 - April- 2022. Uploading the csv file automatically updates the dashboard.

KEYWORDS

COVID - 19 Dashboard, DOH, Batangas Province, PyCharm, Dash, Heroku, QGIS. Temporal Map

L'AVENIR: APPLICATION OF TRANSITIONAL DESIGN IN THE POST-PANDEMIC BEDROOM SPACE OF ARETA RESIDENCE

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ABSTRACT

Coronavirus disease 2019 or COVID-19 pandemic has caused massive changes in the lives of everyone. This sudden shift has been the turning point of interior designers to re-invent spaces and propose new design solutions fit for the pandemic needs of people. Historically, previous studies have already considered the importance of interior design and its significant help on pandemic situations in the past. With the current phase of the pandemic and through relevant research of past pandemic situations, this study answered how a bedroom space will adapt to the changing needs of its occupants during the pandemic. This case study focused on the master bedroom space of Areta residence. A qualitative interview with the occupants of the space was conducted in order to assess their needs and personal activities. This study will be carried out from February 2022 to May 2022. The designer incorporated transitional design approach in order to bring out a timeless looking bedroom space that is both comfortable and sophisticated for the client. Adaptable design elements were included in the master bedroom plan such as a comfortable bedding space with a cozy atmosphere, a work-space area for virtual meetings, an entertainment area which promotes fun and enjoyment in the room, and a dressing area that is both efficient and has sanitation properties. As the world transitions to the" new normal", the findings of this study utilized the Haussmannian design concept and establish how personal spaces are now designed not just based on aesthetic considerations but also its functionality and adaptability to the new normal lifestyle of its occupants.

KEYWORDS

Coronavirus disease, post-pandemic, master bedroom, Haussmannian, transitional interior design

FILIPINO AND ENGLISH LANGUAGE SPEECH RECOGNITION FOR PROJECT REASAL

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ABSTRACT

The COVID-19 pandemic changed the way we do things in our daily lives. Delivery and receiving an education are also affected. As much as the learners are having difficulty coping with this new challenge in receiving education, the teachers face as much to deliver instructions and assess performances with accuracy and efficiency. In light of the Department of Education (DepEd) initiative "Hamon: Bawat Bata Bumabasa" under the Memorandum No. 173 S. 2019, teachers are expected to profile the reading skills of students, deliver reading instructions, and perform assessments and interventions for all children who can read in early grade.

This project is based on helping teachers assess the current reading skills of early-grade learners. In accordance with this, the focus of this study was on the second component of Project ReaSAL (Reading Skills Assessment for Learners), which is the Filipino and English Speech Language Speech Recognition. The goal of this study is to develop a speech recognition system for both languages. In particular, two algorithms, the Convolutional Neural Network (CNN) and the Artificial Neural Network (ANN), were tested while the Mel Frequency Cepstrum Coefficient (MFCC) was used as the feature extraction method. The dataset used for training is made up of 70 syllables from Filipino words with consonant-vowel-consonant-vowel (CVCV) pattern and 14 syllables from selected English words; all taken from (Hamon: Bawat Bata Bumabasa). The model building started with the Data Preparation to be used for feature extraction. The ANN and CNN models were trained using the dataset, wherein different training techniques were used to improve the accuracy. Both models were used to predict the syllables and return the concatenated syllables as a text file. As a result, the ANN model achieved a test accuracy of 51.86% in Filipino and 84.57% in English, while CNN model achieved 83.05% in Filipino and 51.13% in English. It was also proved that augmenting training dataset can improve the accuracy of the speech recognition system.

KEYWORDS

Coronavirus disease, post-pandemic, master bedroom, Haussmannian, transitional interior design

19

A-P1-3

-P1-4

"PHOTOGRAM" GRAMMAR IMAGE RECOGNITION

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ABSTRACT

A-P1-

Grammar checking tools benefits those non-writers and non-technical personals. Such tools allow them to improve their knowledge of the language of English by showing them their mistakes and errors. Different grammar checking applications, tools and websites had emerged throughout the years. The study decided to innovate and build a grammar checking tool that uses image processing. The application Photogram, uses image processing to recognize text in an image and extracts it. After extracting the text, the application then uses the proofreading API embedded with the application to correct its grammar. The application was built with the use of different open-sourced frameworks, libraries and packages. These includes React Native, React Native Camera, GrammarBot API. The application could benefit a lot of people. Most especially those who wants to check the grammar of text found in books, documents or articles without the need to retype them again. The study was only limited to those people who are not that proficient with the English language that needs the help of a grammar checker.

KEYWORDS

Grammar checking tools, image processing, Photogram

A FINE TUNED AND TRUNCATED MACHINE LEARNING MODELS FOR DIABETES MELLITUS CLASSIFICATION

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ABSTRACT

Diabetes mellitus is a disease that happens when the blood glucose, also called blood sugar, is too high. There are two types of diabetes – type 1 and type 2. Medical experts sometimes get confused in detecting whether the diabetes is type 1 or 2 because of some of its similarities and because of that, with machine learning capable of classification/prediction, the researchers proposed an idea to classify whether a person doesn't have, or has type 1 or type 2 diabetes, with the use of machine learning approaches. For diabetes classification, five machine learning models have been employed: Random Forest, Support Vector Machine (SVM), k-nearest neighbors (KNN), Adaptive Boosting (AdaBoost) and Stacking. Five collective diabetes mellitus datasets were used to create a general process of preprocessing techniques and parameters of models. For determining the best preprocessing techniques, the accuracy scores of different combinations were tested. To generate final parameters for each model, averaging techniques were used to check which model's parameters were best suited for all datasets. During the analysis, it was observed that the combination of random oversampling – standard scaler – principal component analysis, outscored other combinations in terms of accuracy score and execution time. It was also observed that stacking performs well in some datasets by providing a higher accuracy score compared to other models. Moreover, the performance of the proposed model is better than the related study's model of each datasets.

KEYWORDS

Diabetes Mellitus, Blood sugar, Machine Learning, Prediction

A-P1-7

-P1-

DESIGN AND SIMULATION OF AN IOT-BASED SOLAR-POWERED AQUAPONICS MONITORING AND CONTROL SYSTEM

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ABSTRACT

Aquaponics which combines the methods of aquaculture and hydroponics is a popular and unique farming technique among urban farmers and other individuals. This study aims to apply the concept of IoT in aquaponics for control and monitoring including the benefit of renewable energy in the system. With the symbiotic relationship of plants and fish in aquaponics, the air and water quality is a critical part that needs proper management. The need for the constant observation and supervision of the system is essential for a better and more productive outcome. The proponents selected the components to be utilized by gathering probable system parameters and developing a smartphone application as the project's front-end that monitors and controls the circuits of aquaponics systems installed with an IoT made of sensors and actuators as the project's back-end. This study can be a part of the increasing contemporary agriculture and urban farming in the Philippines and serves as a future reference for the actual development of an IoT-based solar-powered aquaponics monitoring and control system.

KEYWORDS

Aquaponics, Internet of Things (IoT), ThingSpeak, MIT App Inventor, Arduino Mega, Proteus

APPLICATION OF DATA MINING TECHNIQUES IN DIAGNOSING VARIOUS THYROID AILMENTS: A REVIEW

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ABSTRACT

The thyroid gland plays one of the most important organs in the human body. It secretes thyroid hormones, which regulate metabolism. Hypothyroidism and hyperthyroidism are caused by either too little or too much thyroid hormone secretion. This study assesses and analyzes existing data mining methods for diagnosing thyroid diseases. This paper aims to provide and identify the best practices in terms of applying data mining techniques such as decision tree, k-nearest neighbor, SVM, PNN, various Thyroid ailments which include the best machine learning model, naive Bayes, etc. Also, this research evaluates the preliminary techniques used to diagnose various thyroid diseases based on their efficacy and the number of attributes under the evaluation matrix. The attributes Age, sex, TSH, T3, TBG, T4U, TT4, and FTI were determined to be the most commonly used medical attributes in previous research works to perform experimental work to diagnose thyroid disorders. Almost every researcher has utilized one or more of these features to perform thyroid disease diagnostic work. According to the results of this study, there is a relationship between the number of attributes used and the accuracy rate achieved; The noticeable results that were presented in this study are some models are higher with fewer feature attributes while with the advent of the neural networks, the higher that number of attributes can give a better performance of classification. This area could be explored by considering adding and using more features to provide a more accurate and reliable output that can be a baseline for development.

KEYWORDS

thyroid diseases, classifications, paper review, machine learning, data mining

"SIKAP: SALAYSAY NG IBA'T IBANG KARANASAN SA AKADEMYA SA PANAHON NG PANDEMYA" A SHORT DOCUMENTARY FILM

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ABSTRACT

A documentary film is an effective instrument that brings important topics to the public in a captivating way that generates discussion and raise awareness to the target audience. This documentary film research aspires to address various struggles of the students with the new learning mode which is the online learning that was implemented in all levels in all school, including Batangas State University caused by the covid-19 pandemic and to raise awareness for the students striving to learn amidst the pandemic. The researcher targets to capture the attention of the higher education institution to come up with ways to help the students in-need and to inspire and motivate students to keep striving hard to learn. Result shows that 54% of the students surveyed from Batangas State University the National Engineering University-Pablo Borbon and Alangilan Campus are uncomfortable with the new learning system implemented due to the covid-19 pandemic. 59% of the respondents which are the students find it difficult to complete their schoolwork at home. The documentary film entitled "SIKAP: Salaysay ng Iba't Ibang Karanasan sa Akademya sa Panahon ng Pandemya" is the output of this documentary research that shows the struggle of a student a parent and a professor. The result of the evaluation showed that the documentary film "SIKAP" was informative in addressing the struggles in the perspective students and professors and according to result the respondents agree that watching this film might raise awareness to the higher education to help students in need of assistance.

KEYWORDS

Film, Documentary Film, Batangas State University The National Engineering University, Covid-19 Pandemic, New Learning System

B-P1-5

OPTIMUM SPACE UTILIZATION FOR FACILITIES SUSTAINABILITY AT COLLEGE OF ENGINEERING, ARCHITECTURE AND FINE ARTS

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As the University aims in becoming a National Engineering University, it drives to expand Engineering specialties by introducing new engineering courses starting 2021. Improvement and strengthening of its existing facilities and assets are essential in providing the best learning environment for engineering students. The research aims to assess the existing learning facility, its rooms, laboratories and learning areas of CEAFA' capacity and provide a proposal for capacity allocations and additions to assure compliance with enrolment demand and CMO requirements. Considering all variables, the researcher had developed a mathematical model appropriate to determine optimum allocation and distribution of learning spaces per program based on the forecasted enrolment demand of the CEAFA. Using the model, the researcher was able to simulate an optimal space utilization of facilities of the CEAFA, given the 10-year projection of students' enrolment, as basis of each program's room and laboratory distributions.

KEYWORDS

ABSTRACT

Linear Programming, Learning Spaces, Mathematical Modelling Space utilization, Sustainability

ATTENTIVENESS IDENTIFICATION AND ASSESSMENT FOR ONLINE LEARNERS VIA PUPIL CENTER DETECTION USING DEEP LEARNING

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ABSTRACT

Online learning has become a popular alternative to face-to-face classroom set-up during the prevalence of COVID 19. Using the online platform limits the personalization of the educational experience and likewise limits the teacher-student interaction and communication. In the online environment, the educator's means to observe the Attentiveness and Inattentiveness of the online learners. This paper with the endeavor to create a Pupil Center Detection Model for identifying the online learners' attentiveness was thereby proposed to facilitate monitoring. Primary to this, an assessment of 1, 000 Columbian Gaze Datasets made by The Computer Vision Laboratory at Columbia University was done in terms of Accuracy, Precision, Recall, and F1 Score. Application of Augmentation Techniques of Cropping, Brightness, Exposure and Flipping was also undertaken as means for improvement. The researchers annotated and Trained the datasets prior to YOLOv5 processing which yielded comparatively higher performance results for raw data vs. augmented data.

KEYWORDS

Attentiveness, Online Learning, Pupil Center Detection, Computer Vision, Deep Learning

CTRLV: A LECTURE AUDIO VERIFIER FOR SPOKEN DOCUMENT RETRIEVAL USING NATURAL LANGUAGE PROCESSING AND SPEECH RECOGNITION

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ABSTRACT

CtrlV is a software created for Spoken Document Retrieval. In this paper, the developers created a system which verifies audio lectures using document retrieval techniques. It utilizes Google's Speech Recognition engine so that the audio input will be converted into text. Also, cosine similarity using the SciPy python library was used to check for similarity of two vectors, one is the transcribed text and one is the document itself. The trained model was created using the Python Language in Google Colab with the use of the Sentence Transformers library for natural language processing. QtDesigner and PyCharm were used for the creation of the graphical user interface. The system produced accurate results, with correct similar articles being shown when trying to verify an audio-based lecture.

ASCENT '22 Conference Proceedings

KEYWORDS

CtrlV, Lecture, Document Retrieval, Automatic Speech Recognition, Cosine Similarity

8-P1-(

A PROPOSED DESIGN COLLECTION FOR TIFFANY AND CO.

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ABSTRACT

A documentary film is an effective instrument that brings important topics to the public in a captivating way that generates discussion and raise awareness to the target audience. This documentary film research aspires to address various struggles of the students with the new learning mode which is the online learning that was implemented in all levels in all school, including Batangas State University caused by the covid-19 pandemic and to raise awareness for the students striving to learn amidst the pandemic. The researcher targets to capture the attention of the higher education institution to come up with ways to help the students in-need and to inspire and motivate students to keep striving hard to learn. Result shows that 54% of the students surveyed from Batangas State University the National Engineering University-Pablo Borbon and Alangilan Campus are uncomfortable with the new learning system implemented due to the covid-19 pandemic. 59% of the respondents which are the students find it difficult to complete their schoolwork at home. The documentary film entitled "SIKAP: Salaysay ng Iba't Ibang Karanasan sa Akademya sa Panahon ng Pandemya" is the output of this documentary research that shows the struggle of a student a parent and a professor. The result of the evaluation showed that the documentary film "SIKAP" was informative in addressing the struggles in the perspective students and professors and according to result the respondents agree that watching this film might raise awareness to the higher education to help students in need of assistance.

KEYWORDS

Film, Documentary Film, Batangas State University The National Engineering University, Covid-19 Pandemic, New Learning System

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A SOFT VOTING APPROACH OF CONVOLUTIONAL NEURAL NETWORK-BASED ALGORITHMS FOR TYMPANIC MEMBRANE DISEASE CLASSIFICATION

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ABSTRACT

Otitis media (OM), often known as middle ear infection, refers to a collection of conditions that include acute otitis media (AOM), otitis media with effusion (OME), and chronic suppurative otitis media (CSOM). In clinical practice, pneumatic otoscopy is the most accurate approach for diagnosing otitis media. However, the accuracy of pneumatic otoscopy is reliant on the user, which might result in modest findings. This paper presents the application of a CNN-based soft voting classifier for tympanic membrane disease classification. To create the soft-voting classifier, four pre-trained CNN models – alexnet, googlenet, vgg-16, and resnet-50, were compared based on their classification performance, and the top-two models were chosen to create the proposed method. Resnet-50 and googlenet achieved the best performance with an accuracy of 97.1% and 95.4%, respectively. These models were used to create the soft-voting classifier achieving aN accuracy of 97.6%. The result shows a significant leap in the accuracy rate of the classification of tympanic membrane diseases. This research brings forward an extension of using the soft-voting method based on CNN algorithms in classifying tympanic membranes.

KEYWORDS

otitis media, soft-voting, resnet-50, googlenet

CONTROL SYSTEMS ENGINEERING E-LEARNING PLATFORM IMPLEMENTED IN MATLAB® AND SIMULINK®

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ABSTRACT

The COVID-19 pandemic has forced universities to close and disrupted student learning environments, especially for students taking technical courses like Control Systems Engineering that require hands-on experience. Thus, the researchers came up with the idea of developing an e-Learning platform for Control Systems Engineering that would be implemented in MATLAB® and Simulink®. This e-Learning platform is composed of six developed models in various file formats, including a MATLAB® script, a MATLAB® live script, a Simulink file, a Simscape and Multibody model, and a MATLAB® application (GUI). Moreover, a Control System Handbook, serving as a learning resource for students, was made to utilize these models into various laboratory experiments. The handbook is comprised of ten laboratory materials that cover general Control Systems Engineering topics. Students and instructors assessed the e-Learning platform's usability and effectiveness, including the models and Control System Handbook. The assessment's findings indicated that the e-Learning platform as a whole made a good impression not only on students, but also on instructors. This means that the project not only provided effective material to students, but also an instructional supplement and additional tool for course instructors to aid them teach more effectively even when there are no face-to-face interactions with the students.

KEYWORDS

e-Learning, control systems engineering, MATLAB®, laboratory experiment, assessment

ALERTO: AN ANDROID-BASED ACCIDENT HOTSPOT TRACKER NOTIFICATION SYSTEM UTILIZING ANALYTICS AND GPS TRACKING ALGORITHM

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ABSTRACT

Road traffic accidents are now considered as the top leading cause of death worldwide that is unrelated to any medical diseases. Furthermore, CALABARZON, had the most traffic injuries in 2018, accounting for 16.5 percent of all car accidents nationwide. Thus, the objective of this study is to develop an application that will notify the user when they are 200 meters near or heading to an accident hotspot, this will help them to be more cautious and attentive when traversing different routes of Nasugbu. ALERTO is a mobile application that provides information about the different accident hotspots in the municipality and alerts the user about them. RAD and K-means clustering were applied to the development of the study. The researchers used the RAD methodology since it is efficient to use for a shorter time frame for it focuses on prototyping and feedback rather than planning, so the development is faster. K-means clustering was used in grouping the accident hotspots in the different areas of Nasugbu. A survey was used to evaluate the system. After the evaluation, the gathered data were tallied, computed, and interpreted. Based on the results, most of the accidents in Nasugbu happen along the National Road of Barangay Lumbangan, Bilaran, and Banilad. The absence of road signages and without thoroughly checking the vehicle condition are the leading causes of the occurrence of an accident in the municipality. Respondents highly accept the mobile and web applications and strongly agree with their effectiveness.

KEYWORDS

Keywords: Alerto, Android, Accident Hotspot, Notify

2

CARE.IO: CONTACTLESS INFORMATION SYSTEM WITH DATABASE AND QR CODE SCANNER

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ABSTRACT

This study is entitled "Care.io: Contactless Information System with Database and Qr Code Scanner". The continuous increase in the number of positive cases of Covid-19 and the possible spread of virus by filling up the form at the establishment prompted the researchers to make this project development study. This study aimed to help the customers to have a tool on their device that can easily register without filling out information via paper and pen. The developed application by the researchers was built for the customer for them to register and for the administrator of the establishment to know who is entering. The application is capable of getting customer's information stored in the database. The customer can use the application for them to scan the Qr code at the entrance of the establishment. The application can only be activated once it is connected to the internet. There is also a page for the cases and news for the customers to be updated. At the logbook, the customer can view the establishment they enter.

KEYWORDS

QR Code, contactless, pandemic, information system

ENLIGHTEN: AN INFOGRAPHIC TO RAISE AWARENESS ABOUT ONLINE SEXUAL EXPLOITATION OF CHILDREN

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ABSTRACT

-P1-6

Infographic is a visual representation of information and data. By combining elements of text image, chart, diagram. It gives the opportunity to shape the tone, visual style, and message of advocacy. Animated infographics will focus on raising awareness about sexual violence, as technology is taken advantage of to participate in bugging, spontaneous, or non-consensual sexual communications. Some individuals are unaware of what sexual violence is. There is a possibility that they have encountered such things and don't have an idea of what it is. Famous social media platforms like Facebook, Instagram, Tiktok, and online dating apps like Tinder outspread an individuals' presence online. Each of these online platforms allows a user to express themselves and establish online connections. Unfortunately, perpetrators can also use these platforms to take advantage of young people's desire to connect and be noticed. Young people frequently bring online friendships into real life without realizing who they will meet in person. This animation targets parents and teenagers as these people spend more time online. This animated infographic will focus on explaining sexual violence and providing scenarios and ideas on how to deal with sexual violence. Results revealed that the majority of the parents and children are using social media. There were also respondents who were not aware of OSEC and most of them misunderstood some information and situations regarding OSEC. After the animated infographics were made, the project evaluation was conducted to the respondents to test the effectiveness and understanding of OSEC in the infographics. It revealed that the technical aspect of the infographic was very effective while the contents of the infographic were effective and the instructional design of the infographic were very effective.

KEYWORDS

Online Sexual Exploitation of Children (OSEC), Internet, Social Media, Infographic

WEB-HUGIS: A WEBSITE DESIGN AND DEVELOPMENT OF GEOSPATIAL INFORMATION OF GIS-BASED AGRICULTURE CROP MAPPING FOR BATSTATEU-HUGIS

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ABSTRACT

Web-HUGIS: A Website Design and Development of Geospatial Information for GIS-Based Agriculture Crop Mapping System of BatStateU-HUGIS was designed to obtain information about the farmers, their crops, and their coordinates to provide useful insights about the agriculture and aquaculture involved regions with the utilization of GIS to improve the ecosystem researched by partner SUCs. This project aims to design and develop a harmonized GIS-based platform, specifically a website dedicated to containing information about agricultural crops that can be found within certain vicinities in the Philippines. The gathering of data was done with the help of the project staff through the use of survey forms that were disseminated to different farmers of concerning locations. The website development was made with the use of an online and free platform called WordPress to design and create the website. In terms of creating the interactive map, the developers manually coded the map with HTML, CSS, and JavaScript through the use of Microsoft Visual Studio and Mapbox's API and GL JS Library. Prior to its release on the internet, the developers conducted functional and non-functional testing. Researchers/Developers concluded that agricultural data and information could be more accessible and widely distributed to the public, particularly to the various industries that rely on agricultural products for product development.

KEYWORDS

Agriculture, Geographic Information System, Website, Interactive Map, HUGIS

DESIGN AND DEVELOPMENT OF SMART: A WEB-PORTAL APPLICATION ECOSYSTEM FOR THE MUNICIPALITY OF CALACA

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ABSTRACT

This study entitled "Design and Development SMART: A Web-Portal Application Ecosystem for the Municipality of Calaca" focused on the development of a web-portal application for receiving request form, sending notification and receiving request emergency response from the mobile app.

The Web Portal Application was proposed as a convenient and efficient way of transaction. The primary goal of this research was to design and develop a web portal application for the Municipality of Calaca. The proponents states the problem encountering in terms of manual transaction such as unsustainability of processing the requests, uncontrollable number of individuals on each department per day, unapproachable staff, unreliable information, non- transparency of information and inconvenience of time are cons of practicing traditional way of requesting documents and services. To achieve the project's goal, the proponent researched various web portal applications and gathered information about traditional methods of transaction between Calaca staff and citizens. This includes the planning, designing, and material selection stages.

In constructing the project, the proponent used HTML, Bootstrap, and CSS for the Web design. Visual studio's integrated development environment (IDE) was used as a software application that provides comprehensive support for software development. Maria DB was used for the database to store large numbers of record efficiently. LARAVEL is the framework that was used to avoid having to reinvent the wheel each time the proponent created a new application. For the backend, PHP was used as the data access layer and for the frontend JQuery and JavaScript was used.

KEYWORDS

Transaction, Municipality, Web-Portal, Application, Ecosystem

HEURISTIC APPROACH FOR HYBRID AND BLENDED SCHEDULING **OPTIONS AND FACILITIES LAY-OUT FOR THE COLLEGE OF** ENGINEERING, ARCHITECTURE AND FINE ARTS (CEAFA)

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ABSTRACT

The main purpose of this research study was to design a hybrid schedule in the college of CEAFA and design a layout that will help both students and faculty to cope with the changes made by the pandemic. Industrial Engineering concepts were applied like Integer Programming and Facility Layout that were incorporated in the developed design schedule and layout in CEAFA. The study was limited only in the design of schedule for hybrid and blended class and layout for classrooms, laboratory, and hallways considering the guidelines and protocols of the university for undergraduate programs and was delimited to the scheduling for major examinations. Other facilities such as clinic, canteen, library, comfort room and other staff buildings and creation of protocols and guidelines were excluded in this study. The researchers used Heuristic Approach for the design of the schedule and layout. C&K Heuristic model for classroom and laboratory scheduling were developed considering the constraints being identified such as the alert levels based from IATF, which was alert level 1 to 5, the total sections per program, the courses needed to be conducted at face-to-face class, the hours required for each course, and the total number of rooms available to be used by each program for the upcoming First Semester AY 2022-2023.

KEYWORDS

Hybrid, Blended, Cluster, Heuristic, Algorithm

DESIGN, SIMULATION, AND ANALYSIS OF A GRID-TIED PV SYSTEM FOR -P1-3 **BAUAN TECHNICAL INTEGRATED HIGH SCHOOL, BAUAN, BATANGAS**

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ABSTRACT

The purpose of installing a Grid-Tied Photovoltaic (PV) System in Bauan Technical Integrated High School (BTIHS) is to help reduce carbon dioxide emissions, support sustainable development, and lessen the electric bill paid, providing the students of BTIHS with uninterrupted energy usage. The study aims to design, simulate, and analyze the installation of a grid-tied PV system in BTIHS. The study aims to design a grid-tied PV system for BTIHS and forecast its performance to ensure viability. In order to provide BTIHS with a design that is best suited for the institution, the researchers utilized mathematical and physical modeling. Solar radiation and temperature, two meteorological variables which greatly affect the performance of a grid-tied PV system, were used in simulating the design. The technical parameters simulated are the kWp capacity, kW-hr generation, installation cost, reduced CO2 emissions, equivalent trees planted, accumulated savings, and return on investment. In the project study, three designs were considered, three for each phase. The designs were evaluated using a decision matrix, which took into account each design's aforementioned technical parameters. Outputs of the study include an analysis of the effects of varying irradiance and temperature on the PV system and the best- suited grid-tied PV system design for BTIHS, including its solar panel layout and single line diagram. The Seraphim 670W and SolaX inverter combination is chosen as the best design among single-phase designs, while the Jinko Tiger 580W and Deye inverter combination is chosen as the best three-phase PV system design.

KEYWORDS

grid-tied PV system, mathematical modeling and simulation, MATLAB, Simulink

PERFORMANCE EVALUATION OF LAGGED PIPE APPARATUS FOR HEAT TRANSFER DEMONSTRATIO WITH MATHEMATICAL MODELING

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ABSTRACT

Heat transfer is present in every mechanical system, engineers and students have focused their efforts on understanding this phenomenon and trying to develop mathematical theories to describe it. Nowadays, several experiments have been motivated by the engineering applications of heat transfer. This can be mostly seen in power and industrial plants, specifically in the field of renewable energy. This study tested, evaluated, and designed a mathematical model using the lagged-pipe apparatus for heat transfer demonstration, mathematical models were produced to represent the actual behavior of the change of temperature on material concerning time. This was done using Rockwool Insulation, Fiberglass Insulation, and Calcium Silicate while setting the steady-state temperature at 300[]C, 350[]C, 400[]C, 450[]C, and 500[]C. For every experiment, a single material was used for the inner pipe and outer pipe. Each setup was performed using steady-state temperature to identify its relationships with the performance parameters. The experiments were used to obtain the time versus heater temperature, time versus inner pipe temperature, and time versus outer pipe temperature relationships in every type of insulation and assigned steady-state temperature. MatLab was used for the development of the mathematical model. MatLab has a curve fitting toolbox feature used to generate polynomial model, considering the R-square and Root Mean Square Error. This generated a polynomial regression model was used to predict the performance of the lagged pipe apparatus.

KEYWORDS

Heat transfer, Mathematical Models, Rockwool, Fiberglass and Calcium Silicate insulation, Steady-State temperature, Matlab, Curve Fitting tool box and Root Mean Square Error and Lagged pipe

SMART IRRIGATION SYSTEM BASED ON PENMAN-MONTEITH MODEL OF EVAPOTRANSPIRATION

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ABSTRACT

Smart Irrigation System Based on Penman-Monteith Model of Evapotranspiration is a study that aims to provide a high water efficiency rate and less water consumption for crop use without compromising yield rate through design and simulation procedure. Penman-Monteith Model parameters were discussed, and how these parameters affect the amount of water a crop may need. Data included were gathered through online weather sites and are utilized to calculate a value of water requirement using the Penman-Monteith Model of Evapotranspiration. Development stages of maize crop were given importance, which includes the Kc initial, Kc dev, Kc mid, and Kc late, as these different stages vary water requirements in both dry and wet seasons. Concerning the objectives provided in the study, design requirements were also discussed, and a flow rate of 78.8 Lph was utilized based on the area of 300sqm and the number of drippers the area can hold. The control system of the study was constructed through LabView where different fuzzy inference rules are utilized for each input (ETc Value, Rain Amount, Soil Moisture Content) in order to generate a time duration of irrigation based on crop water requirement. Simulation is presented through Labview (GUI, time duration) and Solidworks (walkthrough).

KEYWORDS

Smart Irrigation System, Penman-Monteith Model of Evapotranspiration, Irrigation duration, Crop water requirement, ETc Value

)-P1-5

INTEGRATED APPROACH IN THE DEVELOPMENT OF A TEN-YEAR SOLIDWASTE MANAGEMENT PLAN OF PADRE BURGOS, QUEZON

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ABSTRACT

Philippine Ecological Solid Waste Management Act of 2000 requires the province, city, or municipality to prepare a Ten-Year Solid Waste Management Plan consistent with the National Solid Waste Management Framework. However, since 2000 when the law was created, not all Local Government Units (LGU's) conforms to the requirements of the Act.

The 2021 waste assessment and classification study (WACS) for the Municipality of Padre Burgos showed that it generated 0.16 kg/capita/day amounting to 4,090.72 kg/day. The municipal waste includes biodegradable wastes (40.89%), recyclable waste (28.31%), residual waste (21.37%), and special waste (9.43%). Currently, the municipality has no proper solid waste management system. In this study, a Ten-Year Solid Waste Management Program for the municipality of Padre Burgos, Quezon is developed using integrated approach focused on resource use efficiency. It covered all sources of wastes and all aspects of wastes covering generation, segregation, transfer, sorting, treatment, recovery, and disposal in an integrated manner. The acceptability of the proposed Ten-Year Solid Waste Management Plan was evaluated by the implementors through dialogue.

Results showed that using the integrated approach the waste generation will reduce the residual waste to 248.42 kg/day equivalent to 95% of total waste generated with expected profit on the 10th year of implementation amounting to 3.07 million Pesos. Lastly, the matrix of monitoring and implementation for the proposed Ten-year Solid Waste Management Plan received positive response and commitment of the municipal officials.

KEYWORDS

Solid Waste Management Plan, Republic Act 9003

GIS (GEOGRAPHICAL INFORMATION SYSTEM) - BASED MULTI-CRITERIA APPROACH ON FLOOD RISK MAPPING ASSESSMENT OF BATANGAS CITY, BATANGAS

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ABSTRACT

A-P2-2

The Philippines is rich with a large number of streams, lakes, and rivers; however, due to excessive abundance of water and other precipitation-producing weather phenomena, these result in disastrous flooding. The City of Batangas is one of the places hit by strong typhoons for the past two years. Given the flooding scenarios, flood risk assessment is an essential measure in extenuating floods, especially in urban areas. To achieve this, the study utilized the Geographical Information System (GIS) and multi-criteria analysis with the application of the Analytical Hierarchy Process (AHP) method producing flood risk maps that analyzed different flood scenarios evaluating the total flood vulnerability level. The integration of MCA and GIS in the study guided the researchers in identifying flood-prone conditions in various areas of Batangas City. This approach will assist disaster risk reduction officers in improving immediate hazard mitigation measures and in determining when a flood may occur in the study area.

KEYWORDS

Flood mapping, GIS, multi-criteria decision analysis, analytical hierarchy process

GIS-BASED CHARACTERIZATION AND PROFILING OF LOBO WATERSHED: INPUT FOR LANDUSE OF WATERSHED MANAGEMENT AND MODELING

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ABSTRACT

Watershed characterization includes the physical, biological, social, and economic components of the watershed, as well as the identification of issues, vulnerabilities, issues, and opportunities for development interventions. This study focused on the physical characteristics in terms of geomorphology, land use, soil, and climate of the Lobo-Rosario watershed located in the municipalities of Lobo, Taysan, San Juan, and Rosario. Both primary and secondary data gathering were done. Delineation and morphometric analysis were done using Archydro using ArcGIS 10.3 by ESRI. Soil and weather data were sourced from BSWM and PAGASA respectively. Streamflow was directly measured using open channel profiler at three stations. Results showed that shape factor, circularity ratio, bifurcation ratio, and rho coefficient indicated a higher possibility of flooding. Relief aspects such as basin relief ratio, relief ratio, ruggedness, Melton's ruggedness, and slope can be inferred that the watershed has a rugged topography and is susceptible to soil erosion. Areal aspects, circularity ratio, compactness constant, elongation ratio, form factor, and shape index indicate that the Lobo watershed has an elongated shape based on the result. The drainage pattern is dendritic and inclined due to the area's general topography. There are 5 land classifications based on the 2015 NAMRIA Landcover in which cropland is the highest portion while the lowest is forest area. There are 4 types of soil series in Lobo River based on the map of the Bureau of Soil and Water Management (BSWM) in which Ibaan (Gravelly phase) is the highest, while the lowest is the Guadalupe clay loam. Municipalities of Lobo, Rosario, San Juan, and Taysan almost have the same climatic pattern. In 6 stations, station 3 has the highest velocity among all of them. Threats observed such as livestock, swine waste, land conversion, quarrying, and urbanization have a great impact on the water quality and physical structure of a watershed.

KEYWORDS

watershed characterization; GIS; delineation; morphometric analysis; streamflow

CONCRETE MIXTURE OPTIMIZATION OF THE UTILIZATION OF TAAL VOLCANIC ASH FOR CONCRETE HOLLOW BLOCK PRODUCTION

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ABSTRACT

Conducting research studies that will benefit the community to be served is among the mandates of Batangas State University - The National Engineering University. In January 2020, tons of volcanic ashes (VA) of the Taal Volcano eruption were released in the areas of Agoncillo, Balete, Laurel, Lemery, Lipa City, San Nicolas, Taal, Talisay, and some parts in Laguna resulting to damages and inaccessibility of infrastructures in the areas. One of the highlighted purposes of these ashes is its potentiality to be a construction material which will also benefit in the rehabilitation and recovery of some facilities in the affected areas. Despite the established utilization of Mt. Pinatubo ash for pozzolanic replacement, Taal VA still needs further verification as to how it will be mixed with concrete mixture for concrete hollow block (CHB) production. In this study, 10%, 20%, 30%, and 40% cement or sand replacement by Taal VA were investigated. All of the specimens of proportioned mix designs did not pass the standards designated by ASTM and DPWH in terms of compressive strength, oven-dry density, and water absorption. The mix design with 10% cement replacement was concluded as the optimum concrete mixture utilizing Taal VA having a mean compressive strength of 2.88 MPa, which is equal to 68.8% of the 28-day compressive strength of the control concrete mix design.

KEYWORDS

compressive strength, concrete hollow blocks, oven-dry density, Taal volcanic ash, water absorption

-P2-

DESIGN AND SIMULATION OF AN ARDUINO-BASED GREENHOUSE ENVIRONMENTAL CONTROL SYSTEM

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ABSTRACT

Agriculture is a major sector in the Philippine economy which is highly dependent on climate change. The four major environmental factors that affect the agricultural products inside the greenhouse are the temperature, humidity, light, and soil moisture. A greenhouse can provide many of the ideal conditions for plants to survive, since it requires optimal natural circumstances to grow. The capstone project is centered on designing and simulating a greenhouse environmental control system using the Arduino platform, mainly focused on monitoring and controlling the four major parameters affecting the plant inside the greenhouse. Generally, tropical plants grow properly mostly at the optimal state of $18^{\circ}C - 24^{\circ}C$ for temperature, 80% for humidity, 0-2000 lux for light intensity, and 40° –79% for soil moisture. The proponents utilize the Proteus and SketchUp software for designing and simulating the greenhouse system. Through design and simulation methods, several tests in the system were compromised in order to meet the objectives of the project. When the sensor detects that temperature surpasses and the humidity reading falls below the setpoint, the fan is energized and the servo motor is open. The servo motor will open the water supply when the soil moisture falls below the setpoint. The LED is turned on when the brightness reading goes below the setpoint. The actuators will be disabled after all of the parameters have reached its setpoint. In the final analysis, when sensor reading does not reach the setpoint, the actuators will continue providing a supply until it reaches the setpoint, and when the sensor reading meets or surpasses the setpoint, the actuators will turn off automatically.

KEYWORDS

Greenhouse Control System, Design, Simulation, Physical Model, Temperature, Humidity, Light Intensity, Soil Moisture, Arduino, Setpoint



CTAB-MODIFIED REDUCED GRAPHENE OXIDE (RGO) FROM SUGARCANE BAGASSE AS SORBENT FOR COPPER (II) IONS REMOVAL

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ABSTRACT

In this study, graphite was made from carbonization of sugarcane bagasse in a furnace and the percent yield is 20-24%. It was made into reduced Graphene Oxide (rGO) and chemically modified using Cetyltrimethylammonium bromide (CTAB) to make an adsorbent sample. The final sample (CTAB-modified rGO) has a yield of 72% from the synthesis out of graphite. The rGO and CTAB-modified rGO were characterized through FTIR, XRD, TGA, zeta potential, and SEM. Using the simple batch-adsorption technique, the Cu(II) was adsorbed onto the CTAB-modified rGO in aqueous solutions. The quantity of Cu(II) removed effectively varied with pH, starting copper concentration, contact duration, and adsorbent dosage. Under pH 5 at initial Cu(II) concentration of 50 ppm over 40-min adsorption time, the highest removal efficiency of Cu 2+ is 76.151%. The experimental data agree well with the Langmuir isotherm, and the maximum adsorption capacities of CTAB-modified rGO is 32.5733 (mg/g) and the pseudo-2nd order kinetics best fit as the kinetic model. The metal adsorption of CTAB-modified GO is significantly affected by initial Cu (II) concentration, among the rest of the parameters.

KEYWORDS

CTAB-modified rGO, Copper (II) removal, Sugarcane bagasse, Adsorption, Heavy metal ion

DNAniel: A NOVEL DESIGN OF DNA LOSSLESS COMPRESSION ALGORITHM BASED ON SORTED SUBSEQUENCE PREFIX-FREE ENCODING

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ABSTRACT

Genomic data is growing exponentially. With sequencing costs dramatically decreased in recent years, massive amounts of genomic data are being generated but the storage needed to store this information is limited, and therefore developing a new approach for genomic data compression is necessary. This study provides a new approach for encoding and compressing genomic data that can be very helpful in biomedical research and science. It aimed to develop a novel DNA encoding and lossless compression algorithm, evaluate and analyze the algorithm performance and compare it to the standard compression algorithms. Consequently, this study tried to prove that it is possible to encode and compress a sequence with a finite set of symbols using its sorted subsequence as another way of prefix-free encoding.

To develop the algorithm, several approaches, reconfiguration and tuning were done. The algorithm is implemented using Python and tested in six different DNA datasets from the NIH GenBank genetic sequence database. Itsperformance is evaluated in terms of compressed size, compression ratio (bpb), compression and decompression time(s), and memory usage. The algorithm is benchmarked to standard lossless text compression algorithms such as 7zip, bzip2, and gzip.

The results showed that while the novel design of the algorithm can compress 50-60% of genomic data, with an average of 3.7-4.0 bpb, it is not optimal and cannot be considered for archiving DNA sequences and as a substitute for the standard and state-of-the-art DNA compression algorithms that have compression ratio closer or better than 2.0 bpb. The algorithm time execution is measured on O(n) complexity.

Finally, it is concluded that a prefix-free encoding scheme using sorted subsequences is possible in a sequence with a finite set of symbols that has no consecutive repeated elements. The order that yields the minimum number of sorted subsequences is the most efficient configuration for the encoding algorithm. While the best order is possible to obtain by brute-forcing all possible permutations of the order set, it is recommended that future research devised a way to efficiently identify the best order without trying all combinations. Applications of sorted subsequences can also be considered in other areas of computer science and DNA sequencing.

KEYWORDS

sorted subsequence, lossless compression, prefix-free encoding

DESIGN AND DEVELOPMENT OF AUTOMATED BANANA PSEUDOSTEM WATER EXTRACTOR AND PURIFIER MACHINE

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ABSTRACT

Developing an automated banana pseudostem water extractor and purifier machine aims to help minimize agricultural waste while providing an alternative water source for drinking. The machine was designed and developed using locally available materials. The essential components of the machine include the hopper, crusher blades, extruder screw, water purifier system, gear motors, and water pump. Banana pseudostems are fed into the hopper and crushed by the crusher blades, driven by a 1.5 HP. A 1 HP motor-driven extruder screw then extracts the water. The extracted water will go straight into the bin, which will activate the 1/4 HP pump, while the pulped pseudostems will be discharged through the waste outlet. The water pump will pressurize the water into the water purifier system to produce clean water. Results show that the average yield is 800 mL of water for every five kilograms. Laboratory tests were performed on the water purified by the machine. The output has a pH of 7.7, arsenic, cadmium, and nitrate are minimal, with concentrations of 0.002 mg/L, 0.003 mg/L, and 0.28 mg/L, respectively, and E. coli concentrations are 1 MPN/100mL, all of which are below the MAL set by the Philippine National Standards for Drinking Water.

KEYWORDS

banana pseudostem, hopper, crusher blades, extruder screw, water purifier system

-P2-7

SUBMERGED MARINE DEBRIS DETECTION AND CLASSIFICATION USING DEEP LEARNING APPROACH

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ABSTRACT

With recent technological advancements, systems such as vision systems are being used in a variety of useful applications. Because they function with a wide range of real images and videos, deep learning techniques have made vision systems more helpful in real-world settings. With the aim of identifying the best deep learning technique for the classification and detection of submerged marine debris, this study uses image transformation techniques for the preprocessing of data and the deep learning algorithms YoloV5 and RetinaNet for the process of reaching the aim. As YoloV5 is generally recognized as the fastest detection method, and the accuracy and the detection speed are greatly improved compared with the other methods, RetinaNet is a one-stage object detection model that has been shown to work well with dense and small-scale objects. Another aim of this study is to identify how much of a difference an image preprocessing technique will make compared to the raw dataset. The dataset that will be used here is a public dataset named AquaTrash and the image transformation techniques used here are affine transformation, grayscale transformation, rotation, and image translation. And upon using the mentioned models on different datasets, on YOLOv5 and RetinaNet, the dataset that went image translation got the highest mAP among the other dataset including the raw ones.

KEYWORDS

data preprocessing, image transformation, deep learning technique, YOLOv5, RetinaNet

FACTORS AFFECTING BIOSECURITY AND MOVEMENT PRACTICES AMONG LIVESTOCK FARMERS IN LOBO, BATANGAS

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ABSTRACT

-P2-2

Biosecurity and movement practices are crucial in disease prevention and farm output. Observations in Lobo, Batangas show that biosecurity and movement practices are still far less implemented than suggested. In this context, this study evaluated the factors affecting biosecurity and movement practices among livestock farmers in Lobo, Batangas. The study employed a descriptive research method, and a total of 100 respondents from the top five producing upland and lowland barangays were chosen at random. A systematic questionnaire was used to collect the data. The biosecurity and movement measures were scored technically, and data were analyzed using descriptive statistical indices and SPSS Statistical Tool (software version 28.0). This study found that most of the hog raisers' age was above 40 coupled with their educational background, making it hard for them to qualify for jobs in the formal sector, which can potentially offer them a higher income source, and had experience in the field for a longer period. Small-scale farming is the most common economic activity in pig husbandry. Because of this characteristic, hog raisers do not prioritize and are not fully aware of the multi-benefits of both practices. Biosecurity and movement practices of the investigated farms were observed as poor indicating that there are still issues that need to be dealt with. The correlation analysis results showed that herd size and the number of individuals involved in management decisions had a significant positive influence on biosecurity and movement practices score. Thus, biosecurity and movement practices are too expensive to be implemented.

KEYWORDS

biosecurity practices; movement practices; livestock; diseases; socio-economic

PHENOTYPIC AND MORPHOMETRIC CHARACTERIZATION OF NATIVE CHICKEN IN LOBO, BATANGAS

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ABSTRACT

Most of the farmers are not fully aware of the breeds of native chicken they are raising. The fact that they might not know that they could earn profit from it and the chance of finding a new novel breed of native chicken. Given these context, this study aimed to identify the distinct breed, phenotypic and morphometric characteristics of native chicken in upland areas in Lobo, Batangas. The study characterized native chickens based on phenotypic and morphometric traits, measuring 5 traits and describing 9 discrete characteristics of 205 randomly-selected native chickens from ten upland barangay in Lobo including Nagtaluntong, Nagtoctoc, Jaybanga, Apar, San Nicolas, Calo, Malalim na Sanog, Malapad na Parang, Calumpit and lastly barangay Pinaghawanan in the province of Batangas. Phenotypic form which served as survey-questionnaires were distributed to farmers to gather necessary data. As for the findings, the identified native chicken breeds were Banaba (150), Paraoakan (30), Darag (12) and Unidentified (13). This entails that Banaba breed was found to be popular in Lobo. The native chickens from both sexes across barangays were found to have red earlobe, white skin, gray/white shank, single comb type, red comb, and orange color of eyes. The plumage colors in roosters and hens with dominantly normal feather morphology. The researchers also noticed that roosters were heavier than the hens which means they had dominant morphometric traits than most of the female chickens.

KEYWORDS

native chicken; breeds; phenotypic; morphometric

PROPERTY CHARACTERIZATION OF COMMERCIALLY SOLD AGGREGATES SOURCED IN SELECTED LOCATION AS INPUT TO A DATABASE – DRIVEN WEB APPLICATION

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ABSTRACT

The increase in the infrastructure development in Batangas resulted in diverse sourcing of construction materials. As such, there is a need for quality assurance in aggregates. Aggregates serve as the primary component of different construction materials like concrete; thus, it is appropriate to identify the aggregate characteristics suitable for the said materials. This study utilized different methods such as survey interview, experiments, and tests to characterize the aggregates sold in Batangas. Specifically, aggregates available in the 3rd District of Batangas were described according to its source, and price. Through quasi – experimental research, the physical characteristics of aggregates sourced in Pampanga, Quezon, and Tarlac in terms of grading, specific gravity and absorption, moisture content, bulk density and voids, and abrasion resistance was determined and evaluated through other related literatures and standards accepted both local and international. Furthermore, a database web application was developed featuring the descriptive characteristics and physical properties of aggregates according to sources they were acquired. Results of this study are beneficial to the construction industry of the province which will emphasize the need for quality aggregates.

KEYWORDS

aggregates, physical properties, compressive strength, database web application

B-P2-

PROPOSED DESIGN OF WASTEWATER TREATMENT FACILITY FOR IBAAN PUBLIC MARKET

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ABSTRACT

Public markets produced high strength wastewater that is more polluting than residential wastewater. Wastewater from public markets is generated in distinct sources such as from meat and poultry section, fish preparations, eateries, and toilet facilities which contains high organic materials, suspended solids and oil and grease. Ibaan Public Market, a public market in Ibaan produces high strength wastewater from its discharge point which is the Ibaan Creek that is connected to Ibaan River and Calumpang River. It is stated in the Municipal Ordinance No. 2011- 03 or also known as the "Market Code of Ibaan, Batangas" that it is the policy of the municipality that a proper and adequate pollution abatement facilities shall be established in the public market to maintain cleanliness and sanitation. The proponents proposed two (2) wastewater treatment systems, Membrane Bioreactor (MBR) and Moving Bed Biofilm Reactor (MBBR), which can improve the generated wastewater at the Public Market before going to the discharge point. The WWTF are designed to meet the effluent categorization for Class C water. From the evaluation of design criteria, it is found that the second proposed system, the MBBR, is more appropriate to be utilized as a wastewater treatment facility for the Public Market of Ibaan.

KEYWORDS

Membrane Bioreactor (MBR), Moving Bed Biofilm Reactor (MBBR), underground wastewater treatment facility, wastewater

UTILIZATION OF STARCH FROM BREADFRUIT (ARTOCARPUS ALTILIS) PULP REINFORCED WITH MICROCRYSTALLINE CELLULOSE FROM KAPENG BARAKO (COFFEA LIBERICA) HUSK FOR FOOD PACKAGING BIOPLASTIC PRODUCTION

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ABSTRACT

This study aims to determine the feasibility of starch from breadfruit pulp reinforced with microcrystalline cellulose from kapeng barako husks for food packaging bioplastic production through experimental method of research. Average percentage yield of extracted starch and microcrystalline cellulose were 23.61% and 42.19% using aqueous and acid hydrolysis respectively. The physicochemical characteristics of microcrystalline satisfied the standards of its commercially-available counterpart with approximately 210.00 µm particle size, 0.37 g/mL bulk density, 0.46 g/mL tapped density, 20.02% compressibility index. 1.24 Hausner Ratio, 5.96% for Loss on Drying and pH of 6.28. Its morphological properties were 73.93 Å crystallite size and 55.11% crystallinity index and determined through X-ray Diffraction Analysis (XRD). Then, formulations of three starch to microcrystalline cellulose bioplastic ratios (70:30, 80:20 and 90:10 w/w) were produced and compared in terms of their physical (color, density and water absorption), chemical (chemical resistance to acid and bases and thermal stability) and mechanical properties (tensile strength and elongation at break). As a result, there was significant difference on the chemical and mechanical properties except for physical properties of the varying starch to microcrystalline cellulose ratio. Obtaining good properties from the comparison . 70:30 starch to microcrystalline cellulose ratio possessed an improved surface morphology, good biodegradability after 20 days produced partial inhibitory activity (++) with mild reactivity against Gram positive bacteria (Staphylococcus aureus) and Gram negative bacteria (Escherichia coli) and inhibit the perishability of tomatoes after nine days. When 70:30 starch to microcrystalline cellulose bioplastic ratio was compared to commercially available bioplastics, it was indicated that there was significant difference between them in terms of physical (except for density at minimum value), mechanical and biodegradability properties.

KEYWORDS

breadfruit, kapeng barako husk, starch, microcrystalline cellulose, bioplastic

INTEGRATING GEOGRAPHIC INFORMATION SYSTEM (GIS) AND B-P2-MICROSCOPIC TRAFFIC SIMULATION MODEL FOR IMPROVED EMERGENCY EVACUATION PLAN OF AGONCILLO BATANGAS

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ABSTRACT

Emergency evacuation planning is a comprehensive method that entails planning traffic control, rerouting of the evacuees, and designating evacuation shelters and exits. The municipality of Agoncillo has been one of the most vulnerable municipalities in Batangas when it comes to natural disasters. With this in mind, an efficient and effective emergency evacuation plan plays a vital role. Concerning this, this study entitled Integrating Geographic Information System (GIS) and Microscopic Traf ic Simulation Model for Improved Emergency Evacuation Plan of Agoncillo Batangas aims to enhance the current emergency evacuation strategy and plan of the aforementioned municipality. By conducting traffic simulations using PTV Vissim software, the proponents have created and evaluated real-time scenarios developing alternative route options for faster and more efficient rescue and evacuation operations for the residents of Agoncillo, Batangas. The results of the conducted simulations were then integrated with Geographic Information System (GIS). This helps the researchers to pinpoint areas with high risk of different natural disasters and their secondary and tertiary consequences and develop alternative evacuation route plans for the municipality. With the integration of these two technologies, the Municipal Disaster Risk Reduction Office (MDRRMO) can improve its disaster management approaches, reducing the risk during evacuation. Along with a faster and more efficient emergency evacuation route plan, LGUs and citizens of Agoncillo, Batangas can be prepared for unforeseen events during evacuations.

KEYWORDS

Emergency evacuation, Route plan, Simulation, Maps, Geographical information system (GIS), PTV Vissim

UTILIZATION OF KERATIN BASED PROTEIN FROM PIG HOOVES (SUS UNGULATES) FOR THE REMOVAL OF COPPER (II) ION IN SIMULATED WASTEWATER

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ABSTRACT

The Philippines' rapid rising population has driven industrialization and urbanization, which has polluted sources of water. Domestic and industrial wastewaters, heavy metals, raw sewage, detergents, and fertilizers, are all prevalent contaminants. Heavy metals are non-biodegradable, poisonous, and have a high tendency to bioaccumulate, posing a serious hazard to environment, animals, and humans. Biosorbent appears to be the solution to the issue. In recent years, the use of biosorbents with a biosorption effect proves to be one of the most simple and efficient strategies of removing heavy metals from wastewater. Biosorption key advantages over conventional treatment includes low cost, highly efficient, minimal chemical and biological sludge, biosorbent regeneration, and possible metal recovery, which has been demonstrated in numerous studies and/or articles. Keratin-based protein, which is found in hair, hooves, and teeth are the most commonly used raw material for it is believed to effectively remove heavy metals from wastewater. Farm animal hooves' (cows, cattle, goats, etc.) are already being utilized to remove heavy metals from wastewater due to its lower costs. Pig hooves, as the most extensively utilized animal in the Philippines, is seen as a promising cost-efficient and eco-friendly biosorbent in the removal of Copper (II) ions from wastewater.

KEYWORDS

Pollution, Heavy Metals, Biosorption, Pig Hooves, Keratin, Copper (II) ions

LIFE-SAVING BED BOAT

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ABSTRACT

-P2-1

Typhoons as one of the most hated disaster in the Philippines, brings heavy and destructive floods causing people to lose their properties, livelihood and even their loved ones. Even though disasters are inevitable, there are still some ways to save people and important things from these natural phenomena. Rescue teams and necessary equipment are not always enough and available to rescue people out of danger zone and alternative objects from household are not always present.

Life Saving Bed Boat is a multi-purpose furniture that will give users a very convenient and helpful object inside their house. Its main purpose is to provide its users a comfortable and unique design of a bed and to save lives during calamities such as floods while securing their important things inside the compartment. The top priority of this project are the people residing in flood prone areas as they cannot provide immediate action when the flood raised up high. Rescuers cannot always save individuals faster because of various factors such as lack in rescue boats and rescue teams.

The Life Saving Bed Boat has a dimension of 2.50 meters in length, 1.22 meters in width, and .60 meters in height. The size of the project is based on the size of semi double bed measuring 1.96 meters in length and 1.4 meters in width. When transformed as a boat, the height will be raised by .67 meters as the bed frame will be lift up to serve as the roof of the boat.

This project can fit two persons when used as bed and can accommodate four to six persons when used as a boat.

KEYWORDS

Boat, furniture, calamities, dimension

"PROPOSED DESIGN OF WASTEWATER TREATMENT FACILITY IN GAODIONCO UY VENDIOLA (GUV) VILLAGE, SAN ANTONIO, SAN PASCUAL, BATANGAS"

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ABSTRACT

C-P2-3

Wastewater is the polluted form of water generated from human activities. It contains pollutants that are toxic to humans and the ecosystem thus proper treatment before releasing it back to the environment is necessary. Gandionco Uy Vendiola (GUV) Village, located at San Antonio, San Pascual Batangas is composed of 146 residential houses and a population of 833. The area has one outfall discharging all the untreated wastewater to the creek directly flowing to the Batangas Bay which not only result in water body contamination and pollution but can also cause the death of the fish and other aquatic animals. Therefore, proposing a Wastewater Treatment Facility (WWTF) in the subdivision is crucial in order to prevent and address the problem. Moreover, it is needed to comply with RA 9275. The parameters that are involved in the proposed project that focuses on the treatment of wastewater in the village were assessed to meet the standards of DAO 2016-08 and DAO 2021-19. The two alternative designs were Moving Bed Biofilm Reactor (MBBR) system and Biological Aerated Filter (BAF) system. In evaluating the design considerations, it was determined that MBBR is more advantageous and economical than the BAF system.

KEYWORDS

Wastewater, Contamination, Pollution, Wastewater Treatment

AN SDR-BASED COMMUNICATIONS LINK FOR EMERGENCY COMMUNICATIONS IN DISASTER ISOLATED AREAS OF BATANGAS PROVINCE

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ABSTRACT

In this study, a concept for an SDR-based communications link is proposed, which may be useful for emergency communications in disaster-affected areas of Batangas Province. Software Defined Radio (SDR) refers to a platform that enables extensive radio communication and allows for the incorporation of new technology through the use of software updates. This results in a significant cut in the costs associated with expansion and makes it possible for the product to continue its technological development. Moreover, in the proposed design, an SDR Active Learning Module, specifically an ADALM PLUTO AD9363, was utilized, which was then configured and tested using simulations in MATLAB Simulink. An SDR-based Communications Link was successfully designed and configured under the Ultra High Frequency of 2.437GHz. The results of the simulations demonstrate that by using QPSK as the modulation technique, the design is capable of transmitting and receiving messages for a short range transmission during disasters. Moreover, the communication link 65 that was created was able to transmit messages concurrently with a small margin of error and no losses which is significant considering the location of the testing.

KEYWORDS

Software-defined radio, ADALM-Pluto, MATLAB, Simulink, communication

ASSESSMENT AND OPTIMIZATION OF EMERGENCY EVACUATION ROUTE PLAN IN AGONCILLO, BATANGAS CITY

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ABSTRACT

Agoncillo town is a 4th class municipality with a total of 40,940 individuals as per the result of the survey conducted by the MDRRMO as part of evacuation planning which identifies the number of individuals and families that will go to evacuation centers, Given the municipality's vulnerability to disaster due to its proximity to Taal Volcano and coastal areas, particularly barangay Banyaga, Bilibinwang, Subic Ibaba, and Ilaya, which were all impacted by typhoon Ulysses, which displaced 10 families totaling 48 people, the local government unit, which included the Municipal Disaster Risk Reduction and Management Office (MDRRMO) and Engineering Office, had already made plans for evacuation and disaster preparedness. After analyzing the current evacuation route map, it was discovered that a total of 843.55 km will be needed to evacuate all of the affected people and the factors considered by the MDRRMO was not enough in order to have a smooth and fast evacuation. By using a scientific method like Operation Research, the researchers aims to optimize the distance of evacuation, which is also a critical aspect of a successful evacuation. To determine the probable alternative routes and to make a mathematical model of the alternative routes, the researchers considered pick-up points, evacuation centers, number of evacuees, the capacity of evacuation centers, and road networks and distances. The researchers were able to design an alternative route by considering and modifying the existing plan using mathematical modeling and transportation models. The variables that was used to design the mathematical model of each proposed alternative route that aims to minimize the distance traveled, are the total number of evacuees, the number of evacuees per pick-up point, the capacity of each evacuation area, and the distance traveled from pick-up point to evacuation area.

KEYWORDS

evacuation, vulnerability, emergency

C-P2-

P2

OPTIMIZATION OF VOLATILE FATTY ACIDS PRODUCTION THROUGH ANAEROBIC DIGESTION FOR THE VALORISATION OF CHICKEN MANURE -P2

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ABSTRACT

This study aimed to develop a renewable source of VFA that is sustainable, biodegradable, versatile, and environmentally friendly. Further, by valorizing chicken manure as a feed for anaerobic digestion in the manufacture of volatile fatty acids, this research sought to optimize the operating conditions for the production of VFAs. The results showed that all of the physicochemical characteristics of the CM except moisture content increased after drying at 70°C. On an average basis, the production rate of biogas was 151mL/kg-1day while the cumulative biogas produced was 1270 mL/kg -1 day. Along with the biogas produced during the digestion of chicken manure, the VFA produced from day 7 to day 12 were 0.607 g/Vs, 0.622 g/Vs, 0.559 g/Vs, 0.603 g/Vs, 1.950 g/Vs, and 4.25 g/Vs respectively.

The sludge is composed of macronutrients including potassium, which is 3.6 Mg/L k, 0.082 % nitrogen, 0.10 Mg/g ammonia, 0.11% phosphorus, and 0.17% of sulfur. The VFAs produced are classified as acetic acid, lactic acid and tartaric acid. The total production for a period of 7-12 days was 4.61 mg/L acetic acid, 4.03mg/L lactic acid, and 0.48mg/L tartaric acid which acetic acid as the dominant VFA produced. The optimum pH value for the production of VFA is 7. The best temperature is at 45°C. The optimum HRT and OLR is 9.5days and 45 kg/L, respectively. The mathematical model solving the effect of varying anaerobic digestion parameters to VFA yield was likewise developed.

KEYWORDS

Chicken manure, Optimization, Sludge digestate, Volatile fatty acids (VFAs)

ENHANCED FISH POPULATION AND ESTIMATION TECHNIQUES **USING FASTER R - CONVOLUTIONAL NEURAL NETWORK** (FASTER R - CNN) & COUNTING TECHNIQUE

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ABSTRACT

The Philippines as one of the world's centers of marine biodiversity established marine protected areas (MPAs) to address the threats plaguing marine resources [1]. These projects aimed to protect and conserve the natural resources and support and enhance local fisheries for monitoring fish populations. Some LGUs, specifically in Municipality of Lobo, Batangas, are still using monitoring surveys for fish population estimation based on manual counting in their three (3) marine protected areas and fish sanctuaries located at Barangay Biga, Malabrigo and Sawang Olo- olo, which is usually time-consuming and laborious, but some studies developed using technology-based estimation. However, there still needs improvements in object detection accuracy and reliability to validate the estimation of fish abundance. Thus, an enhanced approach for object detection and algorithm for counting was used to solve these issues. To provide a more efficient, effective, and faster way of monitoring fish population; this study used Faster R-CNN with ResNet 50 module as an enhanced machine vision based approach of fish population estimation. The output of this object detection was used as input for counting technique. These methods were implemented in Matlab and used different tools that provide analysis report. Different metrics were used to evaluate the performance of the algorithms. The results show that the algorithm for identification and classification of fish species type reached its high accuracy rate of 100%. As compared with existing model implemented, it has a 3.97 percentage increase on accuracy. The time of prediction also shows a 1.2 percentage difference in estimation of fish population counts. The overall performance of the detection network and the counting technique shows improvement in object detection accuracy and reliability to validate fish abundance estimation and will help to easily monitor the abundance of fish species and populations with accurate estimation.

KEYWORDS

machine learning, convolutional neural networks, TensorFlow

MODEL-BASED LAND USE ANALYSIS OF BATANGAS STATE UNIVERSITY AS INPUT TO SUSTAINABLE DEVELOPMENT GOALS

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ABSTRACT

This study aimed to determine the land use of the Batangas State University system in terms of built environment, vegetation, open spaces, accessibility, building demographics and conditions using model-based analysis. These were assessed using sustainable development goals (SDG) scoring matrices based on SDG 3: Good Health and Well Being, SDG 6: Clean Water and Sanitation, SDG 11: Sustainable Cities and Communities, and SDG 15: Life on Land of the 2030 Agenda for Sustainable Development of the United Nations. This research employed the descriptive method of research to assess the current condition of the land use of the BatStateU system and evaluate their environmental effects. Data were gathered through site validation and field surveys on each BatStateU campus, which were incorporated in the model-based analysis using QGIS software. The study revealed that maintenance and repair were mostly required for the campuses' architectural, fire safety, and electrical aspects. BatStateU-Mabini had the greatest potential for future development. All campuses have the accessibility to the nearest essential facilities. BatStateU Pablo Borbon has the highest SDG compliance percentage Recommended action plans include the need for an Environmental Management Unit (EMU) on the four (4) campuses namely BatStateU Lipa, BatStateU Lobo, BatStateU Mabini, and BatStateU Rosario.

KEYWORDS

sustainability, land use, sustainable development goals, QGIS, building demography

SOIL-UTION: A SOIL CLASSIFICATION AND CROP SUGGESTION USING MACHINE LEARNING

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ABSTRACT

Soil is one of the most important variables that affects crop productivity. Improving strategies for predicting agricultural production in various climatic circumstances will assist farmers and other stakeholders in making better agricultural and crop selection decisions. The use of data mining in the agriculture industry has produced results in the field of study. Most existing studies offer different soil classifications and analyses of soil properties and attributes, but most of them lack data on how or what crops to plant on each type of soil. In this paper, the researchers have proposed a system that can classify soil and suggest crops from it. The researcher developed an application that was able to gather all the sensor data, classify soil and suggest crops. Different sensors and machine learning were tried and used in this study that greatly contributed to determining the type of soil and the suggested crops, such as the NPK sensor, temperature sensor, humidity sensor, and soil moisture sensor.

KEYWORDS

Machine Learning, Image Classification, Sensors, CNN

-P2-5

PROPOSED DESIGN OF CONSTRUCTED WETLANDS FOR SWINE FARM WASTEWATER TREATMENT IN BRGY. SORO-SORO IBABA, BATANGAS CITY

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ABSTRACT

Water bodies have been highly affected by human activities such as the discharge of untreated wastewater. The decline of the water quality of Calumpang river basin in Batangas has been majorly affected by agricultural activities primarily due to the increased number of swine farms in the area. Brgy. Soro-soro lbaba is one of the barangays in the city that is generally dependent on its agricultural income, with a total of 123 registered piggeries for swine fattening and swine breeding. Negligence of owners and improper discharge of swine wastewater to the creek flowing towards Calumpang river highly causes pollution. The outfall of the area has been identified as one of the point sources of pollution with the intensive swine industry that produces a great volume of wastewater. With the continuous operation of swine farms and as part of Batangas City Government's Calumpang Watershed Rehabilitation and Development Master Plan of 2013-2023, a proposed constructed wetland in the location is significant to mitigate and address the problem.

KEYWORDS

swine wastewater, piggery, constructed wetland, Wastewater Treatment

GREENHOUSE WITH AUTOMATED FARMING TECHNOLOGY (GRAFT): ONLINE MONITORING AND CONTROL SYSTEM

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ABSTRACT

A-P3-

In modern settings, the population and application of non-replacement components such as remote online monitoring facilities has become a vital need for many grid processes. Through Internet considerations of technology-related matters and modernization, the Internet integrates objects, cloud computing and data mining in many fields of modern technology settings. Maintaining a controlled greenhouse environment within a greenhouse is crucial. Fluctuations temperature inside greenhouses can damage or kill your plants. Remote monitoring and systems protect our plants from extreme temperature instabilities.

These reasons prompted the researcher to come up with Greenhouse with Automated Farming Technology (GrAFT): Online Monitoring and Control System. The following essential tools were considered in designing and developing the system that will monitor the defined parameter of the greenhouse; suitable algorithm for automatic hardware configuration and system notification of the derived hardware adjustment. Furthermore, the system designed databases for the system report generation with system report generation queries. The functionality, accuracy and security testing was also done. On the other hand, the researcher opted not to perform a survey on User Design Acceptability since the system is not yet posted to any hosting site and need more testing to investigate and evaluate the software functionality after its full implementation.

KEYWORDS

Greenhouse, Automated Farming Technology, Online Monitoring, Controlling System

OPTIMAL DELIVERY SCHEDULING PROCESS OF 2GO EXPRESS IN BATANGAS CITY

-P3-

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ABSTRACT

2Go Express is a courier service provider that offers a wide range of services to its customers. But, one of its hubs, the Batangas City hub, receives complaints regarding delivery delays resulting in lower customer satisfaction. Initially, the hub was struggling with 3-5 days of lead time which was more than its allowable lead time. Through an interview, it was identified that it was a result of inefficient delivery scheduling. As a solution, the proponents developed delivery scheduling aligned with the constraints of the company to achieve consistent and efficient delivery performance. The data for the existing process was analyzed and used as an input for the creation of the new scheduling process. It includes scheduled workload, scope of deliveries, vehicle capacity, and allotted delivery lead time. Considering the constraint, a forecasting was used for the demand, aggregate planning, non-cyclical scheduling, and load chart was developed. This output was given to the hub together with a manual as a guide. This output was assessed through its efficiency, delivery promptness, delivery lead time, and customer satisfaction. Through the data collected after testing, the mean was compared to the data before implementation. The result leads to a positive improvement in productivity and customer satisfaction.

KEYWORDS

courier service, delivery, aggregate planning, non-cyclical scheduling, load chart

EVALUATION OF TAAL TEPHRA AND POLYETHYLENE **TEREPHTHALATE FOR CERAMIC TILE PRODUCTION**

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ABSTRACT

The study focuses to evaluate the taal tephra and polyethylene terephthalate for ceramic tile production. Tephra and PET were the additives used for the formulation of the tiles. Tephra is a widely use material for cement – based products so that the X-Ray Fluorescence spectrometer was utilized in order to determine the percentage of silica in the tephra. On the other hand, silica has the highest percentage among of all the analytes that was found on the tephra. In addition, the PET bottles were shredded in 0.5 mm size diameter. Different formulation were formulated in order to evaluate the effects of the tephra and PET in terms of different parameters such as, water absorption, modulus of rupture and surface abrasion. The results were interpreted using graphical analyses. Findings showed all formulation has a good effect in terms of water absorption. On the other hand, 1% of mixture of both PET and tephra has the highest average of 20.31%. In addition, 0% of PET and tephra has the best result when it comes to modulus of rupture of the ceramic tiles but all of the samples has no significant difference in properties between the ceramic tile with tephra and plastic additives and ordinary tiles. In surface abrasion, two sets of samples were passed the test, specifically, the samples from with 1% and 0.5% of both PET and tephra. It was concluded that tephra and PET has an effect for each of ceramic tiles depending on the formulation that will be used.

KEYWORDS

Tephra, Polyethylene Terephthalate, Water Absorption, Modulus of Rupture, Surface Abraison.

-P3-4

ASPHALTENE STABILITY PREDICTION BY NON-SARA-BASED CORRELATION

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ABSTRACT

In the petroleum industry, the production stage is the most crucial part since there are many changes happening beneath the earth's surface and this may affect flow assurance of crude oils from the reservoir up to the surface. This flow assurance issue can greatly affect production of crude oils since it can cause clogging in pipelines, damage in porous media and difficulty in refining it. Predictive models were established to know the stability of asphaltenes in crude oils at an early time. The problem with this is that they greatly depend on SARA analysis wherein this takes up too much time leading to the production of crude oils to be vulnerable and with great cost also. Therefore, using MATLAB Curve Fitting Tool, a new correlation was developed to predict asphaltene stability by using density and viscosity of crude oils. The generated model was validated by assessing whether a crude oil is stable or unstable using its own range of CII values and comparing it to the actual stability of the crude oil observed in the field. A total of 15 crude oils were categorized as stable and 8 crude oils were interpreted as unstable. The model obtained an 86.96% reliability for predicting asphaltene stability. The correlation coefficient (R2), sum of square error (SSE), and root mean square error (RMSE) of the developed model are 0.9688,14.13, and 0.2692 respectively.

KEYWORDS

Asphaltene, Colloidal Instability Index, Flow Assurance.

APPLICATION OF REINFORCEMENT LEARNING FOR OPTIMIZATION OF TRAFFIC LIGHT SYSTEMS USING SIMULATION OF URBAN MOBILITY (SUMO)

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ABSTRACT

A-P3-

Traffic congestion is a burning problem in urban areas. In this study the researchers objective is to improve the traffic lights in Lawas, Batangas to lessen traffic congestion in every lane of each junction. With SUMO (Simulation of Urban MObility) the researchers simulated the dataset obtained from the Transportation Development Regulatory Office (TDRO). The dataset has 1,723 cars for its non-peak hours between 9am to 10am and 2,654 for its peak hours from 5pm to 6pm.

Then the researchers applied the DQN (Deep Q-Network) algorithm with reply memory to optimize adaptive traffic light traffic signals in order to avoid traffic jams. Simulating the process results in a 54.07 percent drop in queue length for non-peak hours and a 5.53 percent decrease for peak hours. In this study the algorithm was used on the specific place of Lawas, Batangas City for the simulation of the traffic light intersection together with the application of reinforcement learning algorithm.

KEYWORDS

traffic congestion, traffic light, reinforcement learning, sumo, deep q-network

A COMPARATIVE ANALYSIS BETWEEN DIFFERENT FRUIT EXTRACTS FOR THE DEVELOPMENT OF LUMINESCENT SOLAR CONCENTRATORS

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ABSTRACT

There had been an increasing interest in luminescent solar concentrator (LSC) in the electrical field because of its capability to absorb and concentrate sunlight to produce electricity. Natural resources have been frequently utilized as precursors for the synthesis of carbon quantum dots (CQDs), a luminescent material used in this technology. This was considered to compare and analyze the potential of local fruits like coconut, sinturis (dalanghita) and tomatoes in developing LSCs. This will be a big contribution to one of the United Nations (UN) sustainable development goals of ensuring access to affordable, reliable, sustainable, and modern energy for all. The study utilized hydrothermal method for the synthesis of CQDs, epoxy resin and hardener as the host matrix and monocrystalline solar cell. The dimensions were $15 \times 15 \times 1 \text{ cm}3$, $10 \times 10 \times 1 \text{ cm}3$ and $5 \times 5 \times 1 \text{ cm}3$. The parameters include Light Absorbance, Open-Circuit Voltage (Voc), Short-Circuit Current (Isc) and Power Conversion Efficiency (PCE). Among all the fabricated LSCs, Voc was best measured in $10 \times 10 \times 1 \text{ cm}3$ tomato having 0.649 V. For Isc, the highest was measured in $15 \times 15 \times 1 \text{ cm}3$, tomato with 27.01% efficiency. In general, the most efficient was tomato, coconut and sinturis, respectively. And for the dimension, $15 \times 15 \times 1 \text{ cm}3$, $10 \times 10 \times 1 \text{ cm}3$ an, $5 \times 5 \times 1 \text{ cm}3$, respectively.

KEYWORDS

carbon quantum dots, coconut, luminescent solar concentrator, sinturis, tomato

BUILDING INSPECTION DECISION SUPPORT SYSTEM FOR BUREAU OF FIRE PROTECTION IN THE PROVINCE OF ROMBLON

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ABSTRACT

This study aims to design and develop a Building Inspection Decision Support System for the Bureau of Fire Protection in the Municipality of Romblon, Romblon Province. In serving the mass, this agency has been utilizing manual systems for years, some difficulties in the overall process require solutions or improvements. The main objective of this study is to design and re-engineer the processes of BFP by developing a web application framework for all transactions related to the issuance of building permits and certificates. The characteristics, components, and decision-making process applied in this study were adopted from Tripathi K (2021). In this paper, the parameters for recording the inspection results, the kinds of data, and system configurations, are presented regarding the inspection support system to acquire the data necessary for releasing reports and Fire Safety Inspection Certificate (FSIC) license. Systems Development Life Cycle model was used in the development of the system. Furthermore, the results of this study show the (1) Contactless transactions in BFP-Licensing, (2) Generated findings and recommendation and/or corrective actions based on the violation and deficiency IRR RA 9514 Fire Code of the Philippines, (3) Report Generation, and the (4) Acceptability Result of the system using ISO 25010:2011 standard with the weighted mean of 4.41 and the result obtained was "very satisfactory", applying this system to the Bureau of Fire Protection in the Municipality of Romblon, Romblon Province.

KEYWORDS

inspection support system, decision support system, decision-making process, process re-engineering, contactless transactions

EXOSKELETON DESIGN FOR LOWER-BODY REHABILITATION USING MATLAB® AND SIMULINK®

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ABSTRACT

Owing to population growth, diseases, and accidents, some people may lose lower-body function due to physical injury, muscle disorder, and nerve damage, and other factors. Also, the traditional rehabilitation sessions necessitate a significant amount of effort from both therapists and patients to improve the ability of the lower-body from having a disability. The researchers considered designing an exoskeleton robot to aid lower-body rehabilitation significantly. Moreover, some of the parameters vital for designing were identified. It includes the average height of a Filipino, which is 5'4". The researchers designed the robot where its minimum height can suit a 5'4" tall person. At the same time, the maximum can be used for a person up to 6 feet tall. The SolidWorks software is utilized for the designing and evaluation of the robot. After identifying the material used, Aluminum Alloy 6061, the design is evaluated through linear stress analysis. Linear stress analysis determines the response of the design parts and assemblies due to the effect of forces. The stress analysis gave the result of Von Mises stress which helped the researchers determine the certain forces that the robot parts' can only withstand. Moreover, for the mechanism components, DC Brushless Motor and Lithium-Ion Polymer battery (LiPo) were selected as the most suitable components for powering the robot. Meanwhile, for the simulation of the CAD model, MATLAB® and Simulink® were utilized. The simulation, the visualization of how the robot will move was identified.

KEYWORDS

lower-body exoskeleton, SolidWorks, Simulink®, Simscape MultibodyTM, hanging simulation, walking simulation

EFFECTS OF WATER SALINITY ON THE LIFESPAN OF ELECTRODES USED IN SALTWATER LAMP

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ABSTRACT

In this study, the effects of water salinity on the lifespan of the electrodes used in saltwater lamps were analysed. A concept was proposed for a saltwater lamp design based on the combination of various electrodes with different salinities of electrolytes. The power output generated by the electrodes immersed in different salinities were also measured as well as the salinity and conductivity. Six-cell-battery with six plates per cell were alternately aligned and connected in series to power up a 7W load. A tolerance of 0.3% to 0.6% is observed from the solutions. Zn-Cu in 50 ppt generated the highest power output (7.455 W) at the beginning, while Al-Cu in 30 ppt generated the lowest (1.47402 W) on the 15th day. Al-Cu in 50 ppt dropped the biggest salinity from 50 ppt to 14.9 ppt in 20 days. It has a conductivity range from $65340 \,\mu$ S/cm to $24000 \,\mu$ S/cm and the corrosion rate of $2.3329 \times 10-6$ for aluminum and $1.0584 \times 10-6$ for copper. Zn-Cu in 30 ppt dropped the lowest from 30 ppt to 16.4 ppt. It has a conductivity and corrosion rate measured on each battery without loads decreased smaller every 4 days compared when having a load. All the electrode combinations in all levels of saltwater solution comprising six cells can light up a 7W light bulb. Fiber glass is the best material to use due to its transparency, it can show the inside of the batteries.

KEYWORDS

electrodes, electrolytes, saltwater lamp, corrosion, water salinity

SOLAR POWERED GOAT DRINKING STATION

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ABSTRACT

The main objective of the study was to design and simulate the solar-powered goat drinking station. Specifically, to determine the consideration in designing of the solar-powered goat drinking station in terms of material selection and specification and technical specification. Integrate programmable logic control in the process in terms of control and monitoring, mixing section, dispensing section, cleaning and heating section. Simulate the solar powered goat drinking station using Fluidsim for ladder diagram simulation and sketch up pro for animation. The primary component of the system, together with the charge controller, is the solar panel, which supplies the system's operation and each of the other components has a specific purpose in the machine's operation. Based on the findings of the study, the gathered information for the materials selection analysis for the design was beneficial to the development of simulation and technical specification was also helpful to define the capability of the machine. Input parameters was highly considered for the operation and capacity process of the study, the following recommendations were given: Future researchers may integrate another mixing section for salted water tank. Future researchers may fabricate the machine so that the target beneficiaries could benefit and try it. Future researchers may use Codesys as another simulation software for the evaluation of the analysis of the result of the study.

KEYWORDS

solar-powered, fluidism, CODESYS

GRAPHITE NANOPARTICLES (GNP)/ POLYANILINE (PANI) EPOXY-BASED COATING FOR CARBON STEEL

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ABSTRACT

Anti-corrosion coatings are used on metals that depends on the compatibility of the coating with the metal that relies on the interaction of its components. The components also provides the extent of the capability of the coating for the application it serve. Graphite nanoparticles (GNP)/polyaniline (PANI) composite was synthesized from graphite nanoparticles and aniline and GNP/PANI coating was developed. The effects of GNP/PANI - resin ratio (1%, 3%, 5%), acid type (hydrochloric acid) and concentration (0.1M, 0.5M, 1M), and soaking time (24 hours, 72 hours, 120 hours) in the anti-corrosion efficiency of the coating were investigated. The morphology and elemental composition of the composite was determined which confirmed the presence of Carbon, Nitrogen, Oxygen, and traces of Chlorine and Sulfur. The highest anti-corrosion efficiency in HCI and H2SO4 media were found to be at 1 M acid concentration at 120 hours soaking time for both cases. SEM images determined the roughness of the surface of the coating compared to bare carbon steel which suggests better adhesion and higher corrosion resistance. The dispersion of GNP/PANI filler in the polyaniline matrix was investigated and it was found out that the longest distance between particles is at 2.34 μ m and the shortest is at 0.68 μ m with the mean of 1.39 μ m. GNP/PANI coating obtained an average 115.56 degrees water contact angle and a mean of 10 days to achieve the maximum water uptake. Electrical conductivity and zeta potential of the coating have means of 1.051 x 10-4 S/cm and 2.36 mV respectively. Weight loss method was employed to compare the GNP/PANI coating to commercially available anti-corrosion coating and statistical analysis determined the significantly higher anti-corrosion efficiency for GNP/PANI coating.

KEYWORDS

graphite nanoparticles, polyaniline, nanocomposite, corrosion

DESIGN AND SIMULATION OF SALTED EGG COLORING AND DRYING PROCESS

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ABSTRACT

The research was designed to develop and simulate a machine in the coloring and drying process of salted eggs in San Jose, Batangas City. This machine was also designed to meet the demands of the agricultural industry and, moreover, for some owners of salted egg businesses. The project has been developed and assimilated in some stages, such as conceptualizing, planning, designing, 3D modelling, programming, simulating, and presenting in the development of the machine through simulation. The researcher ensures the quality of the project and improves its components that have gone through initial testing to final output, including their safety throughout the making of the project.

Based on their findings, the researcher came to the following conclusions: Upon the analysis of the study, together with the findings, the researchers have formulated the following conclusions: The researchers gathered information for the existing design, which was very helpful in the development of simulation and schematic diagram for the project design's control system in development and in process. The design was reliable and was presented using 4D Cinema and fluidsim.

Upon giving the findings and conclusions drawn, the researcher suggested the following recommendation for a better innovation in the simulation of the salted egg coloring and drying process: Future researchers may design the system and simulate it using automation studio. It may use PIc simulatorsoftware for a better understanding of the additional parameters needed in the process. Also, they may useArduino C++ codes to validate the system function in miniature simulation.

The proper ways of ensuring the efficiency of the project are the proper maintenance and operating. In the future, researchers may improve the machine's features and how the production works.

KEYWORDS

fluidsim, Software, simulate

PROPOSED DESIGN OF INTEGRATED MATERIALS RECOVERY FACILITY AND SOLID WASTE MANAGEMENT PLAN FOR BATANGAS STATE UNIVERSITY – ALANGILAN

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ABSTRACT

B. D.3.

Batangas State University - Alangilan aims to provide a facility that would cater the solid and hazardous waste as the existing MRF was demolished due to the construction of KIST Park. There have been gaps in the structure and solid waste management plan of the existing facility. Solid and hazardous waste cannot be accommodated due to the large volume produced by students and employees. As a result, frequent hauling is required, increasing waste removal expenses.

The objectives of the project are to reduce the amount of solid and hazardous waste generated by providing adequate trash bins, launching campaigns, and collaborations, having a proper waste management system, and having a proper facility to handle and store wastes. The researchers provided two (2) different Integrated MRF designs in two separate locations to address the current concerns. Design 1 is a single-story separate Materials Recovery Facility and Hazardous Waste Management Facility located at the back of the Fitness Development Center. Design 2, on the other hand, is a two-story facility located parallel to the façade of the campus that combines the aforementioned facilities on the ground floor, while on the second floor is a Student Center Space which is intended to be used for various activities.

Based on the results of the evaluation using the researchers' set design criteria of cost, space, construction speed, sustainability, and operation and maintenance, it was recommended to use Design 2 of this study as aguide for future construction of the waste facility. Additionally, the researchers encouraged the University to use the produced Waste Management Manual to have a proper waste system.

KEYWORDS

Integrated Material Recovery Facility, Waste Management Manual, RA 6969, RA 9003, and DAO 2013 - 22

GREENHOUSE WITH AUTOMATED FARMING TECHNOLOGY (GrAFT): STRUCTURAL DESIGN AND DEVELOPMENT

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ABSTRACT

Fast-growing technology plays an essential part in Philippine agriculture, from agricultural infrastructure like greenhouses to the timely provision of vigor cultivars. The development strategy for sustainable agriculture, smart farming, and the environment is one of the agricultural sector's most important challenges. A number of recent studies, most notably those by Groener (2015) and Hemming (2010), have demonstrated the value of a controlled climate for crops, particularly in areas where temperature extremes are becoming an increasing worldwide problem. A greenhouse construction with sufficient strength and durability must be conceived and created. The ongoing collaboration of the Department of Agriculture – Bureau of Plant Industry (DA-BPI) with the Korea International Cooperation Agency (KOICA) demonstrates that the Philippine government firmly supports and encourages greenhouse farming. Furthermore, it is one of the key study areas recognized by Batangas State University within Agriculture, Environment, and Technology. The Philippine Agricultural Engineering Standard (PAES) design and specifications are followed and carried out in the overall design methods of the study.

KEYWORDS

Aeroponics, Agriculture, Greenhouse, Green Technology, Wind Load Analysis

OPTIMAL LOCATION OF PUBLIC HOSPITAL AT SAN LUIS, BATANGAS

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ABSTRACT

The municipality of San Luis, Batangas has encountered challenges in terms of providing an adequate health service to its growing number of constituents due to various gaps such as incomplete health services, lack of health personnel, and insufficient facilities that led the local government unit to improve their health care through the establishment of a first level public. Thus, the study aimed on evaluating and selecting the optimal location for the facility which is one of the first and most crucial decisions that must be made prior to construction. It took into account the different site planning and design requirements in establishing a public hospital considering the Department of Health and Municipal recommendations. From the large number of location alternatives, the researchers analyzed that there were five potential location sto choose from. These are the barangay Boboy, Calumpang West, Dulangan, Luya and Taliba. In the utilization of the four location evaluation techniques, barangay Dulangan scored 3 out 4 which is considered as the optimal location for the establishment of a public hospital at San Luis, Batangas.

KEYWORDS

health service, first level public hospital, optimal location

DESIGN OF PIPE CRAWLING ROBOT

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ABSTRACT

The Pipe Crawling Robot was designed for moderate function on different size segments of pipes, which is 125mm to 150 mm or convertibly in 5 to 6 inches pipes for possible easy locomotion. It is operated by the use of integrated sensors, MQ135. It can be operated with Remote Control in forward, reverse, control and speed control via PWM. The micro-DC geared motor is used to operate using the DF Robot "Gravity" interface to be able to control the motor using only one control signal, it also combines the features of a DC motor and 360- degree servo.

The researchers also integrated in the design the following components: Arduino Mega for the program of the robot; Motor Drivers for the movements control; MQ 135 Gas Sensor by detecting the air quality that sense by the robot; 3.7 v Li- po Battery that will power the module section of the robot; and Dc Motor to have a desired mechanical motion as per command signal.

The design of the robot started with the research supporting theories and facts from different resources as foundation. The Pipe Crawling Robot is significant to industrial facilities that is useful in surveilling parameters for inspecting obstructions, gas detection, and monitoring of the pipe being used. The finished project would be a great benefit for users in terms of inspection and surveilling.

KEYWORDS

Pipe Crawling Robot, motor, sensors

EVALUATION OF THE EFFECTS OF EXTRACTED CARBOXYMETHYLCELLULOSE FROM WATER HYACINTH (EICHHORNIA CRASSIPE) ON PROPERTIES OF OIL WELL CEMENT

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ABSTRACT

Carboxymethylcellulose (CMC) is an anionic, water-soluble glucose-derivative synthesized mostly from plants including water hyacinth (WaHy), a weedy plant with a high cellulose content. Previous researches have shown that using plant-based polymeric materials including WaHy as an additive to oil well cement was effective and greatly advantageous. The production of CMC from WaHy involves three main processes such as isolation of cellulose, alkalization, and carboxymethylation process (Hidayat et. al, 2018). During FTIR test, it was proven that CMCWaHy was successfully produced in the experiment. This was verified from the spectrum transmitting from 3500 cm-1 to 650 cm-1 indicating ether and carboxyl functional group. To emphasize the outstanding outcome of produced CMCWaHy as a potential additive, this study evaluated the oil well cement properties such as rheological properties, density, thickening time, and compressive strength for wellbore applications based on API RP 10B-2. The findings of the experiments revealed that adding CMCWaHy by weight of cement (BWOC) to oil well cement had a significant effect on its properties. The decreased plastic viscosity from 0.10%-0.50% CMCWaHy BWOC allowed the slurry to be easily pumped and placed in the annulus. The increased yield point from 0.25%-1.25% CMCWaHy BWOC indicates that the cement slurry's carrying capacity has enhanced. Also, the increase on gel strength from 1.0%-1.50% CMCWaHy BWOC helped prevent cement segregation after pumping the annulus with cement. The density of the cement remains stable as the percentage of CMCWaHy BWOC added to the oil well cement increases. The addition of CMCWaHy to the oil well cement could be retarder from 0.10% - 0.75% CMCWaHy BWOC and accelerator from 1.0% - 1.50% CMCWaHy BWOC based on the thickening time. Likewise, the wait-on-cement (WOC) was shortened upon reaching compressive strength of 500 psi by upon addition of 1.0%-1.50% CMCWaHy BWOC. Moreover, the study used statistical treatments such as t-test to determine the significant difference between the effect on oil well cement slurry with no CMCWaHy or with varying concentrations of CMCWaHy, and an ANOVA to determine the significant difference between the effect on the properties of oil well cement slurry with varying concentrations of CMCWaHy. The results revealed that varying concentrations of extracted CMCWaHy have a significant influence on the performance of oil well cement.

KEYWORDS

Water Hyacinth, Carboxymethylcellulose, Oil Well Cement

COCONUT PEAT AND COIR MAKING MACHINE

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ABSTRACT

Coconut Peat and Coir Making Machine is a machine that extracts the husk from coconuts and converts it into coco peat and coir/fibers. This machine can easily separate peat and coir, and it includes a peat strainer to finely grind the peat, resulting in both strained and untrained peat. One of the problems identified in the existing decorticator was the discharging of coir dust at the fiber outlet. However, the coconut peat and coir making machine manifested the same behavior in terms of coir dust that discharged or came out from the fiber outlet/coir exit, but that would be not exactly the same as what happened on the existing design. The machine has also its own peat strainer attached and mounted at the bottom of the peat exit. The study indicates the husk to become a coir and peat. This will lead to other crops that can be selling and use for many. The husk of a coconut can turn into many things and can use in gardening. By means of that machine the coconut husk waste will be lessen and turns it to useful things.

KEYWORDS

coconut peat, coir making, extract, convert, decorticator

PUNLA: AN INTERIOR INNOVATION FOR A DISASTER-PROOF BEDROOM OF THE CACAO RESIDENCE LOCATED AT QUILING, TALISAY, BATANGAS

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ABSTRACT

Volcanic eruptions happen when lava and gas are discharged from a volcanic vent. The most prevalent consequences of this sudden natural disaster are damaged properties, health risksof nearby residences, and also reimbursement of damaged interiors. Because of the inevitable eruption, it is difficult for other residences to be forced to evacuate due to the uncontrollable disaster happening within the area. Thus, it may lead to harm or in any worse case possible. A durable home interior keeps the residences safe during these types of catastrophes. Such disasterscauses interiors to be somewhat damaged due to the effects of a volcanic eruption which is very alarming because it is what keeping them safe from harm; away from ash fall, debris, and toxic air. Observing ventilation is essential because of the sulphur dioxide the volcano is emitting. Sulphur Dioxide is very toxic and poisonous to breathe. The vast world of interior design has evolved in countless discrete forms. However, there are only few design solutions for house residences that are near and prone to danger such as active volcanoes. Hence, creating and examining this kind of design problem, would open a new eye opening solutions for interior designers. Furthermore, the goal of this study is determining what needs to be flourished in a home interior; this could provide different varieties of solutions for interior designers on how to turn a home interior into adisaster proof shelter for the residences near volcanoes In this case, understanding people] s lives is more important than focusing purely on aesthetics. This study also aims to identify what is there to consider and use to promote a flexible, effective, and durable design.

KEYWORDS

health service, first level public hospital, optimal location

DEEP LEARNING APPLICATION USING YOLO ALGORITHM AND J-P3-(SPATIOTEMPORAL ANALYSIS FOR SMART TRAFFIC SIGN RECOGNITION

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ABSTRACT

Traffic signs are signs erected at the side or above roads to provide information to the drivers. There are two types of traffic signs - Warning Signs and Regulatory Signs. One of the leading causes of accidents is when vehicles misunderstand these traffic signs. Road conditions, weather conditions, busy roadways, and other variables can all have an impact on road safety. Sometimes drivers misread the traffic signs, and because of that, the researchers proposed an idea to identify the traffic signs with the use of machine learning approaches. For identifying the traffic sign, two machine learning algorithms have been employed: You Only Look Once (YOLO) and You Only Look Back Once (YOLBO) Algorithm that already implements the Spatiotemporal method. Three collective traffic signs datasets were used to create a general process of preprocessing techniques and parameters of model. For identifying the best preprocessing techniques, the accuracy scores of two different models were tested. To generate final parameters for each model averaging techniques were used to check which model's parameters were best relevant in all datasets. During the analysis, it was observed that the You Only Look Back Once (YOLBO) and Spatiotemporal method outscored You Only Look Once (YOLO) in terms of accuracy score. It also provides a highest accuracy of 97.8% compared to YOLO models.

KEYWORDS

Traffic sign, YOLO Algorithm, Spatiotemporal, Machine Learning

DESIGN AND DEVELOPMENT OF HAND-BASED COMPUTER MOUSE CONTROLLER

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ABSTRACT

.-P3-7

As the 21st century enters, computers engage people's daily lives whether it is at school, work, or for entertainment. As the pandemic approached, this brought significant changes such as work from home setup which forced people to use computers more often causing some people to suffer from the Workplace Musculoskeletal Disorders like Carpal Tunnel Syndrome. This study also provides an opportunity for amputees to use computers. With regards to this, the researchers intended to develop a wearable computer mouse controller using hand movements. The researchers identify the design requirements necessary for creating a hand-based computer mouse controller, design its working principle, and develop the hand-based computer mouse controller. The performance of the project was evaluated by 15 participants. The device consists of EMG Analog Gravity Sensor for mouse functions, the MPU-6050 for cursor movement, an Adafruit Feather 32u4 Bluefruit LE microcontroller which is BLE HID compatible, and a Lithium-Ion Polymer battery as the power supply. The project is able to do right and left click functions. When it comes to sEMG sensors, the analog values vary even if the electrode is used by the same person and same position. On the other hand, IMU is very sensitive when changing its position and orientation. In terms of PCB design, the size and connection were taken into consideration for the device to be wearable. The microcontroller uses ATmega32u4 which has delays in executing the program. The gathered data shows that respondents agree that the project is easy to learn and use, the cursor responds to each hand movement in real-time, and there are only minimal errors while using it. They also agree that its overall performance is satisfactory.

KEYWORDS

sEMG Sensor, IMU Sensor, Microcontroller, Hand-based computer mouse, Amputee mouse

SPEECH-ENABLED VIRTUAL ASSISTANT FOR PERSONS WITH DISABILITIES

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ABSTRACT

The technology for voice recognition is rapidly developing and is expected to become not only the default input type for smartphones, but also for cars and other home appliances like TVs and refrigerators. Due to the specific voice input features, including the implied verbalization of commands, the use and adoption of voice bases can be influenced by privacy and acceptability issues.

In this project, we propose a system of voice recognition that recognizes human activities. Voice is basically a communication mode that allows users to connect with each other. Voice Recognition, also known as Speech Enabled Virtual Assistant recognizes and converts spoken words and phrases to a computer format that can be read. It takes the user's input in the form of voice or text, processes it, and gives the user feedback in a number of forms, such as the action to be taken or the search result. Speech recognition can be used instead of clicking on a keyboard. Simply put, you're having conversations with the computer, and your words are reflected on the screen. It was designed to provide a convenient way for people with a variety of disabilities to use a computer independently. It is useful for users with hand disabilities who, however, often find it difficult to use a computer. The target clients of the system are the individuals with disabilities such as visually impaired, orthopedic, and people with learning disabilities to inhibit them from using a computer, with it they can enjoy using computers with system ease. The system helps transform the world of people with disabilities, at the same level. The study aims to guide and help people to close the gap in internet connectivity between the regular users and visually impaired, orthopedic, and people with learning disabilities using Speech

KEYWORDS

voice recognition, Speech Enabled Virtual Assistant

DESIGN AND DEVELOPMENT OF EMERGENCY RESPONSE, MONITORING, AND NOTIFICATION MOBILE APPLICATION FOR THE MUNICIPALITY OF CALACA AND BALAYAN

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ABSTRACT

This study entitled "Design and Development of Emergency Response, Monitoring, and Notification Mobile Application for the Municipality of Calaca and Balayan" focused on the development of an emergency response application for disaster related situation to help people when it comes to evacuation plan and for the response team to have an immediate notification for request assistance. The developed system provides a map where it is used in monitoring evacuation centers nearby the user location. This function can monitor the evacuation center capacity, contact number, location and evacuation center name. The user application has its capability to request for assistance to the respondents when they are in critical situation. The request will be generated and will notify the application of the admin so that the rescuers can immediately respond to the said request. The admin application is capable of viewing request and track the location of the request. It can also edit the evacuation centers information to keep it up to date. The developed system is intended for the people in the municipality and for the Municipal Disaster Risk Reduction Office and also for Bureau of Fire Protection of both municipality of Balayan and Calaca. The system aims to upgrade the emergency response management of Balayan and Calaca.

KEYWORDS

emergency response, evacuation center, request assistance, map, mobile application

-P3-9

- P3-

DORMITORY RESERVATION SYSTEM WITH MAP LOCATOR

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ABSTRACT

Dormitories give low-cost accommodation to some of the community's most marginalized and underprivileged individuals. It was also a suitable option for those who lived far from their workplace or school and wanted to save time and money while avoiding the stress and inconvenience of commuting. It's also difficult for tenants because the unfamiliarity with the area might be confusing and stressful when looking for dormitories. On the part of landlords/landladies, most boarding houses used manual processes to handle and manage their reservations. The study's main objective is to create a web and mobile application that can be used to search for dormitories, boarding houses, and apartments in Batangas City. The project was developed to help tenants in finding nearby locations, particularly for those who live distant from their school or workplace. Using a map locator, the project can display all nearby dormitories while filtering the lowest rental available, ratings, and gender identity. In terms of managing and accepting inquiries or reservations, it adds some functions and features to assist the landlord/landlady in dormitory management and handling reservations in terms of room availability, offered amenities for the tenants, and the location of the dormitory. Hybrid coding was used to make the system responsive to the web and smart devices. The developers have made extensive use of JavaScript in both the front-end and back-end of the application. The database used in the system was PostgreSQL. The respondents were selected through testing and evaluation. In conclusion, the Dormitory reservation system with a map locator is well-liked and well-accepted by the tenants and dormitory owners that offers a better, easier way to promote dormitories, as well as a useful tool for finding nearby dormitories.

KEYWORDS

Dormitory, reservation, map locator

D-P3-6

APPLICATION OF TRANSITIONAL DESIGN IN THE POST-PANDEMIC INTERIOR SPACES OF ARETA RESIDENCE

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ABSTRACT

The emergence of the Coronavirus disease 2019 or COVID-19 pandemic has dramatically changed the way of people live. After imposing restricted measures to prevent the virus from spreading, they spend most of their time inside their homes. Building a safer home environment has been a challenge to interior designers; it is the time to envision new space planning and interior design techniques for the betterment of homes and the safety of its inhabitants. The purpose of this paper was to discuss the impact of the COVID-19 pandemic on interior design. Previous studies suggest considering interior design in disease prevention because health is influenced by everything being touched in the interior environment. With the use of these relevant principles and research on how interior design greatly affects interior spaces, this study aimed to identify ways on how to redefine interior spaces in this post-pandemic stage. This study was centered on redesigning the Areta residence through transitional design to arrive with design solutions and strategies that are appropriate to the post-pandemic situation. The qualitative information gathered from the occupants of the space made it possible to arrive with design solutions such as: a more convenient layout plan, use of anti-bacterial materials, a light and natural color palette, ambient lighting, and natural elements of design. This study was conducted from November 2020 to December 2021. Through the use of Haussmannian design concept, the findings of this stud addressed the needs of the home occupants who were facing the transition of a global health crisis.

KEYWORDS

Coronavirus disease, pandemic, residential interior design, transitional interior design, Haussmannian

CROWDEE: AN ONLINE ANDROID-BASED ESTABLISHMENT CROWD TRACKING APPLICATION WITH GEO-FENCING AND GO-TO PLANNER

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ABSTRACT

A crowd is a group of people who may cause problems for a business or a location. The researchers created the CROWDEE: An Online Android Based Establishment Crow Tracking Application with Geo-fencing and Go-To Planner in response to public safety concerns. This research aimed to assist users in making their daily lives easier and less stressful. The researcher's goal is to make people's lives safer, and the establishment's goal is to keep the area from becoming overcrowded. This study will benefit residents who do not have Android phones as well as those who do not have any devices at all. To make the crowd tracker more appealing and useful, this system includes a geo-fence and a Go-To Planner. The user will be able to plan their schedule and see if the establishment or location is crowded or not. Moreover, the administrator may be able to reduce the crowd and print a copy of the results of their establishment's data. They can see how many people are in each establishment. Respondents rated this study as strongly agreeing in terms of data accuracy, timeliness, and system usefulness. The researchers also rated completely agree with the administrators' level of satisfaction in terms of maintainability. The researchers developed the Android system, which is now ready for use.

KEYWORDS

Crowd, Geofence, Go-To Planner, Mobile Application, Crowd Tracking, Heat Map

INTERIOR INNOVATIONS FOR A DISASTER-PROOF HOME INTERIOR OF THE CACAO RESIDENCE IN TALISAY, BATANGAS

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Volcanic eruptions happen when lava and gas are discharged from a volcanic vent. The most prevalent consequences of this sudden natural disaster are damaged properties, health risksof nearby residences, and also reimbursement of damaged interiors. Because of the inevitable eruption, it is difficult for other residences to be forced to evacuate due to the uncontrollable disaster happening within the area. Thus, it may lead to harm or in any worse case possible. A durable home interior keeps the residences safe during these types of catastrophes. Such disasterscauses interiors to be somewhat damaged due to the effects of a volcanic eruption which is very alarming because it is what's keeping them safe from harm; away from ash fall, debris, and toxic air. Observing ventilation is essential because of the sulphur dioxide the volcano is emitting. Sulphur Dioxide is very toxic and poisonous to breathe. The vast world of interior design has evolved in countless discrete forms. However, there are only few design solutions for house residences that are near and prone to danger such as active volcanoes. Hence, creating and examining this kind of design problem, would open a new eye opening solutions for interior designers. Furthermore, the goal of this study is determining what needs to be flourished in a home interior; this could provide different varieties of solutions for interior designers on how to turn a home interior into adisaster proof shelter for the residences near volcanoes. In this case, understanding people's lives is more important than focusing purely on aesthetics. . This study also aims to identify what is there to consider and use to promote a flexible, effective, and durable design.

KEYWORDS

Volcanoes, Volcanic Eruption, Sulphur Dioxide, Ash Fall, Ventilation, Catastrophes

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