

Department of Electrical and Electronic Engineering
Faculty of Technology



Ibadan, Nigeria.

Book of Proceedings of the

1st International Conference on Electrical, Electronic, Computer Engineering
and Allied Multidisciplinary Fields
(1st ICEECE & AMF 2021)

(EEE - UI @ 40 Conference)

Theme: Innovations for social, economic and technological sustainable
development and self -sufficiency of nations.

30 November to 2 December, 2021

@ NLNG Building Complex, Faculty of Technology, University of Ibadan.

Editors

A. R. Zubair, O. O. Olakanmi and A. M. Aibinu

December, 2021

Complete Book of Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering and Allied Multidisciplinary Fields (1st ICEECE & AMF). A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations*. 30 November - 2 December, 2021 at the University of Ibadan, Ibadan, Nigeria. 221 pages.

PDF: <https://drive.google.com/drive/u/0/folders/19rdEF-34TZCM0UMfHeYMpnBt08sVQYAn>

A brief about the 1st ICEECE & AMF (2021)

The ICEECE & AMF was organised by the Department of Electrical and Electronic Engineering, University of Ibadan, Ibadan, Nigeria (www.ui.edu.ng). The ICEECE & AMF brought together researchers from academia, industry and government organisations to share trends in Electrical, Electronic, Computer Engineering and Allied Multidisciplinary Fields for social, economic and technological sustainable development and self-sufficiency of nations. Social distancing became necessary to limit the spread of COVID-19. When nations are locked down for COVID-19, survival depends on each nation's ability to produce adequate technology and resources within its own borders. Nations must therefore strive for some level of self-sufficiency and self-reliance.

Theme: Innovations for social, economic and technological sustainable development and self-sufficiency of nations.

(i) Cover Page

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(ii) Acknowledgement and Appreciation

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(iii) Key Note Speakers

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(iv) Conference and 40 years anniversary in pictures

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(1) O. Apata, A. V. Adebayo and P. K. Ainah (2021). Transmission Losses in Power Sytems: An Overview. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 1–6pp.

Abstract:

Increase in the global population has led to a corresponding increase in demand for electric power. Electric utilities transport electric power from the generation sources to the distribution stations through transmission lines. However, the power system's transmission network experiences some losses in the process of transmitting electric power. These losses have been identified as technical and non-technical losses. However, this research paper focuses on technical losses in the transmission network. This paper aims to provide an overview of these losses, and methods for reducing such. A different perspective has also been presented in the allocation of transmission losses.

PDF: https://drive.google.com/file/d/1pmIrmf85nHcraLKdAjkgCMfERs-Dk-bl/view?usp=drive_link

(2) G. O. Adedeji, A. M. Aibinu, A. A. Bello, D. E. Olatunji and T. O. Shittu (2021). i-Walking Stick for Enhancing Navigation and for Visually Impaired: A Review. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 7–12pp.

Abstract:

Visual impairment is one of the major disabilities in the world. Visually impaired people find great difficulty in moving around freely without a human guide, especially in a new terrain. Several approaches have been employed to assist the visually impaired. This paper presents a review of approaches employed in providing assistance to the visually impaired. Some of these approaches which include the use of traditional walking sticks, trained dogs, intelligent walking stick etc. Thus, a detailed review is presented in this paper.

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(3) J. Dosu, S. G. Ekundayo, E. O. Babatunde, J. A. Bala, A. M. Aibinu and D. E. Olatunji (2021). Development of a Mobile Application for Monitoring and Controlling Stage Lights. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 13–17pp.

Abstract:

Advancement in technology has promoted human-machine interactions in such a way that continues to affect several areas of human endeavors like the ability to indulge in social interactions, media and entertainment. The entertainment industry has become part of the lives and activities of many individuals in recent times, attracting technological innovations in enhancing better interaction. A typical performance stage is arrayed with several lights of various sizes. While the conventional way of looping several lights together involves a cable-to-cable approach, the limitations of configuring, controlling and monitoring the entire lighting clusters is a major setback. This research presents the development of a cross-platform mobile application for controlling stage lights via a Bluetooth communication channel. The results obtained validate the use of flutter frame work for building better user-friendly applications (App) to interact with hardware devices. With the App a control distance of 10 to 15 meters was achieved.

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(4) K. E. Jack, A. A. Amuda, T. A. Johnson and A. B. Inyang (2021). Multi-Functional Poultry Farm Model with Remote Monitoring and Control Scheme. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 18–23pp.

Abstract:

Application of Engineering practices in agricultural-businesses have aided high product yielding. But coordinating Poultry farming activities such as feed, water and drugs supply and regulating the temperature are difficult to achieve manually. Hence the development of this multi-functional poultry farm model with remote monitoring and control scheme for an improved poultry farm management. This model proposed an intelligent way of dispensing major poultry resources; water, feed, and drugs along with a temperature monitoring and control system. Simulation was carried out using Proteus and SolidWorks. Deploying mechanical, electrical and electronic components, the developed

prototype remotely monitored and controlled the poultry farm while dispensing resources smartly. Ultrasonic, temperature and vibration sensors were used to collect data about activities in the prototype farm. At 35cm, the troughs were sensed as empty and relevant resources automatically dispensed. For birds 1-2 days, the temperature of the poultry house was constantly regulated above 29oC. Other ages selected on the mobile application ensured the temperature of the poultry house remained within optimum requirement. Also sounds produced when the birds' beaks beating the empty trough indicates feed availability. For every optimum deviation, notifications were sent and received on the cell phone. Prototype implementation will be the next research progression.

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(5) S. A. Yahaya, M. O. Adeleke, A. Y. Kola, T. M. Ajibola, Y. O. Abdulraheem and K. A. Akande (2021). Impact of Students' Mode of Admission, Age and Gender on their First Year Academic Performance in the Department of Biomedical Engineering, University of Ilorin, Nigeria. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 24–28pp.

Abstract:

This study is aimed at determining whether being in good academic standing at the end of first year of 100 level students at the Department of Biomedical Engineering, University of Ilorin is dependent on the students' mode of entry. Records of 74 students were used out of which 27 were in good academic standing at the end of the session. Chi-square test of independence was carried out which yielded a p-value of 0.545. This implies that the mode of entry of student and the students being in good academic standing are not related. Furthermore, a t-test for independent samples was carried out to compare the mean grade point average of students that were admitted through UTME and those admitted through remedial. The t-test yielded a p-value of 0.018 which implies that there is a significant difference in the grade point average. Therefore, students that are admitted through UTME tend to perform better than students admitted through remedial. Also, it was discovered that the age of students in good academic standing is significantly lower than the age of students that are not. Gender was insignificant as a moderator in all the tests as there was no association between gender and academic performance.

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(6) J. Fadiji, A. M. Aibinu and D. E. Olatunji (2021). Vehicle-to-Vehicle (V2V) Communication Using Multiple Operator Enabled SIM (MOES). In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.).

Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF) 30 November - 2 December, 2021. Ibadan. 29–35pp.

Abstract:

With the growth of technology in the field of transportation, the road user's situational awareness is one of the major issues to be considered. Thus, this paper presents the development of a prototype Vehicle-to-Vehicle (V2V) Communication system for enhancing road users' situational awareness in Nigerian is presented. The proposed system has been built on the principle of Multiple Operators Enabled SIM (MOES) technology for a seamless and accessible network for V2V communication. Performance evaluation of the proposed system shows that the system is efficient and capable of switching between different Mobile Network Operators (MNO) in addition to effective vehicular data exchange between surrounding road users within a very short period of time.

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(7) M. E. Irechukwu, M. N. Irechukwu, S. S. Mushakangoma and D. A. Kisinga (2021). Controller Design and Sizing of Battery Energy Storage System for Islanded Solar Power System Improvement. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF) 30 November - 2 December, 2021. Ibadan. 36–41pp.*

Abstract:

The quest for use of renewable energy keeps increasing daily as the need for clean energy is becoming very important and power utilities are working on cost-effective rural electrification methods. However, renewable energy sources are often intermittent in nature and this affects the stability of the solar power system parameters negatively, especially in an islanding mode. This paper undertakes a controller design and sizes the battery energy storage system (BESS) based on DC link voltage. Following that, a solar power system grid-connected sample in Tanzania is investigated and the designed controller is verified in MATLAB/Simulink where ability to adapt to fluctuations of load and insolation is proven.

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(8) A. M. Saba, I. A. Bello, T. H. Sikiru and U. A. Dodo (2021). Improved Frequency control of one and two areas power system with nonlinearities using grasshopper optimization based Fractional Order

PID Controller. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 42–51pp.

Abstract:

A Grasshopper Optimization based Fractional Order Proportional Integral Derivative (FOPID) controller for load frequency control of one and two area power systems with nonlinearities is presented. One of the major reasons for power system control is to mitigate large frequency deviation and to ensure zero steady state. Large frequency deviation occurs when the parameter values of the various generating units of the power system like generators, turbine and governors keep changing due to numerous on/off switching of loads. Large frequency deviation can damage equipment at the generation level and the consumer devices at the distribution level. For a more realistic study, nonlinearities such as time delay, generation rate constraints, governor dead band and boiler dynamics have been introduced into the power system design. Anti-windup control will then be used to compensate the effects of governor dead band and generation rate constraints. The gain of the FOPID controller will be optimized using grasshopper optimization algorithm and the objective function for minimization is the Integral Square Error (ISE). The Errors to be minimized are the summation of frequency deviation, tie-line power deviation and the area control errors. Simulations were carried out on the designed power system using MATLAB/Simulink and results obtained show a significant improvement in mitigating frequency deviation. However, the proposed method took a longer time to balance the generated power and load demand. This is because the proposed method considered nonlinearities in the power system designed and results were compared with other design method for power system without nonlinearities.

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(9) G. A. Adepoju, H. A. Aderinko, S. A. Salimon, F. O. Ogunade, S. O. Ayanlade and T. M. Adepoju (2021). Optimal Placement and Sizing of Distributed Generation based on Cost-Savings using a Two-Stage Method of Sensitivity Factor and Firefly Algorithm. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 52–58pp.

Abstract:

One of the main advantages of Distributed Generation (DG) penetration in distribution network is the economic benefits due to cost savings as a result of reduction in energy purchased and/or cost associated with losses. This study investigates optimal allocation of DG considering maximization of the economic net savings in electrical energy cost as main objective. The net savings is achieved via

minimization of the energy purchased from the sub-station which include the system energy loss. Further-more, a two-stage method of Loss Sensitivity Factor (LSF) and Firefly Algorithm (FA) is utilized for the solution of DG planning problem in the network. The proposed methodology was utilized for solve one and two DG units allocation problem and applied to standard 33-bus and Nigerian Ayepe 34-bus distribution networks. The results indicate that for the allocation of one and two DG units, there were 13.63% and 15.68% savings in the cost of energy purchased, respectively for the standard 33-bus while the values were 25.06% and 26.70%, respectively for Ayepe 34-bus. This establishes the viability and effectiveness of the technique in significantly maximizing the cost-benefits due to net savings in the electrical energy cost.

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(10) A. I. Yussuff, M. O. Ayeni and A. R. Zubair (2021). Response to COVID-19 Challenge: Development of Microcontroller-based Digital Ventilator. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 59–64pp.

Abstract:

Acute respiratory distress syndrome (ARDS) is a disorder in which a patient has severe difficulty in breathing as a result of fluid seeping into their lungs as a result of COVID-19 infection. It is critical to provide the greatest pulmonary ventilation possible for the patients for them to survive COVID-19. Most African countries do not have sufficient ventilators; hence, COVID-19 pandemic has exposed the inadequacy of medical facilities in most countries to cope with large numbers of infected patients. Medical facilities are overwhelmed, and medical staff are frustrated. Furthermore, importation of medical devices is difficult since virtually all nations are locked down; with all borders closed. The development and performance evaluation of a microcontroller-based digital ventilator is presented as a response to COVID-19 challenge. The device ensures patients' comfort, convenience and safety. Pulmonary pressure and breathing frequency are adjustable in line with Doctor's prescriptions.

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(11) A. Ogundipe and Y. Bello (2021). Design and Implementation of an Effective Controller for a Digester in a Pulp and Paper Plant. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 65–70pp.

Abstract:

In pulp and paper industries, a significant problem faced is low pulp yield after a pulping process. The cause has been identified as a lack of proper monitoring and control of process parameters (temperature and pressure) during the pulping process. This paper discusses an effective solution by introducing a controller that monitors and controls the pulping process parameters. This controller works on an algorithm based on the Proportional, Integral, and Derivative (P.I.D.) principle to determine the rate at which the heaters increase and decrease the temperature and pressure of the system. The controller was built with components such as the Atmega micro-controller, pressure and temperature sensor, heater, pressure relief valve, keypad, and Liquid crystal display. The controller was implemented on a manually operated laboratory batch pulp digester. The setpoint for the temperature, pressure, and time of different pulping stages were pre-determined and set through the keypad. The controller was able to maintain all these setpoints throughout the experimented pulping process. The impact of the controller design was justified through a standard beater test on the pulp using TAPPI methods T200 and T205. The pulp yield of the pulping process was at an average of 60 percent.

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(12) E. U. Undie, A. M. Aibinu, T. A. Folorunso, J. A. Bala, D. E. Olatunji and J. Dosu (2021). Effects of Electricity Generation and Supply on National Growth and Human Health: A Case Study of Nigeria. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 71–75pp.

Abstract:

This paper presents an all-inclusive review of the effects of electricity supply on Nigeria's economy while establishing a relationship between them both. It investigates the correlation of electricity usage and its supply with national development. A total of 21 articles relating to electricity supply and national growth, and the effects of electricity generation from fossil-fueled engines on health, published during the period from 2014 to 2021 are reviewed. The review is categorized into sections based on the aforementioned categories of articles. The results of this paper have shown that a co-integration relationship exists between electricity supply and national growth as in the case of Nigeria as a focus nation. Also, it has shown that the noise level emission and pollutant concentration from fossil fuel generators were greater than the recommended values by the WHO, and the carbon emitted during the combustion of these engines is the leading cause of global air pollution and as well, global warming.

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(13) L. A. Akinyemi, S. O. Oladejo, S. O. Ekwe, O. O. Shoewu and A. T. Ajibare (2021). Frequency-Dependent Photonics and Plasmonics of Dielectric Material Problem with a Periodic Geometry. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 76–81pp.

Abstract:

This paper examines and employs the application of optical communication in solving physics-inspired engineering problem and periodic structure in plasmonics and photonics with inspired electromagnetic waves. The optical properties of the material (gold) such as dielectric function are employed and modelled i.e., the frequency-dependent dielectric function as well as other optical properties through the quantum-mechanical approach to visualise the behaviour of the real- and imaginary parts of the optical properties (dielectric function) of the material of interest. The essential equations and its associated supplementary variable equations are neatly analogous with the starting point being Maxwell's equations. This is a justification that demonstrates the visceral uniformity and flexibility of the calculated supplementary, essential and diagonalised forms from Maxwell's equations.

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(14) A. Y. Ibikunle and I. B. Olusola (2021). Development of a Face Recognition System Using Hybrid Genetic-Principal Component Analysis. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 82–86pp.

Abstract:

Humans have been using physical attributes such as face, voice gait and fingerprints to recognize each other for ages. With the recent technological advancement, face recognition is a branch of biometrics system which has received considerable interest because of its ease in collecting, analysing and recognising face images. It is a system which compares an unknown image against the trained images in a database in order to identify the image. It has a number of applications such as Automatic Teller Machine (ATM), credit card, physical access control, National Identity card and correctional facilities. It has been found to be one of the ways of controlling and reducing crime rate. The development and evaluation of the performance of a face recognition system using hybrid Genetic- principal component

Analysis technique is presented. The system consists of three major subsystems. Initial preprocessing procedures are applied on the input face images acquired using digital camera. Consequently, face features are extracted from the processed images by principal component analysis and finally face identification is carried out using Genetic algorithm. Image resolutions of 50 x 50, 70 x 70, 100 x 100 and 140 x 140 are used in training and testing the system. The identification rates obtained were 100%, 96.36%, 93.63% and 90.90% for 50 x 50, 70 x 70, 100 x 100 and 140 x 140 respectively. This experimental result revealed that the lower the resolution of the cropped images, the higher the number of the correctly identified face images. The reason is attributed to the fact that there is variation in the features considered for recognition for each resolution. Hence, this technique has been proved to be more robust and suitable for low resolution.

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(15) A. Kester, A. Olatunbosun and O. A. Falode (2021). Improved Control System for Rotary Drilling of Oil Wells using Gradient Boosting and Random Forest Algorithm. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 87–91pp.

Abstract:

Oil and gas companies always seek innovative techniques to boost the drilling Rate of Penetration (ROP). Existing ROP control systems do not account for the impacts of bit diameter and drill string Weight on Bit (WOB) at the same time. The goal of this study is to create an ROP control system that integrates the impacts of bit diameter and WOB for enhanced penetration rate during rotary drilling. Field data sets were collected from six wells W1 to W6 in two oil fields in Nigeria's Niger Delta area. Using the gathered data, a comparative analysis was performed on ten ROP control systems, and the top three systems with the greatest ROP were chosen. An improved ROP control system was developed. The Gradient Boosting (GB) and Random Forest (RF) algorithms were used to compare the enhanced control system's performance to the best three control systems using Mean Squared Error and drilling cost. BYMRM increased from 83 % to 85 % and an MSE of 0.13468 and 0.23445 to 90 % and 92 % accuracy and an MSE of 0.07448 and 0.08776. WCRM accuracy improved from 89 % to 90%, with MSEs of 0.13468 and 0.15443, to 98 % and 97 percent, with MSEs of 0.00448 and 0.00999. The revised system has greater accuracy and lower MSE values. The improved system reduced costs and time by 15% and 5 days, 23% and 7.7 days, and 18% and 6 days, respectively, as compared to GWBC, BYMRM, and WCRM. The study created an improved Rate of Penetration system, which enhanced the drilling Rate of Penetration, decreased drilling time, and decreased drilling cost.

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(16) M. S. Benyeogor, A. R. Bhuiyan, O. O. Olakanmi and K. P. Nnoli (2021). Characterization of Ionic Conductivity in Lithium-borate Glass: Experimental and Instructional Material on Impedance Spectroscopy. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 92–100pp.

Abstract:

Impedance spectroscopy is an experimental technique for measuring ionic conductivity in nonconductors or dielectrics, such as glass. This is a novel and effective method of characterizing many electrical properties of materials and their interfaces with electronically conducting electrodes. It can also be applied to probe the dynamics of bound or mobile charge in the bulk or interfacial regions of solid or liquid materials such as ionic, semiconducting, mixed electronic-ionic, and dielectric materials. In this paper, an experiment is carried out to characterize the ionic conductivity (which infers resistivity) of two lithium-borate glass samples as a function of temperature, by means of impedance spectroscopy. The experiment compares or fits the impedance data to an equivalent circuit, which is a model of the underlying physical processes under investigation and discusses the analogies between circuit elements and electrochemical processes. Analyses of the results show how the impedance of lithium-borate glass varies with temperature, between 240°C and 320°C. Moreover, this paper provides a practical and conceptual foundation for integrating the study of impedance spectroscopy into physical sciences and engineering curricula.

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(17) O. O. Ajayi, A. A. Badrudeen, R. O. Abolade and Z. K. Adeyemo (2021). A Bandwidth-Efficient Carrier Frequency Synchronization Technique with Improved Accuracy for LTE Communication Systems. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 101–107pp.

Abstract:

The Long Term Evolution (LTE) communication system is based on the orthogonal frequency division multiplexing (OFDM) multicarrier signalling scheme. The OFDM, however, suffers from carrier frequency offset (CFO) which causes performance degradation of the system if not appropriately estimated and corrected. Thus, frequency synchronization between the transmitter and the receiver in LTE is very important in order to correct the CFO. The LTE standard provides primary synchronization signal (PSS), secondary synchronization signal (SSS) and cyclic prefix (CP) for CFO estimation. However, the use of short CP length can be unreliable especially in multicell network while

lengthy CP is not bandwidth-efficient. This paper proposes a carrier frequency synchronization technique that utilizes the reference signals (or pilots) and CP of reduced length (Normal CP) for fractional CFO (FCFO) estimation; and PSS is used for integer CFO (ICFO) estimation. Log-likelihood function (LLF) and maximum likelihood (ML) methods were employed for the development of the CFO estimators. Simulation results reveal that the proposed CFO estimation technique outperforms the conventional CFO estimation technique in terms of the bandwidth efficiency and mean squared error (MSE).

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(18) I. D. Solomon, P. O. Idowu, M. A. Adeagbo, T. O. Aminu and J. A. Ojo (2021). Smart Energy Management System for Homes. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 108–117pp.

Abstract:

Previous energy management systems are not fully automated and do not consider battery health. This work attempts to tackle these problems with the capacity to monitor battery status in real-time and prevent over-discharging, which eventually result in prolonged battery life. The solution provided in this work named Smart Energy Management System for Homes (SEMS-H) is expected to help in optimum use of solar energy in homes. It consists of sensor networks, the microcontroller, battery bank, load control/switching and the regulated power supply units. Moreover, it incorporates the ability to supply energy to loads and connected devices in order of preference with some other intelligent features. The project's performance fulfilled the design specifications with regards to the period of the day, the state of the battery-charging, load lines, battery level and range, and internet connectivity state at any moment in time.

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(19) L. A. Akinyemi, S. O. Oladejo and S. O. Ekwe (2021). Investigation of Frequency-Dependent Permittivity of Metallic Nano-Material for Optical Communication Systems: A Case of Symmetric and Antisymmetric Behaviour of Model. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 118–123pp.

Abstract:

This paper describes and investigates the physics-based modelling of frequency-dependent dielectric function for small-scale device in optical communication system. Here, the study aims to examine the behaviour of material with low frequency-dependent permittivity with a view to unravelling the forms with metals such as noble (Ag, Au, Cu), Al, Be and transition metals in a nano metallic region. In this study, the five easy phenomenological models: the Drude, Lorentz, Drude-Lorentz, Sellmeier, and Brendel-Bormann (BB) are applied for the analysis and interpretation of intraband and interband parts of the optical dielectric behaviour of material specifically BB model in a large frequency range from 0.1 to 40 eV. The analytical approach was adopted by applying Gaussian function to simplify and regularize the polynomial expression or correcting factor for the initial Drude model which does not consider the issue of band structure. The introduction of Gaussian function throughout the analysis ensures the robustness of the computations. The analytical and numerical results demonstrate that the real- and imaginary parts of the dielectric function are even and odd functions, respectively, as expected. In all the models, Brendel has found to be more reliable and accurate as compared to other models used. However, it is also observed and found out that there is a pathological behavior or singularity property as the frequency tends to zero for the first component of the correcting factor of the Brendel model.

PDF:

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(20) B. S. Emmanuel, P. O. Michael and A. A. Fakunle (2021). A Simulation Study of Triboelectric Nanogenerators for Energy Harvesting Applications. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 124–129pp.

Abstract:

In contemporary time, triboelectric nanogenerators (TENGs) are used for harvesting mechanical energy from the ambient conditions of the environment and this can be converted to generate electricity. A simulation study of a sliding-mode triboelectric generator system for energy harvesting application was carried out using polymer electrode materials with dispersed triboelectric-polarities. This approach of generating electricity from mechanical movements is based on triboelectrification and electrostatic induction coupling. The parameters for the study include the sliding displacement of the electrode surfaces as well as the open-circuit voltage and short-circuit charge density of the TENG system. The triboelectric electrode materials employed include Polyamide 6,6 (Nylon) and Polytetrafluoroethylene (PTFE). As the sliding displacement of the electrode surfaces was varied, the output electrical parameters vary as well. The results obtained for the output parameters include open-circuit voltage up to 2200 V and a short-circuit charge density of up to 65×10^{-9} C. The resulting mechanical-electrical energy conversion system based on carefully selected triboelectric materials

can be deployed as active power sources for miniaturized electronic systems as well as large scale power generation.

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(21) E. K. Akut, A. D. Usman, K. A. Abubilal, H. Bello and A. T. Salawudeen (2021). FANET in Pipeline Surveillance Reliability: A Conceptual Model and Challenges. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 130–134pp.

Abstract:

Several features such as the communication scheme, energy awareness, and task distribution amongst others are the key component that characterizes the Flying Ad-hoc Network (FANET). The operational efficiency in FANET surveying a specific region is affected by the nature of the communication medium (that is Wi-Fi, Zigbee, Li-Fi, etc.), energy used, routing protocol, and node placement. Unique challenges in FANET when applied to the oil and gas industry such as the Unmanned Aerial Vehicle (UAV) node placement in the surveillance area, energy-aware task distribution, and node interaction amongst others make existing protocol designs unsuitable. New routing protocols have been proposed by many researchers for coordinating the activities of the flying ad hoc networks, hence, muddling existing protocol designs. Also, adequate consideration is not given to the shared task interaction. Hence, this paper looks into the key challenges faced in FANET surveying a pipeline and then proposes a conceptual framework for a more effective and reliable survey. Possible solutions and recommendations to these challenges were highlighted.

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(22) O. A. Adegbola, O. F. Oseni, S. A. Salimon and T. A. Fagbenro (2021). Design and Simulation of a 46 kVA Dual Stage Micro Inverter System. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 135–139pp.

Abstract:

Poor harvesting of solar energy due to shading has been identified as a major setback for photo-voltaic (PV) based renewable power generation system. Among the various PV generation techniques

available, the micro inverter system which finds its application in roof top systems is rated as one of the best options for maximum energy harvest from each solar panel. Compared with three stage inverters, the dual stage inverters have a better power efficiency and fewer components for less energy processing stages. Hence, this paper presents simulation of 46kVA dual stage micro-inverter utilizing high step-up DC-DC boost converter with Interleaved Fly back boost converter topology and Maximum Power Point Tracking method (MPPT) algorithm for optimal harvesting of solar radiation. A solar panel, DC-DC converter, DC-AC inverter, LC filter make up the Micro Inverter architecture. The solar cell provides electricity to a DC-DC converter which increases the input DC voltage to the inverter's desired rated input voltage. The pi filter is used between the converter and inverter circuits to eliminate ripple. The 220V PWM sine wave output of the inverter is conditioned to pure sine wave by the L-C filter and the grid microcontroller compares the inverter output with the grid level to connect and disconnect each Micro Inverter accordingly. Simulation studies are carried out in PSIM software. The proposed micro-inverter is well suited for photovoltaic micro-inverter applications that require low cost, small size, high efficiency, and low noise.

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(23) E. E. Oyeleye and K. O. Odeyemi (2021). Mitigating Interference with Maximum Throughput for Densely Deployed Femtocells in 5G Heterogenous Network. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 140–145pp.

Abstract:

Heterogenous networks, in which a high number of femtocells can be distributed in a macrocell network is an emerging solution for the future 5G technology. The introduction of largely deployed femtocells allowed better indoor coverage and high data rate but stairs up the issue of cross-tier interference. Importantly, a macro mobile station (MUE) with high power increases the interference in femtocells and causes performance degradation in the overall network. To increase the maximum throughput, a power control scheme for macrocells in an heterogenous network, based on heuristics resource allocation scheme is employed to control the transmission power of the macrocells and to successfully reduce interference in the macro mobile station (MUE) and among the densely deployed femtocells. To maximize the network throughput of femtocells, two resource allocation schemes which include the heuristic and integer programming are employed and analyzed. The results prove that both proposed schemes increase the maximum throughput of heterogenous network with heuristics scheme offers better performance. Furthermore, the average capacity of the overall network using Shannon Capacity theorem is evaluated to validate the impact of the ‘interfering users’ with Signal-to-noise-interference ratio (SINR). Simulation results show that interfering users contributes to a better overall system capacity of the network.

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(24) A. R. Zubair and O. S. Soneye (2021). Development and Performance Evaluation of 1-Level Discrete Haar Wavelet Transform based Robust Digital Image Watermarking Scheme. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 146–154pp.

Abstract:

Digital Watermarking is a popular tool for copyright protection, content authentication, detection of illegal duplication and alteration, feature tagging and secret communication. In Digital watermarking, one image signal known as the watermark is embedded in another image signal known as the host. Digital watermarking remains an active area of research. The development and performance evaluation of a digital watermarking scheme in the frequency domain is presented. The scheme was based on 1-Level Haar wavelet transformation. Alpha embedding is employed in the embedding stage as well as in the detection /extraction stage. The optimum alpha is found to be 0.04 for good trade-off between acceptable imperceptibility and sufficient robustness. It was realised that there is an inherent internal attack even under no external attack. This inherent internal attack is attributed to approximations in the wavelet domain transformation, inverse wavelet domain transformation, and the “rounding off” of pixel values to the nearest whole numbers in the spatial domain. The discrete wavelet digital watermarking scheme is found to be robust to Salt and Pepper noise, Gaussian noise and jpeg compression attacks. The scheme also passed reliability test as it will not detect a watermark where and when it does not exist.

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(25) A. S. Darma and F. S. B. Mohamad (2021). Face Recognition System Based on Pre-Activation-Batch-Normalization Convolutional Neural Network Architecture: A Deep Learning Approach. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self -sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 155–160pp.

Abstract:

Face recognition is crucial in real-world applications like video surveillance, human-computer interaction, and security systems. As one of the most important research issues in computer vision,

this biometric authenticating system incorporates a wide range of real human facial characteristics. Problems with Internal covariate shift based on deep learning methods for face recognition systems causes gradient explosion or disappearance, resulting in inappropriate network training, network overfitting, and computational load. This lowers recognition accuracy and slows the network speed. Deep learning techniques for face recognition systems must overcome these difficulties. This research presents a modified Pre-activation Batch Normalization Convolutional Neural Network (PABNCNN), which is characteristic with a batch normalization operation after each convolutional layer in all the four convolutional units. The non-Gaussian rectifier linear unit (Relu) activation function works well with this method. The performance of the proposed models is tested using a new dataset called AS-Darmaset, which was created out of the two public online available databases. The two databases are Caltech 101 Objected Categories and Face Recognition Technology (FERET), respectively. This research compared the convergence behavior of the proposed Pre-activation batch Normalization CNN with that of three distinct CNN models. The Post Activation Batch Normalization CNN, Traditional CNN, Sparse Batch Normalization CNN. The experimental results show that the training and validation accuracy of the proposed Pre-activation BN CNN are up to 100.00% and 99.87%. Post Activation Batch Normalization CNN has an accuracy of 100.00% and 99.81% respectively. Traditional CNN has training and validation accuracy of 96.50%, 98.93% and Sparse Normalization CNN has accuracy of 96.50%. CNN has a training accuracy of 96.25% and a validation accuracy of 97.98%. This result illustrates the regularization effect of Pre-Activation-BN-CNN over the state-of-the-art for face recognition systems.

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(26) O. Bada, E. Oyewole, J. Olatunbosun, O. Awobifa, O. Obiyemi and S. Thakur (2021). Smart and e-monitored Internet of Things based Garbage System. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 161–165pp.

Abstract:

Waste management, being a simple but effective way of reducing the amount of garbage dumped into our landfills, has been a major concern in both developing and smart cities. Hazardous pollution and its consequent impacts on human health and the environment, as well as unanticipated littering of water bodies, are among the important ecological issues that constitute a danger. The traditional method of humans monitoring waste has proven to be tedious, time-consuming, and leads to unwarranted traffic due to collection vehicles' random visits to pick up areas. This paper therefore proposes an e-monitoring smart waste system (SWS) to eradicate or minimize unhealthy garbage accumulation using Internet of Things (IoT). The proposed design monitors the garbage level at

regular intervals and informs the garbage collection company and the user when it is full, providing detailed location of the garbage. This is achieved by using an ultrasonic sensor placed on the bin lid to detect the garbage level, a load sensor placed under the bin to detect the weight and compare it with the garbage bin's depth and reference weight. The system makes use of an Arduino ATmega328 microcontroller and a GSM module for sending garbage level status and location for pick-up.

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(27) O. E. Adetoyi (2021). Text Independent Speaker Identification System for Access Control. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 166–169pp.

Abstract:

Even human intelligence system fails to offer 100% accuracy in identifying speeches from a specific individual. Machine intelligence is trying to mimic human in speaker identification problem through various approaches to speech feature extraction and speech modelling techniques. This paper presents a text independent speaker identification system that employs Mel Frequency Cepstral Coefficients (MFCC) for feature extraction and k-Nearest Neighbor (kNN) for classification. The maximum cross validation accuracy obtained was 60%. This will be improved upon in subsequent research.

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(28) A. B. Amole, O. B. Adewuyi and O. K. Akinde (2021). Fabrication of Electronic Circuits Using Through-Hole PCB Technology: An Appraisal. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 170–174pp.

Abstract:

Assembled Printed Circuit Boards (PCB) used in the design of energy-based conversion, as well as, other electronic circuitries, suffers many defects like burning of the entire device or the makeup electronic components. Consequently, losses in terms of finance, materials and time in the overall circuit design becomes inevitable. An overview of the common problems that arises while assembling electronic components on through-hole PCB board was investigated in this article.

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(29) M. O. Lawal, I. O. Oladepo, M. K. Idris, A. M. Aibinu, J. A. Bala and D. E. Olatunji (2021). Wireless Battery Charger: A Review. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 175–182pp.

Abstract:

Regardless of the advances in technology, all batteries will eventually run out of stored energy whether used or not. Thus, every battery must be recharged at some point in time. This highlights the significance of wireless battery chargers in maintaining the performance of electronic devices. This study reviews existing works on different approaches to Wireless Power Transfer (WPT) technologies for battery chargers as WPT has been used in mobile phones, electric vehicles, wireless sensor network and so on.

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