CENTRE FOR LION GADGETS AND TECHNOLOGIES
University of Nigeria, Nsukka
in collaboration with
DEPARTMENT OF ELECTRONIC ENGINEERING
University of Nigeria, Nsukka

INTERNATIONAL CONFERENCE | 2020

theme

TECHNOLOGICAL INNOVATION *FOR* HOLISTIC SUSTAINABLE DEVELOPMENT (TECHISD2020)

Addressing 3 interdisciplinary themes of global interest;
Technology, Education and Security

BOOK OF ABSTRACTS

September 21- 22, 2020
University of Nigeria (Online Via Zoom.us)

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Special Guest of Honor:
His Excellency, Prof. Yemi Osinbajo,
Vice President Federal Republic of Nigeria

Keynote Speakers:
Mr. Peter Obi (Former governor, Anambra state
Rev. Fr. Dr Andrew Ekpenyong (Asst Professor of Physics Creighton University USA)

PANELISTS

Engr. Edu Okeke
Engr. Dr. Cosmas Ogbuka
Engr. Bode Longe
Mrs Iphie Ugonabo (**Moderator**)

Invited Speakers:

Rev. Fr. Dr. Emeka Ngwoke (**Chairman**)
Major General Victor Ezugwu
Chidi Ezeukwu
Patrick Ocheja.
Henry Odoemelem
Magnus Ekwunife
Eric Qinsize

Table of Contents

Program of Events for Opening Ceremony TECHISD2020
Monday 21st September, 2020

PART ONE

9:00am Virtual tour of UNN begins.

9:10am 2019 hackathon/moonlight event/ conference in retrospect.

PART TWO (OPENING CEREMONY)

9:40am Introduction of Chairman of Opening Ceremony Prof. Bennet Nwanguma by Dr. Oyeka (Chairman, technical committee)

9:45am Opening remarks by chairman of session, Prof. Bennet Nwanguma.

10:00am His Excellency, Prof. Yemi Osinbajo (SAN, GCON) The Vice President, Federal Republic of Nigeria, joins the programme

10:02am National Anthem

10:04am University Anthem

10:08am Opening prayer by Most Rev. Dr. Paulinus Ezeokafor.

10:10am Welcome address by the Director, Centre for Lion Gadgets and Technologies, UNN, Rev. Fr. Engr. Dr. Edward Anoliefo.

10:15am Welcome address by the Vice Chancellor, University of Nigeria, Nsukka, Prof. C. A. Igwe

10:20am Speech by Prof Yemi Osinbajo followed by interaction.

10:55am Vote of thanks by the Engr. Dr Ijeoma Ezika (Chairperson, LOC)

PART THREE (KEYNOTE ADDRESSES)

11:00am Remarks by the moderator of the session, Prof. E .S Obe

11:05am **E-learning: Transforming Education landscape by** Magnus Ekwunife

11:15am AI hands-on kit for improving Learning outcome of STEAM students by Eric Qinsize, Government Project Development Director, Makeblock, China.

11:20am Speech by Rev. Fr. Dr Andrew Ekpenyong (Asst Professor of Physics Creighton University) ***One Person, One Innovation: mantra for a Quantum Leap in Nigeria's High-Tech Industrialization***

11:35am Speech by His Excellency, Mr. Peter Obi (Former governor, Anambra state) ***Education for development: A clarion call for synergy among government, industries and universities***

11: 50am **PART FOUR (PANEL DISCUSSION)**

TOPIC*: Power Generation and Distribution in Nigeria: Trends and Issues*

PANELISTS

Engr. Edu Okeke MD Azura Power West Africa

Engr. Dr. Cosmas Ogbuka, Director, Computer Communications Centre, UNN.

Engr. Bode Longe (GM, strategy and corporate planning, Abuja Electricity Distribution, Company

Mrs Iphie Ugonabo (Partner, Adler Rose **Moderator**)

PART FIVE (TECHNICAL SESSION)

12:30pm Remarks by Rev. Fr Dr Emeka Ngwoke

12:35pm Major General Victor Ezugwu *Technology Based Solutions for Addressing Regional Conflict and Security in Africa.*

12:45pm Chidi Ezeukwu *Data Science: An Overview*

12:55pm Patrick Ocheja *Enabling Decentralized Access to Academic Records through the Blockchain.*

13:05pm Henry Odoemelem *A Low-Cost Prototyping Framework for Human-Robot Desk Interaction.*

Schedule of Presentations TECHISD2020
Day 2: Tuesday 22nd September, 2020

Session 1-1: Power Devices and Power Electronics		
Time: 9:30am-12:30am		**Chair: Engr Dr. Boniface O. Anyaka**
Time	**Abstract ID**	**Title and Authors**
9:30	TECHISD007	**Speed And Load Characteristics Of Two Stator Permanent Magnet Machine** *Chukwuemeka C. Awah*
9:45	TECHISD052	**Real-Time Control Of DC Motor Via Ethernet Using ACO** *Oghenevwaire Akpeghagha, Chidiebele C. Udeze, Sochima V. Egoigwe, Chukwudi Chukwudozie, Araoye Timothy Oluwaseun*
10:00	TECHISD005	**Performance Of Two Stator Permanent Magnet Machine** *Chukwuemeka C. Awah*
10:15	TECHISD013	**Feasibility Of A Flow Solar Water Disinfection System** *Ekene Jude Nwankwo, Jonah Chukwuemeka Agunwamba, Clifford Ugochukwu Nwoji, Chijioke Christopher Ikeagwuani*
10:30	TECHISD031	**The Influence Of PVA In The Electrical Properties Of CZTS Thin Films Solar Cell** *N. Ezukwoke, O.U Oparaku, S. A Ugwu, M. O Ezea*
10:45	TECHISD045	**Design and Development of a Solar PV Cleaning and Cooling System.** *E.C Anoliefo, C.O Anyaoha,*
11:00	TECHISD002	**High-Frequency Inverter Based Non-Thermal Plasma System For Flue Gas Remediation** *Aluu J. I, Olisa S. C, Anoliefo E. C, Asiegbu N. C*
11:15	TECHISD022	**Power Loss Minimization In The Distribution Network: Heuristic Approach For Capacitor Placement** *Ohanu Chibuike Peter, Ifeanyi B. Ohanu, Uche C. Ogbuefi.*
11:30	TECHISD065	**The Use Of Carbon Rods From Spent Batteries As An Adsorbent** *C.C. Nnaji, C.C Aroh*
11:45	TECHISD050	**Development Of An Arduino-Controlled Convective Heat Dryer** *Chibuzo V. Ikwuagwu, Stephen A. Ajah, Nwokenkwo Uchenna, Nwigwe Uzoma, Udochukwu J. Anuta.*
12:00	TECHISD068	**Effective Earthing as a Tool for Power Quality Improvement in**

		Medium Voltage Distribution Substation *Boniface O. Anyaka*

Session 1-2: Telecommunication & Wireless Technology **Time: 9:30am-12:30am** **Chair: Engr Nnamani Christantus Obinna**		
9:30	TECHISD059	**Cooperative Spectrum Occupancy Measurement Using Wireless Waveform Generator** *Chukwunonso Marcelinus, Iwunna Eneh Joy Nnenna*
9:45	TECHISD016	**Modelling of a Spectrum Split Tandem PEROVSKITE/SI- TEG Hybrid System For Wide Spectrum Utilization** *Mkpamdi. N Eke, Isreal. O Ibeagwu, Edmund C Okoroigwe*
10:00	TECHISD030	**Wearable Ultrasonic Device for Ranging to Prevent the Spread of the COVID-19 Virus** Chibuzo Joseph Nnonyelu Ihechiluru Samuel Okoro Chidera Linda Anioke
10:15	TECHISD047	**Comparison of Conductive Ink Optimization Techniques for Body-Mounted RFID Tags** D.O. Oyeka, B.O. Ekengwu, U.N. Nwawelu
10:30	TECHISD006	**Smart and Efficient Resource Provisioning Scheme (SERPS) for Wireless Network** *Nnamani Christantus Obinna, Odo Nelson Chinedu,, Ekwo Amarachi Virginia*
10:45	TECHISD012	**Energy optimisation of wireless sensor networks using LEACH, SEP and MIEEPB techniques.** *Ewa Ifeyinwa Hilda, M.A Ahaneku, M.O Ezeja, Akpeghagha Oghenevwaire*
11:00	TECHISD033	**Pointing Mismatch in the Spatial-Matched-Filter Beam-Pattern of a L-shaped Array of First-Order Cardioid Microphones suffering from Orthogonality Perturbation.** *Chidebe Daniela Uzosike, Chibuzo Joseph Nnonyelu*
11:15	TECHISD034	**Digital Design of PID Tuned Digital Compensator for Improved Positioning Performance of Satellite Dish Antenna for Distributed Mobile Telemedicine Nodes within Nigeria** *B.O Ekengwu, D.O Oyeka, C.B Mbachu, C.A Nwabueze*
11:30	TECHISD038	**Review of the Use of Wireless Sensor Network Systems for Oil Pipeline Surveillance** *Ezeja, O. M., Ahaneku, M. A.*

Session 1-3: Smart Systems and Emerging Technologies **Time: 9:30am-12:30am** **Chair: A. Hassan Birnin-Kudu**		
9:30	TECHISD028	**Impact Of Internet Of Things To Health Institutions In Clinical Data Management** *Mesagan, O. Faith, Moses Elechi, Adurota, O Francis*
9:45	TECHISD032	**Internet Of Things (IOT): An Overview And Its Applications In Smart Homes.** *Omenka Ugochukwu Enyinna*
10:00	TECHISD061	**Home Appliance Manager Via IOT** *Chukwu O. O. , Okolo C. C., Olisa J. E., Chijindu V. C.*
10:15	TECHISD011	**Design And Modeling Of Embedded Voice Activated Smarthome Technology System For The Disabled Aged Persons.** *Okorafor Godfrey Nwaji, Opara Felix Kelechi, Ononiwu Gordon Chiagozie, Chukwuchekwa Nkwachukwu*
10:30	TECHISD042	**Digital Technology Coronavirus-Era: Primary Healthcare Workers Commitment & Involvement to Socio-Economic Development in Nigerian Local Governments** *Hassan Birnin-Kudu, W. R . Binti Sheik Osman.*
10:45	TECHISD054	**Design Of Fuzzy Adaptive PID Controller For Networked Control System Using Switched Ethernet Network** *Mberede Pearl O., Udeze Chidiebele C., Akpeghagha Oghenevwaire*
11:00	TECHISD055	**Development of an Eighteen-Point Multi-channel Multipurpose Temperature Data Logger** *A. I. Obi, O. C. Iloeje, C. O. Anyaoha, O. Ojike, P. A. Okonkwo, and U. C. Ogbuefi*
11:15	TECHISD035	**Enhanced Bayesian Techniques Of Nonlinear Autoregressive Neural Network With Exogenous Input (NARX) Network For An Efficient Management Of Smart Prepaid Meter System** *C. C. Ogbonna, S .A. Ugwu, K. C. Asanya, O. U Oparaku*
11:30	TECHISD036	**Short-Term Electric Load Forecasting Using An Enhanced Bayesian Regularisation Algorithm Combined With A Genetic Algorithm** *C. C. Ogbonna, S .A. Ugwu, K. C. Asanya, O. U Oparaku*
11:45	TECHISD066	**Design Of Covid-19 Non-Contact Hand Sanitizing Machines For Nigerian Schools Using Infrared Phototransistor, Pedal And Ultrasonic Sensors With Codes** *Akinwole O.O.*
12:00	TECHISD021	**Unified Emergency AutoService Mobile App** *Olisa S.C, Agbo W. C, Onyishi O. V, Omeje R. C, Asiegbu N. C.*
12:15	TECHISD027	**A Literature Survey On Obstacle Detection For A Mobile Robot**

		Eneh J.N, Yusuf Wisdom I, Chijindu V.C

Session 1-4: Sustainable Industrial and Agricultural Technology		
Time: 9:30am-12:30am		**Chair: Prof. E.N Ikezue**
9:30	TECHISD023	**Effect of cassava peel compost rates as soil amendment on spinach (*Amaranthus hybridus*).** *Eleke, Patience N., Jibril, Mohammed, Akut, Faith*
9:45	TECHISD025	**Development of a Prediction Model for Household Solid Waste Generation and Management in an Emerging Urban Area.** Oji Achuka Nwoke and Wilfred Ifeanyi Okonkwo
10:00	TECHISD040	**Evaluation Of Infiltration Rates Of Two Different Soil Types In Nsukka** *Gloria I. Ezenne, Solomon I. Okoli, Sunday E. Obalum*
10:15	TECHISD009	**Application Of Fuzzy Logic In Central Composite Design For Additives Optimization In Expansive Soil Treatment** *Clifford Ugochukwu Nwoji, Chijioke Christopher Ikeagwuani, Ekene Jude Nwankwo, Chukwudi Humphery Ukwueze, Chinonyelum Ugochukwu Asogwa*
10:30	TECHISD056	**Development And Testing Of A Multi-Frequency Acoustic System For Measurement Of Soil Sediment** *Ogwo, V., and Mbajiorgu, C.C.,*
10:45	TECHISD049	**A Review On The Geotechnical Implications Of Crude Oil And Used Engine Oil On The Atterberg Limit Of Soil** *Obeta Ifeanyichukwu N, Chibueze Chekwubechukwu Victory.*
11:00	TECHISD043	**Characterization Of Some Nigerian And Foreign Rice Flours And Noodles Made From Them** *Nwankwo, C. H. C., Ezeoha, S. L., Aneke, N.N.*
11:15	TECHISD062	**Quality Assessment Of Some Sachet Water Brands Sold In Afikpo Metropolis, Ebonyi State, Nigeria** *C. E. Ominyi; D. N. Ogar; C. C. Amaechi and P. U. Ukoha*
11:30	TECHISD051	**Food Security: Mitigating Climate Change With Transition To Climate-Smart Agricultural Techniques/Technologies.** *Udenze, Chukwudike, Ekwe, David Chininyerem*
11:45	TECHISD001	**Positioning The Nigerian Engineering And Construction Industry In The Fourth Industrial Revolution** *M. E. Onyia, A. O. Oguaghamba*
12:00	TECHISD058	**Influence Of Government Policy On Nigerian Manufacturing Sector: A Look At Engineering Sector** *S.V. Egoigwe, G.E. Okonkwo, T.O. Araoye, C.C. Daniel-Mkpume, A. Okoani*

12:15	TECHISD003	**Gas Deliverability Forecast And The Sustainable Development Of Nigeria's Dwindling Economy** *E.N Ikezue, T.G.Amie – Ogan*
12:30	TECHISD064	**An Assessment Of Perception And Experiences On The Performance Of Traffic Management Systems In Kaduna, Nigeria** *Babangida Zachariah, Philip O. Odion, Saidu I. Rambo, Francisca N. Ogwueleka, Patience N. Yabuwat*

Session 1-5: Education and Education Technology **Time: 9:30am-12:30am**		**Chair: Dr. Celina Jummai Nongo**
9:30	TECHISD014	**Sources And Effects Of The Noise Levels In Nigeria's Institutions Of Higher Learning: A Review** *Cornelius Ogbodo Anayo Agbo*
9:45	TECHISD046	**Integrated Mobile Based Smart Wireless PAS For Lecture Theatre** *Ozue T. I., Ndefo M. I., Ugwu H. I.*
10:00	TECHISD048	**Blockchain Technology And Its Applications Towards Sustainable Development In The Educational Sector** *Anisiuba, Somto Cynthia*
10:15	TECHISD017	**Harmonized E-Content Manager For Higher Institutions** *Olisa S. C, Ogbonna V. C, Ezika Ijf, Olisa J. E*
10:30	TECHISD037	**Contemporary Technologies For Medical Libraries: An Innovative Sustainable Development Techniques For Effective Retrieval Of Medical Information** *Celina Jummai Nongo*
10:45	TECHISD004	**Sustainable Economic Development, Poverty Reduction, Wealth Creation And Global Security Through Technical And Vocational Education And Training (TVET)** *Ike Joshua O., Okanya Arinzechukwu V., Odewale Opeyemi, Akpokiniovo Duke*
11:00	TECHISD044	**Problems And Prospects Of Undergraduate Students' Use Of Internet Resources For Online Presentation Of Mathematics Concepts** *Chika C. Ugwuanyi, William C. Nwachukwu, Innocent O. Odo*
11:15	TECHISD019	**Chronicling The African Experience: The Importance Of Education, Technology And Security In Nigeria** *Dr. Maureen Nwando Onyejegbu*
11:30	TECHISD039	**Re-Positioning Faculty Libraries The Wake Of Post COVID-19 Pandemic: Technological Innovations As Panacea To Information Service Delivery In Academic Libraries** *Celina Jummai Nongo, Anita Asen*

Session 1-6: Sustainable Security Infrastructure and Policies **Time: 9:30am-12:30am** **Chair: Engr. Dr. M.A Ahaneku**		
9:30	TECHISD008	**Two Dimensional Passwords** *Animalu, Alochukwu Vincent, Ahaneku, Mamilus A.*
9:45	TECHISD015	**Biometric Security: A Review Of The Sum Rule And Likelihood Ratio Fusion Algorithms For Multibiometrics Systems** *Samuel I. Ezichi, Ijeoma J. F. Ezika, Cynthia Nkpume, Ogechukwu N. Iloanusi*
10:00	TECHISD018	**Overview Of Voice Biometric System: Voice Person Identification And Challenges** *Ajimah N. E, Ezukwoke N, Dialoke I.C., Odaba A., Iloanusi O. N.*
10:15	TECHISD057	**Maintaining Secrecy In Communication With Uav-To-Ground Jamming Amidst Passive Eavesdropping** *Christantus O. Nnamani, Muhammad R. A. Khandaker, Mathini Sellathurai*
10:30	TECHISD067	**An Intelligent Homogenous Model For Prediction Of Network Intrusion Detection Using Synthetic Minority Over Sampling Technique And Local Outlier Factor** *Awujoola Olalekan J , Francisca Ogwueleka, P. Odion, Martins Irhebhude*
10:45	TECHISD024	**Joined Diverse Cloud Computing Systems; A Digital Forensic Framework** *Zayyanu Umar, Deborah U. Ebem, Francis S. Bakpo, Modesta Ezema*
11:00	TECHISD029	**Challenges Of Security And Privacy With Iot In Healthcare: An Overview** *Chukwu N. P., Edeagu S. O., Chijindu V. C., Eneh J. N., Ndu I. O., Ahaneku M. A., Iloanusi O. N.*
11:15	TECHISD053	**Application Of Internet Of Things For Cyber-Resilient Automotive Industry: A Systematic Review** *Oguguo, U. C., Mustapha, A., Ujevbe, B. O And Raji, A. E.*
11:30	TECHISD041	**Design And Implementation Of Surveillance Robot Using Raspberry Pi** *Onuchia, Nneka Nchekwubechukwu, Emeachi, Chidebere Joseph., M. A. Ahaneku*
11:45	TECHISD060	**Development Of High Accuracy Deep Neural Network Model For Early Detection Of Insurgencies (Experimental Study)** *Uche Stanley Onyekachi, Ebem Deborah Uzoamaka*
12:00	TECHISD010	**Design Of A Remote Controlled Boat For Monitoring Rivers, Streams, And Lakes: An Experiential Learning Experience** *Mr. Uche Ezechi, Obi Chekwube Lazarus, Oji Chinedu Favour*

12:15	TECHISD020	**Financing the Environmental Technologies to minimize the Herders' – Farmers' Conflict in Enugu State Nigeria: Implication for Sustainable Food Production in Nigeria.** *Obianuju Okpukpara, Benjamin Okpukpara, Ikenna Ukwuaba, Morgan P.*

ABSTRACTS

Power Devices and Power Electronics

Abstract ID: TECHISD007
Speed and Load Characteristics of Two Stator Permanent Magnet Machine

Chukwuemeka C. Awah

Department of Electrical and Electronic Engineering, Michael Okpara University of Agriculture, Umudike Email: ccawah@ieee.org

The effect of electric loading and rotor speed on the output of permanent magnet (PM) is presented in this study. Two-dimensional finite element analysis (FEA) is employed. The investigated machine features are: the phase flux-linkage, phase electromotive force (EMF), cogging torque, torque ripple, total harmonic distortion, average torque, loss and efficiency with special reference made to the effect of rotating speed and electric loading. The results show that the investigated machine has symmetrical and sinusoidal flux-linkage and EMF waveforms. More so, the recorded efficiency at high operating speed is as low as almost half of the corresponding efficiency at the normal operating speed. Moreover, the average torque and phase flux-linkage are unaffected by the varying rotor speed conditions. Overall, the input electromagnetic load and rotational speed would influence most of the machine's output performance. The analyzed machine has high potential for wind power and in-wheel vehicle applications.

*Keywords**: Electric load, loss, PM machines, speed, torque, and voltage***

Abstract ID: TECHISD052

Real-Time Control Of DC Motor Via Ethernet Using ACO

Oghenevwaire Akpeghagha[1], Chidiebele C. Udeze[2], Sochima V. Egoigwe[3], Chukwudi Chukwudozie[4], Araoye Timothy Oluwaseun[5]
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Internet of Things (IoT) technologies can be connected via wired or wireless technologies, nevertheless several wireless device still make use of wired technological infrastructure. When it comes to the internet and the cloud, Ethernet is the dominant wired network technology with expanding capabilities for IoT deployments. Ethernet and Transmission Control Protocol/Internet Protocol (TCP/IP) communications are not deterministic, so communication response time between control devices is variable. This paper proposes the use of ant colony optimization (ACO) algorithm for the control of a DC Servo via an Ethernet network. The paper demonstrate how the ant colony optimization can be used to improve the stability and control performance of the Ethernet network for IoT applications by evaluating the behaviour of a DC motor when it is controlled via an Ethernet network interface using the ant colony optimization algorithm. The ant colony optimization is used for tuning the PID controller and finding its optimal parameters. The Truetime simulator and the Matlab/Simulink software was used for the design and simulation of the model. The result shows the feasibility of the Ethernet network for IoT applications.

*KEYWORDS**: IoT, Ethernet, Control, DC Motor, ACO, Truetime.***

Abstract ID: TECHISD005

PERFORMANCE OF TWO STATOR PERMANENT MAGNET MACHINE

Chukwuemeka C. Awah
Department of Electrical and Electronic Engineering, Michael Okpara University of Agriculture, Umudike Email: ccawah@ieee.org

The electromagnetic performance of permanent magnet (PM) machine having a set of different stators is presented in this paper. The investigated machine

elements are: air-gap flux density, magnetic coercive force, flux-linkage, output torque, torque ripple, total harmonic distortion (THD), iron loss and efficiency. Two-dimensional finite element analysis using MAXWELL software is implemented in the whole predictions. The proposed machine has one ring-type of cup-rotor sandwiched between the inner stator and outer stator. The studies show that the proposed machine has better electromagnetic torque than its one stator counterpart. More so, it has lower total loss and improved efficiency than the single-stator equivalent. The developed machine is suited for high torque low speed machine operations, such as in direct drives; *i.e.* it could be employed in automobile and traction applications.

KeyWords: *Efficiency, rotor loss, stator loss, torque, and two-stator*

Abstract ID: TECHISD013

Feasibility of a Flow Solar Water Disinfection System

Ekene Jude Nwankwo*; Jonah Chukwuemeka Agunwamba; Clifford Ugochukwu Nwoji; Chijioke Christopher Ikeagwuani

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Solar water disinfection (SODIS) is a household water treatment (HWT) method that utilizes energy from the sun to kill pathogenic microorganisms in drinking water stored in small transparent containers and exposed to about 6 hours of strong sunlight. The study investigated the feasibility of a prototype continuous-flow SODIS system fabricated with locally available materials. The prototype system was operated for two weeks under varying water turbidity, microbial contamination, and retention time so that the performance of the system could be assessed. Analyses of samples collected from the inlet and outlet of the system showed that retention time is critical. One-day retention time achieved complete bacterial inactivation 60% of the time, while a 2-day retention time achieved complete bacterial inactivation 100% of the time, regardless of weather and the inlet water quality. The system was found to be a technically and economically viable alternative capable of stimulating uptake, diffusion, and sustained use of SODIS when compared to other continuous-flow SODIS systems developed in the past. However, massive promotion campaign and enlightenment programs would be required to make HWT a mainstream practice

Abstract ID: TECHISD031

The Influence of PVA in the Electrical Properties of CZTS thin films solar cell.

N. Ezukwoke[1], O.U Oparaku[2], S. A Ugwu[3], M. O Ezea[4]

For a few years now, thin films of Copper Zinc Tin Sulfide (CZTS) have attracted significant research attention due to its earth-abundant constituent elements, non-toxic, and as material capable of driving the development of low-cost, high-performance photovoltaic solar cells. In this work, novel CZTS thin films were deposited on non-conducting transparent glass substrate materials using low- cost chemical bath deposition techniques. Chemical bath deposition was conducted in a water bath at a depositing temperature of 100^{o}C and depositing time of 12hours. The precursor solution used for the film's growth was prepared from the mixture of copper sulfate used as source of copper (Cu), Zinc Sulphate source of Zinc (Zn), Tin Chloride source of (Sn), thioacetamide as the source of sulfur (S) and conducting polymer or synthetic metal ie polyvinyl alcohol (PVA) used for capping and electrical stimulant. Thereafter the precursor preparation, chemical bath deposition, and spray pyrolysis were carried out consecutively on each stage of the precursor prepared to grow films of CZTS material. The as-deposited films were further annealed to the temperature of 200^{o}C after which the films were characterized to evaluate the optical properties using UV-VIS spectrometer for energy band gap, X-ray diffraction machine, (XRD) for photosensitivity of the material. The results revealed that the presence of polyvinyl chloride (PVA) in the deposited films yielded an absorption coefficient of $2*10^{7}cm^{-1}$ at the photon energy of 4.5eV using PVA concentration of 0.07M. It was observed also that the films showed a zero reflectance as the wavelength increased from 400nm through 1200nm.

***KEYWORDS:** CZTS, PVA, Reflectance, Low-Cost, Absorption Coefficient.*

Abstract ID: TECHISD045

Design and Development of a Solar PV Cleaning and Cooling System.

[1]E.C Anoliefo, [2]C.O Anyaoha,
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Solar energy is one of the renewable energy sources and has a great potential in meeting the electrical energy demand of the world. This usable electrical energy can be delivered with the help of Photovoltaic (PV) panel. However, the overall electrical efficiency of the solar PV panel is greatly affected by accumulation of dust, snow, dirt, sea salt, carbon from smoke, pollen, bird droppings etc. which obstruct the entrance of photons to the PV cells. Similarly, proper cooling of the PV panel will also improve the electrical efficiency of the panel, and decrease the degradation of the panel with time, which results in intensification of the PV module's life span. This paper aims at designing and development of a low-cost automatic PV cleaning and cooling system. The study is divided into two parts: cleaning and cooling. The cleaning system design is done with a fibre roller brush attached to a gear and rack arrangement and powered with an Arduino controlled stepper motor. On the other hand, the cooling system is designed with a set of pipes, which spreads a thin film of water on the surface of the PV panel. The cooling system collects water from a storage tank with the aid of Arduino controlled pump and circulates and filters the water for reuse. The automaton of the cleaning and cooling systems are done with a dust and temperature sensors respectively. An experimental evaluation confirms that the system was able to improve the electrical efficiency of the solar PV by 9.87%. Hence, this design will help to expand the growth of solar energy utilization with PV globally.

Abstract ID: TECHISD002

High-Frequency Inverter Based Non-Thermal Plasma System For Flue Gas Remediation

Aluu J.I[1], *Olisa S.C[2], Umeogamba A[3], Uzoeto I.I[4], Ejiogu E.C[5]
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The emission of flue gas from the oil and gas industries has caused many adverse effects on living organisms and on the environment. Different

techniques have been applied to detoxify the flue gas emitted to the atmosphere, but these techniques have common issues like high temperature, bulkiness, and high cost. In this work, a high frequency based inverter Non-thermal plasma (NTP) system that is capable of detoxifying flue gas at a low temperature of about 100^{o}C - 200^{o}C was designed and implemented. Half-bridge converter topology was used to generate high voltage pulses at 1MHz. Polytetrafluoroethylene (PTFE) was used to wrap the two metal electrode plates, forming a dielectric barrier discharge plasma reactor configuration. Unlike other works on this field, this system was designed with market available components, reducing implementation cost. This system solution is promising and can be installed at the waste gas flues and chimneysin oil and gas industries

Keywords: High-frequency inverter, Non-thermal plasma, Dielectric barrier discharge reactor, Half-bridge converter.

Abstract ID: TECHISD022

Power Loss Minimization in the Distribution Network: Heuristic Approach for Capacitor Placement

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This paper presents a new technique for power loss minimization in the distribution network. The research technique has been tested on a realistic network which is the Enugu State Thinkers Corner distribution network. The types, causes, and techniques for loss reduction in distribution networks have been presented. The heuristic technique for optimal capacitor location and sizing for the minimization of power or energy loss and voltage profile improvement has been adopted in our research due to its relatively high efficiency in loss reduction over other methods. This technique indicates the sizes and actual location of the capacitors to be placed at the network with less computational time. The Newton-Raphson's load flow technique has been applied in modelling the single line diagram of the distribution network in the power system toolbox (PSAT) enabled in MATLAB/Simulink software environment. The load variation, cost of installation of the capacitor as well as the economic power factor to achieve maximum energy savings were considered. The heuristic

technique has been applied to the 30 bus, 11KV, 15MVA distribution networks having an initial power factor rating of 0.85. The analysis has been presented and it has shown that power losses are minimized from 0.556MW to 0.277MW on the application of maximum capacitor rating of 1200 (750 + 450) KVAR at a power factor of 0.96.

***KEYWORDS:** active power, compensation, distribution network, loss reduction, power flow, PSAT.*

Abstract ID: TECHISD065

The Use Of Carbon Rods From Spent Batteries As An Adsorbent

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The problems associated with unplanned and improper waste disposal has contributed significantly to the pollution and degradation of the environment (land, air and sea). Some of these substances are not biodegradable and therefore persist in the environment for a very long time. Others produce leachates with high level of toxins. It has therefore become essential to look into ways of harnessing these waste materials into more profitable ventures. In this work, carbon rods from spent batteries were used for the removal of chromium and nickel from wastewater through adsorption. These rods were used as adsorbents after activation using alkaline compounds. This study shows that waste materials can be employed to solve various problems in the environment. It was also observed that the material developed was a good adsorbent as was seen in its removal efficiency for the metals (Chromium and nickel)

Abstract ID: TECHISD050

Development of an Arduino-Controlled Convective Heat Dryer

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Abstract

Drying, has always been used for preserving agricultural products. In this study, an Arduino-controlled convective heat dryer was designed, fabricated and tested using Dioscorea dumetorum (Trifoliate Yam). The stages of preparation of the yam were done as to be used commercially with a dimension of 50mm by 30mm by 5mm. The drying time for the second and the last temperatures of 65^0C and 70^0C are 110mins and 80mins respectively. Temperature was inversely proportional to drying time. Moisture movement from inner to outer surface was rapid as well. The whole drying occurred almost at falling rate period. The work has also shown that any agricultural product can be dried and controlled, provided the temperature of drying is specified, the heat and the power required to drive out moisture present in the product to the desired weight is controlled using Arduino.

Keywords: Dryer, Arduino, Dioscorea dumetorum, moisture removal, convective heating.

Abstract ID: TECHISD068

Effective Earthing as a Tool for Power Quality Improvement in Medium Voltage Distribution Substation

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Many of the power quality problems suffered by industrial, commercial and domestic installations are caused by the ineffectiveness of the grounding scheme adopted. Power quality problems range from just a sensitive equipment malfunctioning to outright failure or damage. There are several problems generated mainly by power quality issues namely; overvoltage, harmonics, transient disturbances, uneven ground potentials, phase imbalances and safety – which have a crucial effect on the grounding behaviour. The problems generated during a lightning strike fault at the power utilization level (control room) building is analysed. The analysis includes the lightning hitting the lightning-rod or airspace rod and flows into the low-voltage circuit, passing through the surge and earthing scheme at a larger magnitude. Practical situation was given in the paper, describing the problems and their adopted solutions. The result of the adopted solution was simulated in a MATLAB environment which shows that discharge of fault and lightning current was brought to zero value under 0.25s thus reducing ground potential rise from 25,200V before intervention to zero within the same time consideration. Existence of ground loops associated with the existing earthing was eliminated through equipotential bonding. Stability and safety was achieved at the substation even at worse experience of lightning and thunderstorm within the substation area.

***Key-words:** earthing, transients, safety, power quality, ground loop*

Telecommunication & Wireless Technology

Abstract ID: TECHISD059

Cooperative Spectrum Occupancy Measurement Using Wireless Waveform Generator for Cognitive Radio

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Spectrum has become a scarce resource in wireless communication system due to the high growth in demand for wireless devices and services, which has increased, exponentially in recent years. This therefore, poses a major threat on the available frequency spectrum and as a result an efficient method for the utilisation of the limited frequency spectrum is required. Cognitive radio paradigm has been identified as the solution to spectrum underutilization. This research work aims to simulate and compare wideband and narrowband spectrum occupancy measurement. Wideband/ General occupancy measurement which covers several frequency bands each having its own services and signal characteristics, is commonly gear at giving a rough occupancy of the spectrum whereas in Narrowband measurements the system can be optimize according to the signal present in the frequency band as different signal have different characteristics and requires tailored measurement parameters needed in order to obtain the most accurate and reliable result.

Keywords: *Spectrum, Cognitive Radio, Narrowband, Wideband, Occupancy, Utilization.*

Abstract ID: TECHISD016

Modelling Of A Spectrum Split Tandem PEROVSKITE/SI- TEG Hybrid System For Wide Spectrum Utilization

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This paper adopts analytical and numerical approaches using simulation software such as MATLAB, Python and Excel spreadsheet environment in the

thermodynamic modelling of a tandem perovskite/Si-TEC hybridized with a TEG module using dichroic beam as a spectrum splitter. The TEG is anticipated to be integrated with PV modules to form a hybrid photovoltaic along with a sunbeam splitter to increase the overall conversion efficiency from solar irradiance to electricity. Its combination with PV module can exhaustively absorb a wide range of solar radiation spectrum either in form of infrared energy or ultraviolet energy. Temperature has a significant opposing effect on the efficiency of the hybrid system given that high temperature would cause the temperature of the PV to rise and consequently decrease the system efficiency. To reduce this temperature, the spectrum splitting system was proposed. The spectrum splitting device can divide the sun wavelength into two parts: the suitable wavelength for PV, and the remaining out of range energy for TEG. This would enhance the electricity efficiency of the whole system, and the temperature and heat dissipated by the PV plate can be reduced from this procedure leading to low entropy generation. The combination of photovoltaic module and a solar thermoelectric generator would enable photons outside the range of a particular solar cell's narrow absorption wavelength to be directed to the TE modules which generates electricity by the thermoelectric effect.

Keywords: *PV-TEG hybridized system, spectrum splitting, efficiency, thermoelectric effect, solar radiation*

Abstract ID: TECHISD030

Wearable Ultrasonic Device for Ranging to Prevent the Spread of the COVID-19 Virus

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The current lack of vaccines and cure makes prevention the only approach to battling the deadly COVID-19. Consequently, the World Health Organization (WHO) issued preventive measures to curb the spread of the virus, which include among others, maintaining a minimum distance of one metre (3 feet) from people and avoiding crowded places. This paper, presents the design and construction of a wearable device that is capable of detecting and estimating the

distance of people in front of the wearer and sounding a warning until the minimum safe distance is reached. Two variants of the design are proposed based on cost. The high-end variant uses the XL-MaxSonar MB1360 single-transceiver ultrasonic sensor and a voltage comparator, making it portable. The low-end design, operating at just 95mW, uses the HC-SR04 ultrasonic sensor, timer circuit for triggering the ultrasonic sensor, a low-pass filter to extract the range as voltage level from the pulse-width-modulated output of the ultrasonic sensor, and voltage comparator to compare the voltage levels. A prototype of the low-cost variant was built, tested, and observed to meet 100% of design requirements.

Keywords:*Sensors and Wearable Devices.*

Abstract ID: TECHISD047

Comparison of Conductive Ink Optimization Techniques for Body-Mounted RFID Tags

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Inkjet printing of body mounted (Epidermal) tags has become more attractive for use in body-mounted devices including RFID tags, sensors, smart devices etc. This is due to some inherent benefits of inkjet printed devices, which include flexibility, and ease of fabrication. Flexibility of the device enables conformity with the skin, which would mean comfort of the user. This is very important because for optimum user experience of body-mounted devices, comfort of the user is very important. There should be little or no discomfort during use of such device. In fact, the user should be oblivious of the presence of such device. It is however noteworthy that these benefits of inkjet printed devices can be maximized if production costs are kept at a minimum since cost would increase as the number of tags printed increases. This has led to some ingenious means of reducing the cost of ink (hence overall cost) per tag while maintaining satisfactory performance of the tag using tag read range as a metric. Some means used to reduce ink usage per tag include trimming of tag design, selective deposition of ink, and use of gridded designs. This work aims to evaluate the performance of these different approaches while considering the volume of ink used. These two factors are then used to formulate a figure of merit, which would be used to determine the best ink usage optimization technique.

Abstract ID: TECHISD006

Smart and Efficient Resource Provisioning Scheme (SERPS) for Wireless Network

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Wireless local area network (WLAN) is an unguided data communication network within a localized region, offering benefits such as portability and flexibility to an organization/user. However, they are limited due to finite network resources, which invariably lead to network delay and traffic drop/outage. Improving the performance of WLAN rely on implementing a robust resource management scheme that correlates with the dynamics of the network while efficiently utilizing the limited available resources. In this work, we developed a smart and efficient resource provisioning scheme (SERPS) for WLAN deployed within a University. The developed scheme demonstrated a dynamic network resource management system that optimized bandwidth allocation via prioritization and queuing, with respect to peak/off-peak utilization of network resources and current user location. In comparison with the contemporary resource management scheme deployed within the University of Nigeria Nsukka (LIONET), as a case study, results showed that SERPS was 41% efficiently utilized with lower server occupancy of 31%. These results elucidate that network delay and outage experienced in a typical Nigerian University like the University of Nigeria Nsukka can be reduced with an implementation of efficient resource management scheme.

Keywords: *WLAN, bandwidth, resource management, utilization, occupancy.*

Abstract ID: TECHISD012

Energy optimisation of wireless sensor networks using LEACH, SEP and MIEEPB techniques.

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Wireless Sensor Network has over the years remained a major research focus in the telecommunication sector. Wireless Sensor Networks (WSNs) are large networks made of numerous sensor nodes with sensing, computation, and wireless communication capabilities. WSNs are deployed in several sensing systems for monitoring and controlling environmental and physical processes. Energy consumption of the network nodes has remained a major challenge faced by the WSN, which tends to limit the lifespan of the network. In this work, Matlab has been used as a simulator to analyse the performance of three of these techniques; mobile sink improved energy-efficient PEGASSIS-based routing protocol (MIEEPB), stable election protocol (SEP) and low-energy adaptive clustering hierarchy (LEACH). The simulation was focused on showing the number of sensor nodes alive and evaluated the lifetime of the network using the percentage of dead nodes, which are important indicators for measuring the performance of each protocol. The MIEEPB demonstrated better performance than the other two protocols; the SEP and LEACH. LEACH was found to perform better than SEP.

Keywords:*Wireless sensor network, network lifetime, LEACH, SEP, MIEEPB, nodes.*

Abstract ID: TECHISD033

Pointing Mismatch in the Spatial-Matched-Filter Beam-Pattern of a L-shaped Array of First-Order Cardioid Microphones suffering from Orthogonality Perturbation.

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The L-shaped array comprises horizontal and vertical uniform linear arrays that are nominally perpendicular. This perpendicularity may be violated due to real world imperfections with the beam-former unaware of the deformity. This work presents a study on how the spatial-matched- filter beam-pattern's main lobe of a non-orthogonal L-shaped array of first-order cardioid microphones mismatches the nominal look-direction due to loss of the perpendicularity between the constituent horizontal and vertical linear arrays of the L-shaped array. The beam-pattern of the array is simplified using analytical methods and the peaks, hence the mismatch, is obtained numerically. The relationship between the mismatch, nominal look direction, and the tilt angle of the array is established for the major first-order cardioid microphone patterns.

Keywords: L-shaped array, acoustic beam-forming, spatial-matched filter, cardioid microphones.

Abstract ID: TECHISD034

Digital Design of PID Tuned Digital Compensator for Improved Positioning Performance of Satellite Dish Antenna for Distributed Mobile Telemedicine Nodes within Nigeria

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This paper has presented design of proportional integral and derivative (PID) tuned digital compensator for improved positioning performance of satellite dish antenna for distributed mobile telemedicine nodes within Nigeria. The objective was to design a compensator that will ensure satellite dish antenna for distributed mobile telemedicine nodes within Nigeria maintains desired line of

sight, represented in this paper as achieving robust step response tracking to unit step input, for effective communication and improved propagation time delay handling. In order to achieve this, mathematical model of dish antenna was obtained and expressed in continuous time including, the dynamic models of motor actuator, gear ratio, and propagation time delay in both forward path and feedback. The continuous time system was then transformed into discrete time form. A PID tuned lead compensator was designed using robust response time tuning method with interactive (adjustable performance and robustness) design mode in continuous time and then converted to digital form using Tustin method with frequency prewarping. Simulations were conducted considering four different cases, which are uncompensated control loop, compensated control loop with continuous time compensator, digital compensator control loop, and existing PID control loop using MATLAB programme (m-file). The results obtained showed that the developed digital compensator improved the performance of the system, which was analyzed in terms of time domain parameters, yielding a rise time of 4.68 seconds, peak time of 6.5 seconds, peak percentage overshoot of 8%, and settling time of 10.2 seconds. Generally, the results obtained revealed that the proposed system outperforms the uncompensated system and existing PID compensated system especially in terms of settling time, tracking and stability performances.

Keywords: Antenna, Compensator, Mobile Telemedicine, Nigeria, PID

Abstract ID: TECHISD038

Review of the Use of Wireless Sensor Network Systems for Oil Pipeline Surveillance

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The use of integrated Wireless Sensor Networks (WSNs) for oil pipeline monitoring activities by concerned stakeholders in the oil and gas industry has become commonplace. One of the many challenges of oil pipeline distribution system in Nigeria, and indeed in many other countries, is the issue of accurate localization of bursts and leakages. These leakages may be attributed to intentional vandalism of pipelines by oil thieves and criminals, or corrosion, or pipeline integrity compromise during physical activity like excavations, or even due to aging and fast decaying. WSN systems have been found to be very useful and effective in the management of pipeline bursts and leakages. Low-power,

low-cost and smart WSNs capable of robust and reliable multi-hop communications are standardized in the IEEE 802.15.4 specification. This paper takes a cursory look at the various attempts made by researches to utilize the WSN technology to address the above challenges. Some of these works include MISE-PIPE, PIPENET, Raspberry Pi and Arduino-based WSN system, Acoustic Sensor-based WSNs, and SCADA. However, although these solutions have achieved milestones in addressing the problem, they have been found to have limitations such as inefficiency, frequency or bandwidth issues, monitoring not being real-time, and inability to locate exact point of leakage.

Smart Systems and Emerging Technologies

Abstract ID: TECHISD028

Impact of Internet of Things to Health Institutions in Clinical Data Management

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The Internet of Things (IoT) is the internetworking of physical devices, which consists of an embedded system with sensors, actuators and network connectivity that enable collection, and exchange of data. Each day, we are witnessing the emergence of new technologies that have the capability to embed into our environment and measure the physical, social and contextual phenomenon. Various technological forces such as smart devices, wireless network, and pervasive connectivity among others drive the technology behind IoT. Data collection, management and accessibility are made easy with Internet of Things IOT. The Internet of Things (IoT) is aimed at formulating a complex information system with the combination of sensor data acquisition, efficient data exchange through networking, machine learning, artificial intelligence, big data, and clouds. This paper therefore focused on the impact of Internet of Things (IoT) on clinical data management in health institutions. This includes the impact on how data are collected, how they were being analysed and stored, it's impact in terms of security and privacy related issues.

Keywords—Internet of Things, Clinical Data, Security, Privacy and Big Data

Abstract ID: TECHISD032

Internet of Things (IoT): An overview and its applications in Smart Homes.

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We are in a new era of computing technology i.e. Internet of Things (IoT). IoT is a sort of "universal global neural network" in the cloud, which connects various devices together. The IoT is a system of intelligently connected devices, which is made up of smart machines interacting and communicating with other machines, environments, objects and infrastructures. Radio Frequency Identification (RFID) and sensor network technologies are employed, in addition to computer network and communication technologies, to meet this new challenge. As a result, a very large in size data are being generated, stored, and that data is being processed into useful actions that can "command and control" the things or devices to make our lives much easier and safer - and to reduce our influence on the environment. Smart home systems have achieved great popularity in the last decades as they increase the comfort and quality of life. Smart devices and microcontrollers control most smart home systems. A smartphone application is used to control and monitor home functions using wireless communication techniques. This paper gives an overview of Internet of Things (IOT) and brief information about IOT applications in smarthomes. We explore the concept of smart home with the integration of IoT services and cloud computing to it, by embedding intelligence into sensors and actuators, networking of smart things using the corresponding technology, facilitating interactions with smart things using cloud computing for easy access in different locations, increasing computation power, storage space and improving data exchange efficiency. Finally we present a composition of components to build a robust approach of an advanced smart home concept and its implementation.

Abstract ID: TECHISD061

Home Appliance Manager Via IoT

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Energy and security are essential needs of every home. Saving Energy cost is a function of appliance management and efficiency. However, home appliances are ineffectively managed in many homes due to human factors. Leveraging on the capability of devices to be integrated and unitary controlled from a platform, we proffer a solution to these challenges via the Internet of Things, IoT. The system is designed in three modules: The home environment, created for appliance signal collation and updating of the real-time database; the network communication layer, configured for sensor and control signals transmission; the remote environment, created for appliances integration, warning alert setting and receiving, and control signal generation. The achieved design is simple and responsive, with an average time lag of 4 sec. The real-time testing is a function of network coverage and signal strength at remote access location.

Keywords: *Arduino Uno, Firebase, Java, Andriod App, Home Automation.*
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Abstract ID: TECHISD011

Design and Modelling of an Embedded Voice Activated Smarthome Technology for the Disabled Aged Persons.

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The current technological advancements in information and communication technology (ICT) has brought about revolutionary utilization changes in homes, which have facilitated the realization of automated homes, which has led to the achieving of smarthomes. These smarthome systems use microprocessor-based

intelligence to manoeuvre or control motor driven electrical or relay electronic devices and systems in the home. The proposed smarthome technology system here is distributed in nature, and the design focused mainly on the special needs of the disabled aged users who are 60 years and above, and it is realized using Personal Computer (PC), Bluetooth and Radio Frequency (RF) wireless communication network modules, microphone, voice recognition technology, and so on. The purpose of using wireless communication here, is advantageous in that it reduces complexity related to the installation and maintenance of the home system, and this wireless network is made up of wireless sensors and actuators and it is battery operated. Bluetooth and RF wireless network based smart home systems provide cheap, comfort, secure, and safe network, and support both local and remote monitoring facilities. and provides user friendly multiple way of accessibility and control of home systems. The various tests were conducted to confirm that the system response to various user command words that the system was trained with. And the system responded appropriately by executing the users intended task. The test results revealed that the system has higher user voice command recognition accuracy in a noiseless environment than in a noisy environment, and all the system trained command words were recognized by the system.

Keywords—*Information and Communication Technology, PC, Bluetooth and RF Network, Voice Command Recognizer, and Microphone.*

Abstract ID: TECHISD042

Digital Technology Coronavirus-Era: Primary Healthcare Workers Commitment & Involvement to Socio-Economic Development in Nigerian Local Governments

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Spread of coronavirus (COVID-19) poses heavy socio-economic burdens around the world "One of the toughest challenges ever faced by WHO, coronavirus killed nearly 775,000 lives and infected 22 million since outbreak in China last December. WHO warned that COVID-19 pandemic is now being driven by people in their 20s, 30s and 40s who don't know they are infected". Despite the benefits of digital-technology coronavirus-era, its deployment and implementation have being affected by non-availability of enough mobile health tools to pre-process health and healthcare data and find true causes of COVID-19problemsto bear the current deteriorating socio-economic situation in developing nations. Behaviour-intention theoretical factors based on theory of planned behavior (TPB), extended unified theory of acceptance and use of technology (UTAUT2), technology organization environment (TOE) and social bond theory (SBT) theories were reviewed, survey conducted among primary-healthcare workers who were conversant with digital health technology based on shell model, precaution adoption model process (PAMP) from March 18, 2020 to August, 19, 2020. Twelve primary healthcare workers completed the survey, pre-processed collected data have shown significant percentage frequency counts range values of internet access and other online services 67% to 75% , adapted training factors 50% to 92% and factor items average range values 50% to 58.3% for hypothesis generation, expert confirmed factors validation and reality pilot testing towards development of legal framework in finding explanation to "aged group of 25-29 years that lost highest jobs to coronavirus should be tested if feasible said WHO". Youth entrepreneurship development, business data security "banking sector recorded 263.78 trillion-naira electronic transaction in Q2, dept rises by 2.3 trillion-naira, hits 31 trillion-naira and recession enters fourth quarter with 51% GDP drop", food security, electronic

government implementation plans, interoperability, and mobile-health research funding needs. Except primary-healthcare system adoption problem insights are known and mapped, approaches to national policy design and implementation will result in lack of awareness and poor conclusions. Furthermore, primary-healthcare workers in Nigerian local governments do not know yet if patients recover from coronavirus can still be infected again.

***Keywords**: Behaviour-Intention, Mobile-Health, Primary-Healthcare, Coronavirus-Era, Nigeria.*

Abstract ID: TECHISD054

Design Of Fuzzy Adaptive Proportional Integral Derivative Controller For Networked Control System Using Switched Ethernet Network

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One of the major concerns in networked control system is networked-induced delay. The real-time industrial network, often referred to as fieldbus, is an important element for building automated manufacturing systems. Thus, in order to satisfy the real-time requirements fieldbus protocols were developed. These fieldbus protocols have an important advantage over the widely used Ethernet in terms of their deterministic behaviour. However, the application of fieldbuses has been limited because of the high cost of hardware and the difficulty in interfacing them with multivendor products, as a result led to further improvement of Ethernet to switched Ethernet. The use of the 100M Switched Ethernet technology is more efficient when the real-time process shares the same medium with other applications due to its large bandwidth. This research work is focused on delay compensation in 100M switched Ethernet using a fuzzy adaptive Proportional Integral Derivative (PID) controller for Networked control system, with the aim of making it more deterministic. The result obtained from this simulation of fuzzy adaptive PID controller was compared to PID and Fuzzy_PID controllers. MATLAB/Simulink was employed in the system implementation of the model. The result however, showed that the signal of Fuzzy adaptive PID had no overshoot and lesser settling time which indicates more stability.

Keywords: *NCS- Networked Control System, PID Controller, Fuzzy, 100M Switched Ethernet , MATLAB/Simulink*

Abstract ID: TECHISD055

Development of an Eighteen-Point Multi-channel Multipurpose Temperature Data Logger

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A low cost multipoint, multipurpose temperature data logger was designed and fabricated in this study. The design was done using Max6675 temperature sensors. The purpose of data logger in this work is to accomplish the task of monitoring temperature measurement of any kind of equipment or component. The developed prototype was internally or externally powered and has a retrievable memory card module. The system is portable and rugged. The temperature sensor's response time was observed to be one minute leading to a time series analysis. It was observed from the graphical plots that the temperature patterns were in consonance with the solar radiation patterns. The trend of the temperature flow pattern showed that they approached standard when compared with literature hence, indicating that the system actually senses changes in the surroundings effectively. The accuracy of the temperature sensors were about ±0.5^{o}C.

Keywords: *multipoint; multi-channel; temperature sensors; data logger; patterns*

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Abstract ID: TECHISD035

Enhanced Bayesian Techniques Of Nonlinear Autoregressive Neural Network With Exogenous Input (NARX) Network For An Efficient Management Of Smart Prepaid Meter System

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The optimum architecture of a nonlinear autoregressive neural network with exogenous input (NARX) network is very complex and the optimal number of hidden layers and neurons in each layer are determined by trial and error method. This paper presents an enhanced Bayesian technique of a NARX network to face successfully the problem in the management of smart prepaid meter system. The NARX network is trained and built through artificial neural network (ANN) toolbox of MATLAB. The generated model is configured and further improved by a genetic algorithm through a global optimization toolbox of MATLAB. Using the proposed network, the mean absolute percentage error and a cumulative variation of Root mean square Errors in the order of 0.967% and 0.945% have been achieved, which is 29% enhancement on the average error using levenberg- marquadt, scaled conjugate and Bayesian regularisation. The real data collected from 200 smart prepaid meter users in EEDC Nsukka district are used to train and validate the forecast prediction.

Keywords: Smart prepaid meter system; Bayesian regularisation algorithm; nonlinear autoregressive exogenous input (NARX); artificial neural networks (ANN)

Abstract ID: TECHISD036

Short-Term Electric Load Forecasting Using An Enhanced Bayesian Regularisation Algorithm Combined With A Genetic Algorithm

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Background/Objectives: Short term load forecasting (STLF) is applied to everyday power system operation and spot price calculation, so the accuracy requirement is much higher than for a long-term prediction. In order to improve the accuracy, we propose an enhanced Bayesian regularization algorithm combined with a genetic algorithm. Methods/Analysis: Artificial neural network and a global optimization toolbox are used to train, configure and optimize the neural network. The propose system utilizes non-linear autoregressive neural networks with exogenous input (NARX) network. Findings: The performance of the proposed algorithm is compared with performance of three NARX network-training algorithms. The mean absolute percentage error (MAPE) and CPU training speed for the techniques are respectively found to be: Levenberg-marquadt (0.60, 6.18), Scaled conjugate (0.65, 8.39), Bayesian regularization (0.70, 15.32) and the Proposed model (0.20, 5.53). This shows that the prediction accuracy and speed of the proposed model are superior to the existing techniques. Applications: The Bayesian regularization technique has been improved for short term electric load forecasting. A small improvement in electricity load forecasting could reduce production costs and increase trading advantages, particularly during the peak electricity consumption periods. The National Bureau of statistics (NBS) and Nigeria Electricity regulatory commission (NERC) electrical load data are used to train and validate the forecast prediction.

***Keywords**: Short-term electric load forecasting; Bayesian regularization algorithm; nonlinear autoregressive exogenous input (narx); artificial neural networks.*

Abstract ID: TECHISD066

Design of COVID-19 Non-Contact Hand Sanitizing Machines for Nigerian Schools Using Infrared Phototransistor, Pedal and Ultrasonic Sensors with Codes.

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The new Coronavirus disease 2019, which has its epicentre in Wuhan, China in December, 2019 has become a pandemic. WHO has established that the virus can be spread through surface contacts with droplets from a sufferer or a carrier who may be asymptomatic. Thus, any act that prevents unnecessary contacts with surfaces coupled with applications of hand sanitizers will help in limiting its spread. The project used various commonly used non-contact sensors to design COVID-19 hand sanitizing machines. The three designs methods were done using Infrared Phototransistor, Pedal and Ultrasonic sensors. Arduino codes were written for Pedal and Ultrasonic sensors operated types being microcontroller controlled while Phototransistor unit employed simple DC coupled transistorized designs to realise the machines. Codes were written and compiled on the Arduino IDE while simulation of pedal operated unit done on the Proteus platform. Phototransistor and pedal triggered designs were implemented on breadboards. It is believed that these designs will go in long way to impede the spread of the Virus, flatten the epidemic curve and also help Power Electronic engineers and students alike to glean one or two ideas from their resources.

Keywords — *Coronavirus, Epidemics, Infrared, Microcontroller, Pedal, Sanitizer, Ultrasonic*

Abstract ID: TECHISD021

Unified Emergency AutoService Mobile App

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An emergency is an unexpected happening that needed immediate intervention due to its degree of threat, while an emergency response is a mechanism devised

to control and manage it. A vehicle breakdown is a specific emergency that has caused vehicle owners and travellers frustrated moments, especially when it happened in an unfamiliar location. Furthermore, access to competent vehicle technician and other related services are limited and can be worsened by factors like language barrier and unfamiliar location. In this work, we created a unified vehicle emergency response mobile App as a solution using sets of mobile App developing techniques and Google Geo-locator. The mobile App connects vehicle drivers to a well-defined database of competent vehicle technicians, security officer posts and towing van services within the locality of emergency. The mobile App interface is designed in English and WAZOBIA languages to make it more user -riendly for Nigerians and a solution to the language barrier. Online payment interface is integrated for accountability and cashless society promotion. The mobile App testing showed high responsiveness in performing task with reasonable delay time that relies on network coverage strength.

Keywords: Google Geo-locator, Mobile devices, Flutter, WAZOBIA language, Emergency response App.

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Abstract ID: TECHISD027

A Literature Survey On Obstacle Detection For A Mobile Robot

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Nowadays many industries are using robots due to their high level of performance, reliability, ability to navigate in risky environments, huge work hours with accuracy which is a great help for human beings. Robots are in high demand for security intelligence in many nations especially in a hazard-prone environment that is highly risky for human personnel to thrive. In other for robots to perform these tasks, there is a great need for them to take some decisions without human assistance. One major decision among several others that the robot must take is that of obstacle avoidance. For obstacle avoidance to be possible, the robot must first of all detect such obstacles. Obstacle detection is one of the ways of enhancing the visual mechanism of any robotic system. It is a source of real time input data to any obstacle detection and avoidance system. This has been achieved with the help of different detection mechanisms such as laser infrared sensors, ultrasonic sensors, and camera. The choice of the mechanism depends on the nature and effectiveness of the image required as

well the physical environment in which the detection is to be applied. The obstacle avoidance robots are capable of detecting obstacles and avoiding collision during navigation. For any mobile device such as robot, the ability to navigate in its environment is important because proper navigation enables the robot to achieve a desired task that it is designed for. A survey of an ultrasonic sensor-based obstacle detection mechanism in a sampled environment has been explained in this project. The robot detects the presence of an obstacle at threshold distance from the robot. The output of the ultrasonic sensors is connected to the microcontroller so that the measured distance can be used to control the actuators, based on the preset distance limit for detection and avoidance.

Sustainable Industrial and Agricultural Technology

Abstract ID: TECHISD023

Effect of cassava peel compost rates as soil amendment on spinach (*Amaranthus hybridus*).

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The study was conducted to assess the effect of cassava peel compost rates as soil amendment on spinach (Amaranthus hybridus), on the height, number of leaves, and length of leaves of spinach, for a period of five (5) weeks. The study site was within the premises of the Department of Agricultural Technology, Kaduna Polytechnic, Kaduna. The treatment was prepared in compost rates of 20 gm, 30 gm, 40 gm and 50 gm. They were applied to the spinach and arranged in a completely randomized block design with four (4) replicates. The height, number and length of leaves parameters were recorded from the 1st to the 5th week of planting. Result of the study shows that the quantity of cassava peel as treatment had no significant effect on the height of the plant at $p > 0.05$ level of significance. The average height recorded for the spinach for the duration of the study were mean and standard deviation of $6.74_{\pm}3.28$ cm, $15.10_{\pm}15.03$ cm, $16.10_{\pm}16.37$cm, $17.50_{\pm}19.02$ cm, $9.56_{\pm}6.47$cm, for the 20 gm, 30 gm, 40 gm, 50 gm and control (0 gm) of cassava peel, respectively. There was no significant effect ($p > 0.05$) of the rate of treatments on the number of leaves observed. The results for the average number of leaves, were; $3.60_{\pm}1.51$cm, $5.40_{\pm}3.13$cm, $6.00_{\pm}3.74$ cm, $7.40_{\pm}5.03$ cm and $4.00_{\pm}1.58$ c m for the 20 gm, 30 gm, 40 gm, 50 gm and control (0 gm), of the cassava peel, respectively. For the length of leaves, the rate/quantity of the treatments applied showed no significant effect ($p > 0.05$). The average length of leaves recorded were $2.12_{\pm}1.55$ cm, $4.50_{\pm}3.58$ cm, $5.10_{\pm}4.78$ cm, $5.82_{\pm}5.29$ cm and $4.16_{\pm}3.84$ cm for the 20 gm, 30 gm, 40 gm, 50 gm, and control, of cassava peels, respectively. Generally, the study revealed that 50 gm of cassava peel compost produced better yield minimally, than the other rates. This shows that cassava peels applied in appropriate quantities as soil amendments could improve spinach yield. However, further research should be carried out on the effectiveness of cassava peel as an amendment.

KeyWords: Cassava peel, Soil amendment, Effect of compost rates, Spinach, yield parameter.

Abstract ID: TECHISD025

Development of a Prediction Model for Household Solid Waste Generation and Management in an Emerging Urban Area.

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The aim of the study was to develop mathematical model for predicting household solid waste (HSW) generation and management in Nsukka, an emerging urban area. 100 sampling points (SPs) were chosen considering the individual socioeconomic levels and the ward division in Nsukka. Housing unit types were used as the representative indicator of the socioeconomic levels. Five (5) types of housing units were distinguished according to Census of 2006 in Nigeria as (i) Houses on separate stand; (ii) flat in a block of flats; (iii) semi-detached house;(iv) rooms/let in house and;(v) traditional/hut structures made of traditional materials respectively as levels I, II, III, IV and V. Level I was presented as High income group(HI), Levels II and III as Medium income (MI) group, and Levels IV and V as Low Income(LI) group. Five sampling points were chosen for each level. Solid wastes were collected and separated into different fractions namely organics, paper, plastics, metal, glass, textile and others (unclassified). A multiple mathematical regression model was developed for the prediction of HSW generation in Nsukka municipality using household solid waste as the dependent variable while household size, income and educational level being the independent variables. Results showed that Nsukka municipality HSW generation rate was 0.536 kg/capita/day, and the compositions of the waste were 50.15% organics, 6.75% paper, 27.65% plastics, 8.43% metal, 3.73% glass, 3.05% textile and 0.24% others (unclassified). A model for predicting HSW generation was developed for Nsukka municipality. The suitability of the model for predicting HSW generation rate in Nsukka municipality was compared and evaluated using mean absolute deviation (MAD), mean square error (MSE), root mean square error (RMSE), mean absolute percentage error (MAPE) and coefficient of determination (R^2). The MAD, MSE, RMSE, MAPE and R^2 values of the developed model were 0.038,0.007,0.085, 5.28, and 0.704 respectively. Education level of the household daily manager has a major impact on HSW generation rate. The study showed that housing unit types could be used as representative indicator of socioeconomic levels for waste generation and proper management in emerging urban area such as Nsukka.

Keywords: Prediction Model; Household Solid Waste; Generation Rate; Composition; Housing Unit Types; Socioeconomic Variables

Abstract ID: TECHISD040

Evaluation of Infiltration Rates of two different Soil types in Nsukka

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Infiltration influences hydrological processes such as surface water, soil water reserve and groundwater, as well as some ecological processes that enhances agricultural productivity. This study evaluates the infiltration rates of two different soil types within Nsukka catchment and compared the results obtained in the field with that estimated using Green & Ampt infiltration model. Two sites with different soil types namely: Nsukka Series and Nkpologu Series were selected. Nsukka Series is located on the longitude of 7^{o} 25.334'E and latitude of 6 ^{o} 51.767'N, whereas Nkpologu Series is located on the longitude of 7 ^{o} 24.252'E and latitude of 6^{o} 52.414'N. Three locations (A, B and C) were chosen from each site. Double ring infiltrometer was used to measure the infiltration rates at different time intervals in those locations. In addition to the field measurement, soil samples from each location were collected and soil properties determined in the laboratory. With the obtained soil parameters, Green & Ampts infiltration model was used to determine infiltration rate on each location of the two sites. The values obtained were compared with the measured infiltration rate. The hydraulic conductivities of Nsukka Series and Nkplologu Series were 0.57cm/min and 0.89cm/min respectively. For Nsukka Series, the average measured infiltration rates at the start and steady state were 1.25cm/min and 0.48cm/min respectively. The modeled infiltration rates with Green & Ampts at the start and steady state for Nsukka Series were 1.28cm/min and 0.58cm/min respectively. Also, the average measured infiltration rates at the start and steady state for Nkpologu Series were 1.43cm/min and 0.52cm/min respectively. While the Green & Ampts counterpart at start and steady state were 1.36cm/min and 0.88cm/min respectively. Comparing the two sites, it was observed that the infiltration rate of Nkpologu Series is higher than that of Nsukka Series.

Abstract ID: TECHISD009

Application of Fuzzy Logic in Central Composite Design for Additives Optimization in Expansive Soil Treatment

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This present study integrated fuzzy logic in central composite design (CCD) to optimize multi-additives for expansive soil treatment. The multi-additives, which included sawdust ash (SDA), quarry dust (QD) and ordinary Portland cement (CM), ranged from 0-20% for SDA, 0-20% for QD and 2-8% for CM. Responses such as California bearing ratio and differential free swell were evaluated using the CCD and pre-processed using grey relational analysis. The pre-processed responses were set as input variables in the fuzzy inference system of fuzzy logic to determine the multiple performance characteristics indices (MPCI). Next, the effect of each factor level on the mean MPCI was calculated and the factor level that maximized the mean MPCI value was taken as the optimal level for that factor. Thereafter, the optimum combination of additives (20% SDA+20%QD+8%CM) was determined. Laboratory experiment performed on the optimum combination of additives clearly revealed that fuzzy logic can be integrated in CCD to optimize multi-additives for the improvement of expansive soil.

Abstract ID: TECHISD056

Development And Testing Of A Multi-Frequency Acoustic System For Measurement Of Soil Sediment

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The need to develop multi-frequency acoustic system arises from the fact that single-frequency acoustic systems have an inherent limitation of differentiating the change between soil sediment concentration and particle size distribution in water relative to the acoustic frequency. This limitation is always an unknown

source of error in the measurement. Multi-frequency acoustic instruments can provide both information on particle size distribution as well as suspended sediment concentration. In this study, an acoustic sensor meter based on multi-frequencies of 50 kHz, 100 kHz and 150 kHz was developed using locally available materials. The device was calibrated using the voltage reading discovered from known masses of sediments suspended in water, further interpolation equation was used to obtain subsequent readings of suspended sediments. The acoustic sensor meter was intrusively used to measure suspended sediment concentration of known masses at an incremental rate. The values of R^2 for 50, 100 and 150 kHz are 0.8718, 0.9382 and 0.9757 respectively. Acoustic frequency attenuates as soil sediment concentration increases. The higher the frequency the more efficient the values of detected soil sediment concentration become as the attenuation is promptly avoided. Frequencies above 150 kHz should be used as it could detect very fine particles and gives a more effective output. However, the specified sensitivity of the developed sensor is 0.001 V is to 0.05 g/l at the error of ±0.004. Therefore, reflectors should be used to help harness all transmitted frequencies.

Keywords: *Soil sediment concentration, Multi-frequency, Acoustic sensor, Calibration.*

Abstract ID: TECHISD049

A Review of the Geotechnical Implications of Crude Oil and Used Engine Oil On The Atterberg's Limit Of Soil

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Crude oil is a natural resource (known as "liquid gold") commonly found in the south-southern part of Nigeria and engine oil have been beneficial to mankind in many ways; especially as a source of energy. However, despite their usefulness to mankind in solving daily problems, they have contributed immensely to environmental degradation particularly in the distortion of geotechnical properties of soil. This study seeks to review the effect of crude oil and used engine oil on the Atterberg's limits of soil in such polluted environment. Atterberg's limit is one of the very important properties of soils which accurately defines the moisture contents at which finely grained clay and silt soils transit between solid, semi-solid, plastic, and liquid states. The test values and derived indices serve as a basis for assessing other soil properties such as

shear strength, compressibility and permeability which determines their suitability for foundations, fills, embankments, and pavements. The study revealed that based on the percentage of oil present, physiochemical properties of the soil and the classification of the soils on which the oil is applied, the effects of the crude oil and used engine oil causes varying changes in the plastic limits, liquid limits and plasticity index of the soil which might make it less workable for geotechnical use.

Abstract ID: TECHISD043

Characterization of Some Nigerian and Foreign Rice Flours and Noodles made from them

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The physicochemical properties of FARO 44 and FARO 46 (Nigerian rice) and Thai Jasmine rice (Foreign rice) and the quality characteristics of noodles made from them were investigated. Thai Jasmine rice had 29.52% amylose content, 7.71% crude protein, 1% fat content, 684% swelling power, 13.75 ml/g swelling volume and 5% solubility. FARO 46 had 5.94% amylose content, 8.76% crude protein, 1% fat content, 640% swelling power, 12.87ml/g swelling volume and 6% solubility. FARO 44 had 13.98% amylose content, 8.93% crude protein, 1% fat content, 688% swelling power, 13.76 ml/g swelling volume and 2.5% solubility. Cooked noodles of Thai Jasmine rice were found to have 3.1% moisture content, 5.3% cooking loss, 6.84% swelling ratio, 12.7 N/m^2 tensile strength, 10 mm extensibility, 49.2% elastic recovery and 88% firmness. Cooked noodles of FARO 46 had 3.7% moisture content, 5.8% cooking loss, 6.40% swelling ratio, 11.9 N/m^2 tensile strength, 9.1 mm extensibility, 47.8% elastic recovery and 85.5% firmness. While cooked noodles of FARO 44 were found to have 3.5% moisture content, 6.0% cooking loss, 6.88% swelling ratio, 13.2 N/m^2 tensile strength, 11.2 mm extensibility, 48.8% elastic recovery and 89.9% firmness. Based on the comparable values of the starch properties of both the foreign and Nigerian rice varieties investigated, FARO 44 and FARRO 46 were considered good for noodle making, especially with their higher protein

contents. However, the overall acceptance of Thai rice noodles scored higher than FARO 44 and 46 because of its higher score for hardness, stickiness and appearance.

***Keywords**: Rice flour, noodles, physicochemical properties, rice, quality characteristics*

Abstract ID: TECHISD062

Quality Assessment of Some Sachet Water Brands Sold in Afikpo Metropolis, Ebonyi State, Nigeria

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Physicochemical and bacteriological quality of three (3) sachet water brands produced and sold in Afikpo, Ebonyi State Nigeria were evaluated and results compared with Nigerian Industrial Standard (NIS) threshold limits using standard methods. The results show that all the samples were clear, odourless and tasteless. It was observed that all the samples had low pH values which were not within the NIS acceptable limit. The result for temperature, conductivity, TDS, turbidity, sulphate and nitrate for all the samples were within the NIS specified limits. Results obtained for total hardness (Ca and Mg), copper cadmium and lead show they were below detectable limits. The study also showed the presence of dissolved oxygen in all the samples which might have aided the proliferation of bacteria in sample C. The he result for the bacteriological quality shows that the values for samples A and B were within the NIS acceptable limit while sample C was found to be above the permissible limit. The result of this study shows the need for the pH adjustment of the water samples and improvement of their biological treatment so as to perfect their portability.

Abstract ID: TECHISD051

Food Security: Mitigating Climate Change With Transition To Climate-Smart Agricultural Techniques/Technologies.

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With the population of the world projected to expand beyond 9 billion by 2050, increasing productivity in crop, livestock, fishery and forestry production systems will be essential to achieving global food security. Food and Agricultural Organization (FAO) estimates that agricultural production will have to increase by 60% to satisfy the imminent need for food and ensure global food security. As challenging as this is, the world is faced with the greater challenge of ensuring food security under a changing climate. As the impact of climate change increases and becomes more severe, there is risk of reduction in agricultural productivity and by implication, a threat to food security. To achieve food security goals, there is need for the agricultural sector to become climate-smart. Transition of the agricultural sector, including crops and livestock production, fishery and forestry, from the traditional technique/technology-based to a climate-smart technique/technology-based has become imperative, and will be key to responding to climate change and sustainable increase in agricultural productivity and income. Against this backdrop, this paper inclines itself to ascertain how food security will be achieved through the use of climate-smart agricultural techniques/technologies in mitigating climate change. This paper relied on both documentary evidence and interview to achieve the aim of this research. The paper found that effective deployment of climate-smart agricultural techniques/technologies reduces the effect of climate change on agriculture. The paper therefore recommended a concerted effort on the part of government and other stakeholders in adopting climate-smart agricultural techniques/technologies in Nigeria. This will help reduce the vulnerability of the agricultural sector, to climate change and ensure food security.

***Key Words:** Climate Change, Agriculture, Food Security, Technologies, Productivity.*

Abstract ID: TECHISD001

Positioning the Nigerian Engineering and Construction Industry in the Fourth Industrial Revolution

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The Fourth Industrial Revolution, a term coined by Klaus Schwab, founder and executive chairman of the World Economic Forum, describes an era marked by breakthroughs in emerging technologies in fields such as robotics, artificial intelligence (AI), nanotechnology, quantum computing, biotechnology, the Internet of Things (IoT), fifth-generation wireless technologies (5G), 3D printing, renewable energy, and fully autonomous vehicles. New technologies such as Building Information Modelling (BIM) are giving architects, engineers and contractors a completely different perspective on how to optimize the design, construction and operation of infrastructure. Disruptive technologies will present a challenge to the construction industry, which will have to adapt to very different ways of working, but the potential benefits to society could be enormous. This paper discusses the features of the Fourth Industrial Revolution and suggests recommendations to speed up innovation, minimize environmental risks and increase the positive impact of the Fourth Industrial Revolution technologies for the Nigerian Engineering and Construction Industry.

***Keywords**: Fourth Industrial Revolution, Artificial Intelligence (AI), 3D printing technology, Internet of Things (IoT), Nanotechnology*

Abstract ID: TECHISD058

Influence of Government Policy on Nigerian Manufacturing Sector: A look at Engineering Sector

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Manufacturing is a cost intensive investment. Even with cheap labour force and available market, Nigeria still imports more than it produces. About US$13,069 million worth of consumer goods accounting for 41.79% of total imports were brought into Nigeria in 2017. High unemployment rate in Nigeria have been linked to import based nature of our economy which correlates with the dearth of the manufacturing sector. Lack of basic amenities and existing government monetary and fiscal policies have economic influence on ease of doing business. Hence to be able to contend with competitors from other countries, the role of government is needs to be evaluated. The role of policies that hints on tax reduction, subsidies, reduction of interest rate, import regulations among others as it applies to Nigerian manufacturing sector will be analyzed. Challenges, untapped avenues and future recommendations will be made.

Abstract ID: TECHISD003

Gas Deliverability Forecast and the Sustainable Development of Nigeria's Dwindling Economy

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The United Nations Commission on Environment and development succinctly put the definition of sustainable development "as one which allows nations to meet their present needs without compromising the ability of future generations to meet their own needs", The concept of sustainable development is actually illustrated by a system which operates in an equilibrium state or in a steady state

hence undergoes changes at a rate which is carefully regulated by the authorities (governmental agencies ie CBN, Financial Institutions etc) and which is acceptable to all the citizens. The paper high lights the strategies likely to hasten the sustainable development of the Nigerian economy which include

- The implementation of a plan for the improved energy generation and distribution through the national grid network
- Improvement on the provision of available public transportation system
- Improved funding of research and development activities to boost research at all levels of education.
- Better planning on the rehabilitation and periodic maintenance of the road network both state and federal road infrastructure
- Environmental planning on industrial projects or when setting up new industrial concerns (the use of environmental impact assessment at the early stage for each industrial setup
- Resuscitation of the steel industry to boost the construction and building sectors of the economy
- The inauguration of new fertilizer complexes to boost agricultural production and petroleum refineries to reduce dependence on imported refined products.

Keywords: *Sustainable development, equilibrium state, Nigerian economy, Transportation, Agricultural production, Power generation.*

Abstract ID: TECHISD064

An Assessment of Perception and Experiences on the Performance of Traffic Management Systems in Kaduna, Nigeria

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Perception and experience are major factors that influence system acceptability. Acceptability on the other and has great influence on the successful implementation and operation of a system. However, the performance of the various traffic management systems that are operational in Nigeria have not been assessed from the publics' perception and experience point of views. Therefore, this research employed the use of structured online questionnaire to

assess the perception and the experience of the residents of Kaduna metropolis in Kaduna State, Nigeria. The collected data were analyzed using Descriptive Statistics and Chi-Square Test of Significance in Statistical Packages for Social Sciences (SPSS). The results of the analysis (of four hundred and ninety-six responses) showed that the respondents have a fair perception and experience of the perceived performance of the different traffic management systems operated within the State. The results also showed that respondents are more biased towards the applications of modern computational tools in the management of traffic congestions. Thus, there is likely to be higher acceptability of the modern tools in the management of traffic congestions. Therefore, it is recommended that research focusing on the motorist be carried out to assess whether the acquired results will be similar to those that will be obtained in the case of motorists' perceived performance of traffic management systems within the metropolis.

***Keywords:** Perception, Experience, Kaduna, Traffic Control Systems, Computational Tools*

Education and Education Technology

Abstract ID: TECHISD014

Sources and Effects of the Noise Pollution in Nigeria's Institutions of Higher Learning: A Review

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Institutions of higher education are citadels of knowledge and high intellectual discourse. It is specially designed and secluded in a serene environment. Unfortunately, the worrisome noise pollution in Nigeria's higher institutions of learning has continued unabated. In this paper, a review of the sources, effects and mitigation measures adopted so far has been re-evaluated based on available materials. It has been observed that up to 90% of institutions are exposed to unacceptable noise pollutions. Supposedly standby generators, road traffics, and religious activities within the institutions and their neighbourhoods have been indicated as the major contributors to the noise pollution ranging between 50 – 110 dB(A). Most people exposed to these noise pollutions felt they couldn't help the situation even as they are aware of the disturbing consequences. It is an inclusive recommendation of this paper; therefore, that the school management should work hand-in-hand with governments at all levels to undertake a holistic measure towards provision of acceptable conducive teaching and learning environment devoid of noise pollution. This would go a long way, not only to improve the academic performance of students but also enhance staff output in our various higher institutions of learning.

Keywords: higher education, noise pollution, sources, effects, mitigation measures

Abstract ID: TECHISD046

Integrated Mobile Based Smart Wireless Public Address System.

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The art of communication is a bidirectional sequence which breeds understanding amidst the participants. Communication system is an essential tool in the organization of seminars, symposiums, lectures etc especially an indoor program. In most of these events, we experience delays, lots of movements in the auditorium in a bid to make microphone available to a participant for feedback. In some other auditorium, each participant has a microphone attached to them. This actually makes the Public Address System (PAS) very expensive to deploy and also the auditorium expensive to hire. In a bid to reduce the cost of deploying PAS, seamless connectivity and to control the human movement during an event, we propose an Integrated Mobile Based Smart Wireless PAS (IMSW-PAS). The proposed system consists of a Mobile Device (MD), Integrated Controller (IC) and Smart Wireless Rechargeable Micro-Speakers (SWMS). The mobile application in the MD allows the participant to register with an access code, and participate in the meeting. The meeting host controls the meeting by giving communication access to each participant that wishes to make contribution or ask question through the integrated control panel synchronized with the system. To reduce the effect of sound reverberation in an auditorium without an acoustic wall, the SWMS is equipped with motion sensor to detect human presence within it optimal audible zone. The integrated control panel allows the meeting host to efficiently and effectively moderate the meeting while keeping the environment serene and coordinated. The system will improve learning in our tertiary institution by give more student opportunity to participate effectively in a large classroom as occasioned by COVID 19 physical distancing rule. Virtual meetings cannot be implemented in all situations especially in the third world country where internet connectivity delay, data latency, cost of internet access is still a huge problem. This proposed system will help solve the problem of meeting/event moderation and control that largely depend on communication tool, reduces the cost of deploying PAS, reduce the rental cost of an auditorium and ultimately help improve learning in our tertiary institution.

Keyword: Control, PAS, IMEW-PAS, Auditorium, Communication.

Abstract ID: TECHISD048

Blockchain Technology and its Applications Towards Sustainable Development in the Educational Sector

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Blockchain technology has permeated the economy and it has been found to be a useful tool in digital innovations in the finance industry in achieving lower transaction cost, making intellectual property ownership and payments more transparent, automated and seamless. It is also found to be helpful in the Government sector due to its unalterable ability of any digital asset, integrity, information governance, information security, transparency through the use of decentralization and end-to-end encryption. In line with these benefits of blockchain, this paper aims at exploring the blockchain technology and its applications towards sustainable development in the educational sector through qualitative studies and analysis. It is found that blockchain technology has now progressed far beyond the above-mentioned usefulness and has become a new way of solving problems in the areas of records maintenance, verifying, tracking and aggregating of information for customers, suppliers, creditors and/or investors. This will be of great value in the education sector due to its ability in data storage which is securely encrypted on a blockchain network and will significantly reduce risks and information sharing. Blockchain technology in the educational sector will eliminate many challenges such as unsecured system, manual filing of documents which takes up time and often cause duplication of information, inefficient and inaccurate sharing of information, vulnerability to identity mismanagement and theft. It will also make data highly available in real time than a centralized database and cuts down cost of building infrastructures for data hosting. This paper fills literature gap by presenting a comprehensive review on blockchain technology and the various ways through which it will help in providing sustainability in the educational sector.

Keywords: Blockchain, Educational Sector, Internet of Things, Big Data

Abstract ID: TECHISD017

Harmonized E-Content Manager for Higher Institutions

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One of the cardinal roles in higher institution of learning is content creation and management. This process has become tedious and challenging in many higher institutions of learning in Nigeria, although they have E-content manager but not truly harmonized. Consequently, it has brought about drudgery and underperformance in rendering services in the institution hence demands a holistic and harmonized solution. In this work, we design and implement a harmonized e-content manager using the Department of Electronic Engineering (ECE-UNN) as a case study with the prospect of wider encompass of the institution. Centralized management approach was adopted in conjunction with trending software development tools to model the system while course assigning to the lecturers, course registration, result computation and management were implemented. The logic of the system was performed using the Laravel framework while JavaScript ES6, CSS3 and HTML5 were used on the system interface. In furtherance, MySQL was used on the system database while Morris charts and fusion charts were used to harmonize the content visual display. SSL technology and Comodo secure were used to ensure that the system security strength is high. The fast loading time on the browsers was provided through the use of Service Workers and Indexed DB technologies. The system test result demonstrated its capability in rendering timely, efficient and secured harmonized content management across all browsers and showed optimized mobile application for android phone users.

***Keywords**: Content Management, SSL Technology, MySQL, UML, JavaScript*

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Abstract ID: TECHISD037

Contemporary Technologies for Medical Libraries: An innovative sustainable development technique for effective retrieval of Medical information

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This paper investigates contemporary technologies for effective retrieval of information in medical college libraries in Benue and Kwara States of Nigeria. The specific objectives are; identify contemporary technological resources, determine the extent contemporary technological resources were used for effective retrieval of information, and identify challenges associated with contemporary technologies for effective retrieval of medical information. Research questions are; what are the contemporary technological resources; what is the extent of contemporary technological resources for effective retrieval of information; what are the challenges of contemporary technologies for retrieval of information. The study adopted descriptive survey, with a population of 1035 comprising medical students from the two universities. The sample size is 207; a proportionate stratified random sampling technique was used to select 207 medical students at 20% stratum representing each medical college. The questionnaire titled "Contemporary technologies for effective retrieval of information in medical college libraries in Benue and Kwara States" were distributed, and 200 were returned valid for data analysis representing a return rate of 96%. The data collected were analysed using descriptive statistics of Mean and standard deviation. The findings show that, Medical Libraries under study to a high extent have one form of contemporary technological information resources or the other. Challenges in information retrieval are: inadequate supply of contemporary technologies to accommodate students and delay in payment of internet subscription. Recommendations are; provision of adequate number of contemporary technologies for easy accessibility, improvement on real time subscription that will enhance retrievals. Librarians should imbibe sustainable development techniques as well as indulge in accessing medical educational websites for effective medical information retrieval and a host of other contemporary health information resources.

Abstract ID: TECHISD004

Sustainable Economic Development, Poverty Reduction, Wealth Creation and Global Security through Technical and Vocational Education and Training (TVET)

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Technical and Vocational education and Training (TVET) has been universally recognized as tools for empowering people especially youths for sustainable livelihood and socio-economic development. This paper examines the contributions of TVET to sustainable economic development in workplace development, poverty reduction/wealth creation as well as societal peace and security in Enugu State of Nigeria. A survey design was used and the population consists of 112 technical teachers and 75 senior staff of the State Technical Board of Education, (STBE), Enugu State. A questionnaire was developed and administered on a sample of 150 respondents, made up of 100 technical teachers and 50 senior staff of STBE. The data collected was analyzed with the mean and standard deviation. Analysis of the data revealed 31 contributions of TVET to economic development with respect to workplace development, poverty reduction/wealth creation and global security. It was recommended among others that proper administration of TVET is needed in Enugu State in order to facilitate the achievement of the objectives that are set for the programmes and that more effort should be made toward planning, organizing, controlling, directing, implementing and evaluation of TVET programmes for the realization of sustainable economic development and global peace and security.

Keywords: *technical and vocational education and training (TVET), poverty reduction, sustainable economic development and wealth creation*.

Abstract ID: TECHISD044

Problems and Prospects of Undergraduate Students' Use of Internet Resources for Online Presentation of Mathematical Concepts

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This study was carried out to investigate the problems and prospect of undergraduate students' use of internet resources for online presentation of mathematical concepts. The study employed descriptive survey research design. The study was guided by two research questions. The population of the study comprised all undergraduate students' in pure mathematics and mathematics education in the University of Nigeria, Nsukka. A sample of 100 undergraduate students was selected through simple random sampling technique. The Instrument used for data collection was Questionnaire on Problems and Prospect of the use of Internet Resources for online Presentation (QPPIROP) and a reliability coefficient of 0.8515 was obtained using Cronbach Alpha (α) technique. The research questions were answered using mean(μ) and standard deviation(б).The findings of the study revealed that insufficient computers in mathematics department, lack of ICT training for lecturers and poor internet facilities were the major problems militating against the use of internet resources for online presentation of mathematics concepts. The study also found that the strategies for enhancing the use of internet resources for online presentation is providing ICT training for every mathematics students and lecturers, provision of more laptops in the departmental libraries and engaging mathematics students in online educational lectures. Based on the findings of the study, it was recommended among others that university management should provide internet resources and technological equipment like computers, over- head projectors, and free Wi-Fi everywhere in the university premises.

Keywords: *Internet Resources, Online Presentation, Mathematics and Undergraduate Students.*

Abstract ID: TECHISD019

Chronicling the African Experience: The Importance of Education, Technology and Security in Nigeria

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Looking back in Africa, the journey of the continent is still ongoing. There is no doubt that the continent and the nations therein are at slow in pace in terms of her education, technology and security. In particular, the nation Nigeria is experiencing many setbacks in recent years due to poor management of many vital sectors which includes education, technology and security. There is no gainsaying the fact that indeed Nigeria needs to improve on these for sustainable development to occur on a faster rate in the coming years. This paper points out the fundamental contributors to the slow pace and low standard of the things that should be seen as top priorities in every given nation for sustainable development. Human greed, bad leadership, uncaring and unconcerned politicians are some of the major problems of the nation. The paper observes that it is not impossible to achieve good educational system, quality security and technological advancement in Nigeria if people are truly determined. Good leadership and committed citizens are some of the essentials needed in good decision making and sustainable development. This paper notes the powerful impact of education, technology and security and the urgent need to fund and improve them. It therefore recommends the need for Nigerian government and the people to make the listed three sectors a top priority for sustainable development of the nation.

***Keywords**: Africa, Technology, Education , Security, Nigeria*

Abstract ID: TECHISD039

Re-Positioning Faculty Libraries the Wake of Post COVID-19 Pandemic: Technological Innovations as Panacea to Information Service Delivery in Academic Libraries

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The wake of COVID-19 pandemic has thrown in a revolution of technological resources and its usefulness in dissemination of information services in Academic libraries. There is need for strategies in effective use of evolving technological resources. Post COVID-19 pandemic era requires emphatic sensitization and implementation of the government protocol to avoid reinfection of the community within the university environment which is usually populated. An observational factor of the non-pharmaceutical preventive measures against COVID-19 (which is regarded as the new normal within the faculty libraries requires) requires stringent enforcement by a supervisory team due to the high rate of deviance. This paper seeks to address the strategies on the re-positioning of faculty libraries to effectively use trending technologies to disseminate information needs of the teeming students in their various departmental academic environments. There are enlisted measures on the possibility to divert pressures from the Main Library to the faculty libraries with the objectives of providing intellectual services in a controlled population to avert breaching laid down government protocols within the university community. The technological nexus in this perspective are: OPAC, KOHA, RemoteXs Technology etc. The challenges are remotely faced infrastructural inadequacies, funding and adaptability of the new normal and enforcement of the preventive protocols. However, possible strategies to curtail reinfection are ample.

Sustainable Security Infrastructure and Policies

Abstract ID: TECHISD008

Two Dimensional Passwords

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Password has become a vital area in computer/mobile phone security. Cryptography which involves encryption and decryption has to deal with the secrecy of its password (pass-code, or key or passphrase). Information transmitted over the network is not secure and can be observed and recorded by eavesdroppers. This information can be replayed in attempts to access the server. Again, imposters can attempt to gain unauthorized access to a server, for example, a bank account or a database of personal records. The need to ensure a secure password cannot be overemphasized. In this paper, we have presented two systems using two dimensional passwords. First system will comprise the arrangement of the letters in which the password is made of in a tabular format (matrix). The second system will authenticate an action when all participants in a transaction enter their passwords in a two dimensional format. An example of the second system is where a treasury of bank account of an organization is to be enabled by more than one person in an e-banking. The system ensures that all the clients involved in the authentication are informed and are also involved in the transaction thereby improving the overall security of cryptography.

Abstract ID: TECHISD015

Biometric Security: A Review of the Sum Rule and Likelihood Ratio Fusion Algorithms for Multibiometrics Systems

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Biometric security as a means of both physical and logical access control has been shown to outperform traditional security systems based on hard and soft tokens like smartcards, one-time password, personal identification number.

However, biometric security systems have not performed optimally as most biometric security systems are based on unibiometric modality. On the other hand, security systems based on multibiometrics can significantly improve the performance of biometric systems. hence, the existence of numerous research works on the use of multi-biometric modality. In this work, we discuss different fusion algorithms that have been proposed for multibiometrics systems, as the level and method of fusion is a performance determinant in such systems. Specifically, we focus on two score-level fusion algorithms: The Sum-rule algorithm and Likelihood ratio algorithm. We consider their strengths, weaknesses, and suitable application scenarios. Finally, we show that the performance of a multi-biometric system is highly dependent on the capability of the fusion approach used.

Abstract ID: TECHISD018

Overview of Voice Biometric System: Voice Person Identification and Challenges

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Recognizing persons through their voices has been one of the earliest actions of humans, as a baby could identify the voice of their mother. Researchers have worked on seeing how machines can actually recognize individual the same way man does. Audio Signal Processing (ASP), Machine Learning (ML), Matching Algorithm Techniques has been developed to bring to a success Automatic Voice Recognition (AVR). This work gave an overview of voice recognition in totality as it cuts across voice recognition down to the physics / dynamics of voice production by human. This paper discussed clearly the challenges voice recognition faces and the ways to mitigate this challenges.

***Keywords:** Audio Signal Processing, Machine Learning, Automatic Voice Recognition, Audio Signal Processing.*

Abstract ID: TECHISD057

Maintaining Secrecy in Communication with UAV-to-Ground Jamming amidst Passive Eavesdropping

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Secured communication is a primordial requirement for technological and military exploits. It has become more stringent as the gains of technology advance the mode and means of information theft, especially within the wireless communication field - internet of things (IoT), fifth generation (5G) and future generation networks. In practice, an absolute secured communication is unattainable, nevertheless, it is important, at least theoretically, that communication models must be securely unique in all the layers of the model. The physical layer is the easiest layer to purloin information due to its broadcast nature. The security in the physical layer, measured as its secrecy capacity and/or outage probability, can be subdivided into keyed and keyless security models. While the keyed model use information obscurity as its main security feature, the keyless model harnesses the channel characteristics in the presence of eavesdropper(s). However, the stochastic wireless channel and the evasiveness/obscurity of the theft agent makes it difficult to efficiently harness optimal performance in practical scenarios. Considering these practical scenarios, it is the primary objective in this work to reduce the ability of a passive information theft agent to gain access to the transmitted message over the physical link by artificially controlling the link via aerial jamming with unmanned aerial vehicle (UAV). Results obtained from simulations show that the UAV optimized jamming can increase the secrecy capacity amidst obscure theft agent. It also showed that the UAV jamming reduces the effect of increase in the received power of the theft agent on the secrecy capacity.

Keywords: *UAV, Optimization, Secrecy, Physical Layer security, trajectory.*

Abstract ID: TECHISD067

An Intelligent Homogenous Model For Prediction Of Network Intrusion Detection Using Synthetic Minority Over Sampling Technique And Local Outlier Factor

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The network intrusion detection problem inflicts un-estimable problems to the research institution, organization, and industrial areas while the local intrusion prevention methods, like firewalls, access entry control or encryption, had performed below expectation in protecting the networks and systems from increasing numbers of attacks. Recently, there are persistent and continuous forms of different attacks existing on the cyber-space domain and this impel researchers to develop and design robust techniques in order to address the continuous problem. Therefore, because of high dimensionality of network traffics and ineffective performance of conventional machine learning algorithm in the field of intrusion detection, this research work proposed a novel approach of a hybrid solution with Wrapper based-Feature-Selection technique for removing irrelevant attributes, then use local outlier factor (LOF) to remove the outliers in the data and while further utilize synthetic minority over sampling technique (SMOTE) to recognize the oversampling of the minority samples in a bid to constructively increase the prediction accuracy of the minority class under the assumption that the overall distribution are unchanged and the information loss of majority samples decreased. However, this work considered using an ensemble classification algorithm approach, which combines decisions from Adaboost with J48 and also Adaboost with RandomForest. The experimental results confirmed that the proposed method diagnosed the anomalies very effectively, enhance the prediction accuracy, produced a better result in terms of detection efficiency and false alarm rate from the existing problems to other approaches implemented

***Keywords** Intrusion, Ensemble, classification, J48, Local outlier factor (LOF), Synthetic minority over sampling technique (SMOTE), Random Forest, Wrapper, Feature selection.*

Abstract ID: TECHISD024

Joined Diverse Cloud Computing Systems; A Digital Forensic Framework

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Most commercial complexes and academic institutions now use cloud computing to adopt new communications system. Cloud services vendors are restricted to certain resources, lacking some of the services to their customers' requests, meaning that multiple cloud data centres need to collaborate to share resources. In various characteristics and structures, cloud computing systems may be interconnected, and such network may be exposed to instability or intrusion. Although cloud computing platforms and computer technology are also making strides to meet the increasing application worldwide, attackers use Internet services to commit cyber-attacks. Deployment of cloud infrastructure is becoming increasingly vulnerable to attacks and intrusions. Unauthorized access to or destruction of records gives organizations or agencies significant devastating losses. Human influence and physical tools are not adequate to defend and control cloud vendors; thus, there is need for cyber defence architecture that is more efficient, resilient, versatile, reliable and capable of detecting hazardous cyber - crimes such as a Distributive Denial of Service (DDOS) on joined diverse cloud providers, making it necessary for real-time digital forensic investigations and deterrence. This study presents a framework for digital forensics to detect cybercrime in a heterogeneous networks setup that is joined together. We specifically used activity diagram of Unified Modelling Language (UML) in the design of the proposed architecture, then we adopted an architectural modelling approach to develop an architecture for deployment. We built a model using UML activity diagram that is capable of managing cloud instability and complexities while managing inter-domain services.

Keywords: Architecture, cloud computing, Cloud Heterogeneity, Digital Forensics, cloud services vendors.

Abstract ID: TECHISD029

Challenges of Security and Privacy with IoT in Healthcare: An Overview

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The Internet of Things (IoT) have greatly improved our lives by transforming ordinary devices in our vicinities into smart and intelligent devices that are capable of sensing the activities within the environment, interact with other smart devices and respond reasonably to the changes in their immediate environment. In healthcare, specifically, IoT technologies have assisted immensely in the monitoring, observation and timely decision-making in the treatment processes of patients. Nevertheless, the improvements and conveniences brought by the IoT also come along with huge security and privacy issues. If these security breaches are ignored, they could pose serious unpalatable effects on the different aspects of our lives including fatal exposures of patients' vital data. This paper sheds the light on some of the security and privacy issues that the IoT in healthcare paradigm is exposed to, as well as some appropriate mitigating countermeasures.

Keywords: Security; Privacy; Near Field Communication (NFC); IoT; Healthcare

Abstract ID: TECHISD053

Application of Internet Of Things For Cyber-Resilient Automotive Industry: A Systematic Review

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The automotive industry being one of the fastest growing industries has conceivably transformed the world with innovations ranging from the electric, hybrid, and self-driving, smart cars to the progression of Internet of Things (IoT)-connected cars. Due to its complexity, it necessitates the involvement of some technology industries like the cyber-physical systems and robotics. One of the modern technologies that uphold the industry is the Internet of Things (IoT). The application of IoT will enhance its traceability, data security, power, validation, confidentiality as well as durable sustainability and a higher operational efficiency to the automotive industry. This systematic review explores the potential of applying IoT to the automotive industry with focus on cyber security features. Consequently, the applicability of IoT to the industry is reviewed following the state-of-the-art and emergent challenges. Based on the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, some recommendations are highlighted with the aim of guiding industries and academic institutions in the prospects of cyber-resilient automotive industry.

Keywords: *Automotive Industry, Cyber-resilient and Internet of Things*

Abstract ID: TECHISD041

Design and Implementation of Surveillance Robot Using Raspberry Pi

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Robot is an artificially life form, made to perform a set of intelligent tasks. The Raspberry pi Robot with human and obstacle detection with camera, can be used in various facet of life. In military, to detect and investigate enemy zone. In factory, for inspection and monitoring of workers. In rescue mission, to detect human traps inside danger zones. In companies for security, night watch and inspection. The Robot is equipped with an infrared sensor for detecting obstacle so that it can set in automatic mode and with a PIR sensor its able to detect human presence, take a picture and send an email notification with the picture attached. The robot records video and broadcast it through its Wi-Fi adapter which can be stream life using any video streamer enabled applications. The robot can be set to be controlled using Internet of Things Module, this is made possible through the Wi-Fi adapter connected to the Raspberry pi or inbuilt already as in Raspberry pi 3 model.

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Abstract ID: TECHISD060

Development of High Accuracy Deep Neural Network Model for Early Detection of Insurgencies (Experimental Study)

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Due to the recurring threats of terrorist attacks all over the world and the need for a more effective approach to counter-terrorism, there is the need to develop a high accuracy Deep Neural Network Model capable of early detection of insurgencies. The purpose of this project is to improve on the work carried out by Trisha .J (2018) which is “Predicting Success of Global Terrorist Activities”. To improve on the work, we used extra features in the dataset and also built a

deep neural network (DNN) model for predicting the success of terrorist attacks.This work focuses on the use of available data about terrorist incidents all around the world in combating terrorism with the aid of Deep Neural Network Models. There was a comprehensive literature review and the analysis of existing systems and ideas gathered were used to carry out series of experiments in order to develop the proposed model. To carry out the work, python programming language was used to develop a Deep Neural Network (DNN) model for predicting the success of terrorist attacks. In this work, dataset from the Global Terrorism Database (GTD) was used to train the model.

Keywords; *Deep neural network, terrorist attacks.*

Abstract ID: TECHISD010

Design of a Remote Controlled Boat for Collecting Water Quality Data On Rivers, Streams and Lakes: An Experiential Learning Experience

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This paper provides a functional description of a remote controlled boat designed and developed by mechanical engineering students at University of Nigeria, Nsukka, to be utilized in collecting data of selected water quality variables to provide insight into coastal ecosystems. The project provided an invaluable experiential learning experience for the students. They were able to apply the knowledge of mathematics, and engineering in developing the boat to meet specifications within realistic cost and manufacturing constraints. The project was conceived to be an autonomous monitoring platform for water bodies. Presently, the remote control system for manual navigation and the hull platform has been developed and utilized in navigating the boat on a pond at UNN campus. The remote control system utilizes a transmitter, and an onboard receiver through a 2.4 Ghz radio wave frequency, and Arduino micro-controller. The hull is made from layers of Styrofoam and plywood, bound together with epoxy. The boat is lightweight, stable, has the ability to navigate shallow waters. The boat is air propelled, and has an onboard power source designed for a run of 30 minutes, with space provision to hold all water quality sensors, and electronics. Preliminary design for autonomous navigation using GPS for point-to-point navigation, and a compass for heading control, both connected to an arduino microcontroller have been undertaken. Various water quality sensors

including temperature, pH, salinity, dissolved oxygen, will be incorporated on the boat to provide an easy way of collecting data of geo-located water quality variables.

Abstract ID: TECHISD020

Financing the Environmental Technologies to minimize the Herders' – Farmers' Conflict in Enugu State Nigeria: Implication for Sustainable Food Production in Nigeria.

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Violent confrontations between farmers and herders have become a defining feature of inter-group relations among communities in the Southern and Middle Belt region of Nigeria. The crisis is propelled by desertification, inadequate environmental infrastructure, insecurity, influx of nomads from other West African countries and the loss of grazing land to expanding settlements. These factors have altered relationships that were historically inter-dependent and mutually beneficial. However, states within Nigeria's Southern and Middle Belt have witnessed an increase in casualties as consequences of these fractured relationships. Crop damage, attacks on cattle, and cattle theft/rustling are major conflict triggers that initiate violence between the two groups, which often leads to cycles of revenge attacks. The consequences of this are numerous ranging from killing, instability to displacement. The federal, state and local governments; civil society, religious groups, and communities have responded to the different manifestations of this conflict in a variety of ways. Some of these responses include attempt to creation of grazing reserves, establishment of the national commission for nomadic education, deployment of Security, attempt to pass a bill on national grazing reserve (establishment) bill, state-level legislations prohibiting open grazing, the great green wall initiative and the federal government's comprehensive livestock development plan. At the civil society, communities, and Other Non-State Actors level, community-level; conflict management and resolution, the use of information, communication, and technology (ICT) were some of the responses. However, as the herders' – farmers' conflict persist key gaps and opportunities remain to better prevent the

conflict from occurring. One of the most neglected areas of is recognizing nexus between environmental technologies and the conflict as well as instituting adequate mechanism to finance environmental technologies that will reduce the conflict. This paper examines the existing environmental technologies and financing mechanism by government and non-government actors at the community and state levels as a management strategy to the protracted conflict and offers some recommendations to curtail the conflict.

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