

CURRICULUM VITAE

Abdul Rasak Adegoke Zubair

Dynamic Lecturer in Electrical and Electronic Engineering with proven disciplinary expertise, impeccable teaching credentials, scholarly articles, and conference presentations. Taught rigorous graduate-level and postgraduate-level courses with helpful supporting materials and detail-oriented classroom management. Earned high approval ratings from students. Strong subject matter knowledge and excellent communications skills. Dedicated to individual student success and comprehensive understanding. Eager to contribute to team success through hard work, attention to details and excellent organizational skills. Motivated for further learning, growth and excellence in teaching, research and community service.



I Personal Details

- (a) Date of Birth: November 21, 1964.
- (b) Local Govt: Ibadan North Local Govt.
- (c) State of Origin: Oyo State
- (d) Permanent Home Address: N4/176B, Aloko Compound, Yemetu Adeoyo, Ibadan
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II University Education (with dates)

- (a) University of Lagos, Lagos, Nigeria (1984 - 1988).
- (b) University of Lagos, Lagos, Nigeria (1991 - 1992).
- (c) University of Ibadan, Nigeria (2006 - 2012).

III Academic Qualifications (with dates and granting bodies)

| | <u>Qualification</u> | <u>Date</u> | <u>Granting Body</u> |
|-----|---|--------------------|-----------------------------|
| (a) | B. Sc. (Honours) in Electrical Engineering with Second Class Upper Division. | 1988 | University of Lagos |
| (b) | M.Sc. in Electrical Engineering with specialization in Electronics and Communication Engineering. | 1992 | University of Lagos |
| (c) | Ph.D in Electrical/Electronic Engineering with specialization in Digital Image Processing. | 2012 | University of Ibadan |

IV Scholarships, Grants and Awards

- (a) University of Ibadan Research Foundation (UIRF) Multidisciplinary Team Research Grant (2014 to 2016)-for Renewable Energy Research. (A.R. Zubair- Team Member and Secretary).
- (b) University of Ibadan Staff Development Multidisciplinary Team Research Grant under the John D. And Catherine T. MacArthur Foundation (2010 to 2012)-for Design and Construction of Minihydro and Solar Hybrid Power Plant at Awba Dam, University of Ibadan. (A.R. Zubair - Team Member and Secretary).
- (c) University of Ibadan / ETF Conference Support Grant (14-16 December, 2009)-for participation in and presentation of paper at the 2nd IEEE International Conference on Adaptive Science and Technology (ICAST), Accra, Ghana.
- (d) University of Ibadan Postgraduate School Award (2009)-for Publication of an Article from Ph.D. Thesis.
- (e) University of Lagos Postgraduate Bursaries Award (1991/92)-for M.Sc. Electrical Engineering degree program at the University of Lagos.
- (f) United African Company (UAC) Nigeria Plc Higher Education Scholarship Award (1984 to 1988)-for B.Sc. Electrical Engineering degree program at the University of Lagos.

V Honours, Distinctions and Membership of Learned Societies

- (a) Registered Engineer with Council for the Regulation of Engineering in Nigeria (COREN). COREN Registration No: 55160. 2020.
- (b) Corporate Member; Nigerian Society of Engineers (NSE), Membership No: 08431. 1997.
- (c) Member, Institute of Electrical and Electronics Engineers (IEEE), Membership No: 80540748. January, 2007.
- (d) Letter of Commendation from the Vice Chancellor on Community Service (Technical Service for the University of Ibadan Security Unit in the Procurement and Installation of Radio Communication Equipment). 2008.

- (e) Letter of Appreciation from the Vice Chancellor on Community Service (Technical Service towards the establishment of the University of Ibadan Community Radio Project: U.I. Diamond Radio Station). 2010.
- (f) Letter of Commendation from the Vice Chancellor on Community Service (Technical Service for the University of Ibadan Security Unit in the Procurement and Installation of CCTV Equipment). 2013.
- (g) Letter of Commendation from the Vice Chancellor on Successful Completion of Two-year Tenure (August 1 2020 to July 31 2022) as Acting Head of Department, Electrical and Electronic Engineering Department, Faculty of Technology, University of Ibadan, Nigeria. 2022.

VI Work Experience

- 1) Reader (Associate Professor), Electrical and Electronic Engineering Department, University of Ibadan, Ibadan, Nigeria. 2019 – till date
- 2) Senior Lecturer, Electrical and Electronic Engineering Department, University of Ibadan, Ibadan, Nigeria. 2014 – 2019
 - Delivered higher-level undergraduate and postgraduate courses via classroom, online and hybrid methodologies to satisfy course curricula and meet student needs.
 - Developed innovative teaching aids and innovative illustrative diagrams to enhance students' learning.
 - Conducted research in signal processing and biomedical engineering; presented results in scholarly publications to further enhance knowledge.
 - Managed departmental postgraduate programs as the Departmental Postgraduate Coordinator from July 2018 to December 2020.
- 3) Acting Head of Department, Electrical and Electronic Engineering Department, University of Ibadan, Ibadan, Nigeria. August 1, 2020 – July 31, 2022
 - Coordinated the Academic staff, Technologists and the Administrative Staff for the smooth running of the Department.
 - Planned and executed schedules for lectures, examinations, results processing, staff coordination meetings, staff welfare, students' counselling & well being, and postgraduate weekly seminars.
 - Managed department finances for departmental needs.
 - Managed and maintained departmental buildings, departmental library, laboratories, classrooms, and offices.

- Organized and hosted an international conference on behalf of the department: 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF) Nov. 30 - Dec. 2, 2021.
 - Engaged the students to develop and manage the conference website and other publicity media.
 - Mobilized the alumni to support the department.
- 4) Part-Time Lecturer, Pan African University, Institute for Basic Sciences, Technology and Innovation (PAUSTI), Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya. May to September 2020.
- Utilized distance learning technology to instruct students on Advanced Digital Signal Processing remotely.
 - Used PowerPoint, Private You Tube Videos, Google Classroom technology and Google meet to give presentations to students remotely.
- 5) Visiting Senior Lecturer, Electrical and Electronics Engineering Dept., University of Ilorin, Ilorin, Nigeria. July 2016 – June 2018.
- Delivered higher-level undergraduate and postgraduate courses via classroom to satisfy course curricula and meet student needs.
- 6) Visiting Senior Lecturer, Electronic and Computer Engineering Dept., Lagos State University, Epe Campus, Epe, Nigeria. June 2015 – May 2016.
- Delivered higher-level undergraduate and postgraduate courses via classroom to satisfy course curricula and meet student needs.
- 7) Lecturer I, Electrical and Electronic Engineering Department, University of Ibadan, Ibadan, Nigeria. 2011 – 2014
- 8) Lecturer II, Electrical and Electronic Engineering Department, University of Ibadan, Ibadan, Nigeria. 2000 – 2011
- Delivered higher-level undergraduate and postgraduate courses via classroom to satisfy course curricula and meet student needs.
 - Assisted the University of Ibadan security unit in the selection, procurement, installation and operation of communication gadgets such as radio equipment and CCTV system.
 - Conducted research in signal processing and engineering in medicine; presented results in scholarly publications to further enhance knowledge.
 - Worked frequently as Departmental Examination Officer, Course Adviser, and Departmental Industrial Training Coordinator

- 9) Service Engineer, Xerox HS Nig Ltd, Lagos and Port Harcourt, Nigeria. 1998 – 1999.
- Received management training and training on xerography and servicing of Xerox copiers and Facsimile machines in Lagos, Nigeria.
 - Worked frequently on Installation and servicing of Xerox copiers and Facsimile machines at various customers' locations in Port Harcourt, Nigeria.
- 10) Lecturer II, Electrical Engineering Department, Nigerian Defense Academy, Kaduna, Nigeria. 1993 – 1998.
- 11) Lecturer III, Electrical Engineering Department, Yaba College of Technology, Yaba, Lagos, Nigeria. 1990 – 1993.
- 12) Electrical Engineer Grade II, Directorate of Works, Nigerian Air Force, Ministry of Defense, Lagos, Nigeria. 1989 – 1990.

VII My Teaching Philosophy

Teaching is an art. As a teacher, I am caring and enthusiastic. I am eager that my students assimilate the basic concepts and that each of my students attain full understanding of the subject matter. Through teaching, I contribute to the society by helping to train and produce professionals required for present and future development. Every opportunity to teach is an opportunity for my own further studies and learning. I continue to improve myself on the subjects, develop more innovative and illustrative teaching aids, and evolve more innovative ways of explaining and illustrating basic principles of Electrical and Electronic Engineering to students. Getting the facts, the ideas, the principles, and the applications across to my students is my priority as a teacher.

VIII Teaching and Community Service Experience

(a) Teaching Experience at The University of Ibadan, Ibadan, Nigeria.

◆ Undergraduate

- ✧ TEL 231 Applied Electricity
- ✧ TEL 221 Fundamental of Electrical Engineering
- ✧ TEL 316 Computer Programming & Applications I
- ✧ TEL 411 Digital System Design
- ✧ TEL 417 Sampled Data Control System
- ✧ TEL 418 Computer Programming & Applications II
- ✧ TEL 437 Digital Signal Processing
- ✧ TEL 438 Solid State Electronics
- ✧ TEL 512 Communication Systems II

- ✧ TEL 545 Signal Processing
- ✧ TEL 599 B.Sc. Degree Project
- ◆ **Postgraduate**
- ✧ TEL 701 Software Engineering and Computer Programming
- ✧ TEL 751 Digital Signal Processing
- ✧ TEL 752 Active Network Synthesis
- ✧ TEL 757 Transducers
- ✧ TEL 761 Mobile and cellular Radio Communication Systems
- ✧ TEL 799 M.Sc. Degree Project

(b) Other Academic and Administrative Duties at the University of Ibadan, Ibadan, Nigeria.

1. Departmental Exam Officer (2002/2003, 2003/2004, 2004/2005, 2005/2006, 2007/2008 2013/2014 & 2016/2017)
2. Level Exam Officer (2009/2010-2013/2014, 2015/2016-2016/2017)
3. Course Registration Officer (2000/2001-2013/2014, 2015/2016-2016/2017)
4. Departmental Industrial Training Coordinator (2001/2002, 2002/2003 & 2003/2004)
5. Member, University Committee for the Establishment of the University of Ibadan Community Radio (Diamond FM). (2006-2010)
6. Member, The Ibadan working Team on Operation Stop Cervical Cancer with the aid of Biomedical Screening Equipment in Nigeria, Collaboration between MD Anderson Cancer Center, Texas, United States of America and the Department of Obstetrics and Gynecology, Faculty of Clinical Sciences, College of Medicine, University of Ibadan, Ibadan, Nigeria. (2006 – 2008)
7. Technical Service / Consultancy for the University of Ibadan Security Unit in the Procurement of Radio Communication Equipment. (2008)
8. Technical Service / Consultancy for the Bowen University Security Unit in the Design, Procurement, Installation and Commissioning of Radio Communication Equipment. (2008)
9. Technical Service / Consultancy for the University of Ibadan Security Unit in the Procurement, Installation and Maintenance of CCTV Surveillance System. (2011-2013).
10. Member, Committee for the Establishment of M.Sc. program in Biomedical Engineering. (2011)
11. Technical Service / Consultancy for the University of Ibadan Security Unit in the Procurement of Fire Engine. (2011-2012)

12. Member, Panel of Investigation on fire incidence at the faculty of Arts Annex which occurred on December 23rd, 2011. (2012)
13. Member, Panel of Investigation on fire incidence at the buttry, Tedder Hall which occurred on May 28th, 2013. (2013)
14. Reviewer for the Nigerian Journal of Technology (NIJOTECH). (2013 to date)
15. Member, University of Ibadan Committee on University of Ibadan Power Situation. (2013)
16. Chairman, 75 Campus Power Distribution RMUs Audit Sub-Committee of University of Ibadan Committee on UI Power Situation. (2013)
17. Technical Service / Consultancy for the University of Ibadan Maintenance Department in the Procurement of Underground Power Cables And Accessories. (2013-2014)
18. Branch Counselor, IEEE University of Ibadan Student Branch. (2008-2016)
19. Departmental Lecture & Examination Time Table Officer (2012/2013– 2013/2014)
20. Member, University of Ibadan Senate; Congregation Representative on University of Ibadan Senate. (1st August, 2014 to 31st July, 2016) and (1st August, 2018 to 31st July, 2020)
21. Participation in the annual College of Medicine Core Lectures series as a Visiting Lecturer on “Fundamentals of Bioengineering; Introduction to Biomedical Engineering” organised by the College of Medicine Education Unit (CMEU), University of Ibadan for 400 Level MBBS/BDS students. (2014 to date)
22. Reviewer for the Journal Nigerian Journal of Technological Development (NJTD). (2017 to date)
23. Departmental Postgraduate Coordinator (2nd July 2018 to 31st December 2020)
24. External Examiner for B.Sc. Degree Examination, Department of Biomedical Engineering, University of Ilorin, Ilorin Nigeria. (2018 to 2020)
25. External Examiner for M.Sc. Thesis, Department of Electrical and Electronics Engineering, University of Ilorin, Ilorin, Nigeria. (2019 to 2021)
26. Reviewer for the Journal of Engineering, University of Bagdad, Bagdad, Iraq. (May 2020)
27. Reviewer for the International Journal of Computer and Information Technology (IJCIT), India. (June 2020)
28. Member, University of Ibadan Senate as Acting Head of Department. (1st August, 2020 to 31st July, 2022)

29. External Examiner for M.Sc. Thesis, Department of Electrical and Electronics Engineering, Ladoké Akintola University of Technology (LAUTECH), Ogbomoso, Nigeria. (2021)
30. Independent On-Site Reviewer of the university facilities for the PhD Program in Power Systems and High Voltage Engineering at the Africa Centre of Excellence for Sustainable Power and Energy Development (ACESPED), Department of Electrical Engineering, University of Nigeria, Nsukka on behalf of RSIF Regional Coordination Unit (RCU), International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya. (June 2021)
31. External Examiner for M.Sc. Thesis, Pan African University, Institute for Basic Sciences, Technology and Innovation (PAUSTI), Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya. (March - April 2022)

(c) Teaching Experience at The University of Ilorin, Ilorin, Nigeria.

◆ **Undergraduate**

- ✧ ELE 201 Applied Electricity I
- ✧ ELE 202 Applied Electricity II
- ✧ ELE 342 Applied Computer Programming
- ✧ ELE 443 Control Engineering I
- ✧ ELE 541 Microcomputer Hardware and Software Techniques
- ✧ ELE 545 Control Engineering II
- ✧ ELE 546 Digital Control Engineering
- ✧ ELE 593 Electrical Engineering Project I
- ✧ ELE 594 Electrical Engineering Project II

◆ **Postgraduate**

- ✧ ELE 801 Advanced Engineering Mathematics I
- ✧ ELE 834 Advanced Digital Signal Processing

(d) Part-Time Online Teaching Experience at The University Pan African University, Institute for Basic Sciences, Technology and innovation (PAUSTI), Jomo Kenyatta University of Agriculture and Technology.

◆ **Postgraduate**

- ✧ PUE 3122 Advanced Digital Signal Processing (M.Sc.)

IX Workshop, Industrial Training, Industrial Visits & Fellowships Attended

1. **Professional and Communications Training for Scientists** organized by the Abdus Salam International Center for Theoretical Physics (ICTP), Italy & virtually, 23-27 May, 2022.
2. **African Regional Workshop on SciTinyML: Scientific Use of Machine Learning on Low-Power Devices** organized by the Abdus Salam International Center for Theoretical Physics (ICTP), Italy and virtually, 25-29 April, 2022.
3. **COREN Regional Workshop on Implementation of Outcome-Based Education (OBE) in Engineering Programmes** in Nigerian Universities at the International Conference Center, University of Ibadan, Ibadan, Nigeria, 31 January - 3 February, 2022.
4. **NEST Faculty Development Workshop on teaching strategies including active learning, design, and creating an engaging learning environment** organised by the Newborn Essential Solutions and Technologies (NEST360), Rice360 Institute for Global Health Technologies, Rice University Houston, Texas, USA at the Green Legacy Resort, Olusegun Obasanjo Presidential Library Complex, Abeokuta, Ogun state, Nigeria, 14-18 March, 2022.
5. **Ten Week Program “Developing Innovative Interdisciplinary Biomedical Engineering Programs in Africa” at the Biomedical Engineering Programme and MRC/UCT Medical Imaging Research Unit, Department of Human Biology, University of Cape Town (UCT), South Africa: February to April 2014.**
-7 weeks Participation as a Visiting Academic in the program under the sponsorship of Northwestern University, Chicago, USA Grant under United States National Institutes of Health Grant No 1D43TW009374.
6. **Industrial Visit to Eland Cable, Doncaster, United Kingdom. (4-6 Dec. 2013)**
 - Visited the warehouse and Quality Control Laboratory of Eland Cable.
Eland Cables supply cables and accessories for applications such as Transmission, Distribution and Power Networks Airports, Automation and Process Control, Building and Construction, Communication and Telecommunication, Marine and Defense, Oil, Gas and Petrochemical, Rail and Transport Industry, Renewable Energy, Switchgear and Water Treatment.
 - Quality Control Techniques, Instrumentation, Management and Documentation.
 - Warehouse Arrangement, Computerised Coding/Labeling, Management and Documentation.

7. **Workshop on Biomedical Engineering, Ibadan, Nigeria. (20-22 August 2012)**
 - Participation in workshop on Biomedical Engineering with focus on Biomedical Engineering Curriculum and techniques for training future Biomedical Engineers in providing engineering solutions to medical problems organised by Medical Education Partnership Initiative in Nigeria (MEPIN), University of Ibadan in collaboration with Northwestern University, USA.
8. **One-Day Workshop on Promoting Energy Efficiency Best Practices And Conservation In Nigerian Universities’’ Organised by the National Universities Commission (NUC) in collaboration with the Energy Commission of Nigeria (NEC), The Federal Ministry of Environment (FME) and the United Nations Development Programme / Global Environment Facility (UNDP/GEF), Valencia Hotel, Wuse 2, Abuja, Nigeria. (13 June 2012)**
 - Participation in workshop on Energy Conservation, Energy Efficiency, Energy Management and Environmental Protection: “Saving Energy saves the Environment”.
9. **Industrial Visit to Albert Ziegler GmbH & Co. KG, Stuttgart, Germany and Schwarte Jansky, Emsdetten, Germany. (14-19 May 2012)**
 - Visited the production lines of Albert Ziegler GmbH & Co. KG. The 120 years old company produces fire service vehicles, pumps and hoses of various designs, sizes and capacities for army, airports and various establishments. The company also manufactures all types of equipment fire fighters need.
 - Familiarization with state of the art as far as fire fighting is concerned.
 - Visited the production lines of Schwarte Jansky. The products are trucks and trailers for transportation of water, milk, food, pharmaceuticals, cosmetics, chemicals, liquid and liquid waste.
 - Familiarization with use of modern technology, non-corrosive materials for tankers and mobile data recording and processing systems.
10. **NNPC Special Intervention on Science and Technology Education in Nine Niger Delta States and 24 Federal Universities: Training of lecturers/Technicians on the use of Equipment, Lagos, Nigeria. (24th February to 1st March 2008)**
 - Participation in training on use of Technological Teaching Aid/ Experimental/ Demonstration Modules donated to the Universities by NNPC.
11. **Biomedical Technology Repair Program, Medisend International, Dallas, USA (May to October 2007)**
 - Participation in Biomedical Technology Repair Program under the sponsorship of

ExxonMobil Foundation

12. **University of Ibadan Staff Development Fellowship under the John D. and Catherine T. MacArthur Foundation Grant at Department of Electrical and Computer Engineering, Tennessee Technological University (TTU), Cookeville, Tennessee, USA (August to December 2006)**
 - Conducted part of doctoral research in Digital Water Marking as a Visiting Ph.D Student
12. **Workshop/Training on Use of Equipment for Detection of Cervical Cancer, IITA, Ibadan, Nigeria (30th January to 3rd February, 2006)**
 - Participated in Workshop/Training on prevention of Cervical Cancer in general and use of equipment for the detection of Cervical Cancer organised by the Ibadan Working Team on Operation Stop Cervical Cancer in Nigeria: a study in University of Ibadan's Department of Obstetrics and Gynaecology in collaboration with MD Anderson Cancer Center, Texas, USA.
13. **IAEA Fellowship Training at Institute of Nuclear Medicine and Oncology, Lahore, Pakistan (March – June, 2004)**
 - Received Training on Biological Imaging and Teletherapy Nuclear Medical Systems

X Research

(a) Completed

- (i) Computer Aided Analysis of PWM Schemes in Power Electronics, Stranded Transmission Line Conductors and Rectangular Microstrip Antenna.
- (ii) Computer Aided Root-Locus and Wavelet Transformation Techniques.
- (iii) Suppression of Noise in Images, Image Enhancement, Image Restoration in Spatial and Frequency Domains, Image Texture Analysis and Image Retrieval
- (iv) Visible and Invisible Digital Image Watermarking
- (v) Suppression of Noise in Electrocardiogram (ECG) Signal
- (vi) Development of Biomedical Devices: Bedside Monitor, Electrical Safety Analyzer, Blood Glucose Meter, Sleep Inducer, Digital Ventilator, Biofuel-Powered Autoclaving Machine, Multi-Parameter Portable Healthcare Monitoring Device, Body Mass Index Machine, Baby Care System, Auscultation Simulator, Hand Washing Station with a Brain Box.
- (vii) Interfacing Biomedical Devices with Internet of Medical Things (IoMT)
- (viii) Signal Processing for Multi-Source Energy Flow Control and Smart Home.
- (ix) Automatic Fertigation System (Precision Agriculture)
- (x) Development of innovative teaching aid, illustrative diagrams and class projects for active learning of applied electricity, wavelet transformation technique, amplitude modulation and Low Pass Filter approximation functions.

(b) In Progress

(i) Engineering in Medicine

Biomedical instruments are fundamental to successful medical practice. Medical instruments are devices intended to diagnose, treat, or monitor the patient under medical supervision. Such devices make physical or electrical contact with the patient and/or transfer energy to or from the patient and/or detect such energy transfer to or from the patient. To achieve the development goal of health for all most especially in the COVID-19 and Post COVID-19 era, it is necessary to increase the availability of these devices in Africa.

(ii) Real Time Digital Signal Processing of Analog Signals

Real time digital signal processing of analog signals is being studied. Filter approximation functions have been studied. Various techniques of design of analog and digital filters are being considered. Labjack circuit modules are being studied as interface to couple hardware devices with digital computer. The goal is real time application of digital signal filtering software schemes for the processing of analogue signals.

(iii) Brain Tumor Detection

Application of Image Processing techniques such as image enhancement, image noise suppression, image segmentation and image feature extraction to brain tumor detection is being studied. Tumors are irregular growth of cell and tissue that may be

in solid or fluid form. Early recognition or detection of the tumor is crucial to cancer treatment and management.

(iv) Audio and Video Watermarking

Visible and invisible Digital Watermarking schemes have been developed for digital images in both spatial and frequency domains. Digital watermarking of other medial such as audio and video are being studied.

(v) Application of Signal Processing in Industry, Agriculture and Security Systems

Research efforts are being made to apply signal processing for useful domestic, industrial, agricultural and security purposes. Study and usage of sensors for the detection of signals and actuators for the execution of essential tasks are part of these efforts. Electronic communication and internet of things are also involved.

(c) Dissertation and Thesis

1. Zubair, A. R. (1988). Estimation of Geometric Mean Radius of Stranded Conductors using Digital Computer. B.Sc. Project Report, University of Lagos, Akoka.
2. Zubair, A. R. (1992). Design and Construction of a Delta Modulator. M.Sc. Mini Project Report, University of Lagos, Akoka.
3. Zubair, A.R. (1992). Design of a Basic Group One Elliptic Digital Fitter. M.Sc. Dissertation, University of Lagos, Akoka.
4. Zubair, A.R. (2012). Development of Post-Processing Schemes for Image Signal Recovery with Improved Information Content. Ph.D Thesis, University of Ibadan, Ibadan, Nigeria.

XI Publications

(a) Books already published

(1) **Zubair A. R.** (2021). *Towards Understanding and Expertise in Applied Electricity (Part 1): Fundamentals of Electrical and Electronic Engineering made simple*, Chisnau: LAP LAMBERT Academic Publishing. 241pp. ISBN: 978-620-4-71518-6. (Republic of Moldova Europe) (Contribution: 100%).

(b) Chapters in Books already published

(2) **Zubair A. R.** and Olawale A. J. (2023) *Development of Arithmetic/Logical Computational Procedures: Computer Aided Digital Filter Design with Bilinear Transformation*. In: Z. Hu, I. Dychka and M. He (eds) *Advances in Computer Science for Engineering and Education VI. Lecture Notes on Data Engineering and Communications Technologies*, vol 181, chapter 31, 349–360pp Springer, Cham. https://doi.org/10.1007/978-3-031-36118-0_31 (Switzerland) (Contribution: 60%).

(3) Ahmed Y. K., Danmusa N., Ahmed T. Saminu S., **Zubair A. R.** and Adelodun A. B. (2023). *Development of a Dual-Controlled Wheelchair for Totally and Partially Paralyzed Patients: A Proof of Concept*. In: Z. Hu, I. Dychka and M. He (eds) *Advances in Computer Science for Engineering and Education VI. Lecture Notes on Data Engineering and Communications Technologies*, vol 181, chapter 66, 748–758pp Springer, Cham. https://doi.org/10.1007/978-3-031-36118-0_66 (Switzerland) (Contribution: 20%).

(c) Articles that have already appeared in Refereed Conference Proceedings

(4) **Zubair A. R.** (2009). *Numerical Integration Based Analysis of Pulse Width Modulated Voltage Source Inverter*. In A. Gyasi-Agyei and T. Ogunfunmi (Eds.). *Adaptive Science and Technology: Proceedings of the 2nd IEEE International Conference on Adaptive Science and Technology (ICAST)*. 14-16 December, 2009. Accra. 301–307pp. (Ghana) (Contribution: 100%).

(5) **Zubair A. R.** (2011). *Spatial Domain Restoration Scheme*. In F.M. Nekang and A. Kyaruzi (Eds.). *Research and Development: Proceedings of the 4th International Conference on Research and Development*. 31 May - 3 June, 2011. Lome. 46-54pp. (Togo) (Contribution: 100%).

(6) **Zubair A. R.** and Atusiuba, O. K. (2017). *Alternative Power Supply Systems' Efficiency: Battery Maintenance and Charging Techniques*. In K. C. Okafor (Eds.). *Electro-Technology: Proceedings of IEEE 3rd International Conference on Electro-Technology for National*

Development (NIGERCON). 7-10 November, 2017. Oweri. 905-914pp. (Nigeria) (Contribution: 80%).

(7) **Zubair A. R.** and Ogunware A. O. (2018). Telediagnosis: Interfacing Biomedical Diagnostic Devices with Internet of Things (IoT) using ThingsSpeak Web-Based Platform. In D. P. Asante, R. Boatang, L. O. Babatope and A. Okunoye (Eds.). *Addressing Human-Centered Challenges through Multidisciplinary Innovations and Inter-tertiary Collaboration: Proceedings of the 13th ISTEAMS Cross-Border Conference* 24-26 October, 2018. Accra. 141–150pp. (Ghana) (Contribution: 80%).

(8) Adedigba A. P, **Zubair A. R.**, Aibinu A. M, Adeshina S. A, Okubadejo O. and T. A. Folorunso T. A. (2019). Towards the Development of Intelligent Insulin Injection Controller For Diabetic Patients. In M. M. Boukar, S. A. Adeshina and N. A. Nwojo (Eds.). *Proceedings of 15th International Conference on Electronics, Computer and Computation (ICECCO)*. 7-10 December, 2019. Abuja. 248-253pp. (Nigeria) (Contribution: 20%).

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

(10) **Zubair A. R.** and Soneye O. O. (2021). Development and Performance Evaluation of 1-Level Discrete Haar Wavelet Transform based Robust Digital Image Watermarking Scheme. In A. R. Zubair, O. O. Olakanmi and A. M. Aibinu (Eds.). *Innovations for social, economic and technological sustainable development and self-sufficiency of nations: Proceedings of the 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields (1st ICEECE & AMF)* 30 November - 2 December, 2021. Ibadan. 146–154pp. (Nigeria) (Contribution: 80%).

(c) Articles that have already appeared in Learned Journals

(11) **Zubair A. R.** (2010). Biomedical Instruments: safety, quality control, maintenance, prospects & benefits of African Technology. *African Journal of Medicine and Medical Sciences* Vol. 39: 35-40. (Nigeria) (Contribution: 100%).

(12) **Zubair A. R.**, Fakolujo O. A. and Rajan P. K. (2010). Digital Watermarking of Still Images with Color Digital Watermarks. *Journal of Science Research* Vol. 9: 33-41. (Nigeria) (Contribution: 70%).

- (13) **Zubair A. R.** (2012). Comparison of Image Enhancement Techniques. *International Journal of Research in Commerce, IT & Management* Vol. 2. No. 5: 44-52. (India) (Contribution: 100%).
- (14) **Zubair A. R.** (2012). A Non-Iterative Automated Mechanism for Image Inpainting. *African Journal. of Computing & ICT* Vol. 5. No. 4: 1-8. (Nigeria) (Contribution: 100%).
- (15) Odesola I. F., Atoyebi M. O., Olatunbosun A. and **Zubair A. R.** (2012). Installation and Testing of a 5kW Hydropower Turbine. *Journal of Natural Sciences, Engineering and Technology* Vol. 11. No. 2: 116-124. (Nigeria) (Contribution: 20%).
- (16) **Zubair A. R.** and Fakolujo O. A. (2013). Development of Statistics and Convolution as Tools for Image Noise Suppression: Statistical Performance Analysis of Spatial Filters. *African Journal. of Computing & ICT* Vol. 6. No. 5: 95-108. (Nigeria) (Contribution: 70%).
- (17) **Zubair A. R.** and Olatunbosun A. (2014). Computer Aided Root-Locus Numerical Technique. *Nigerian Journal of Technology* Vol. 33. No. 1: 1-13. (Nigeria) (Contribution: 70%).
- (18) **Zubair A. R.** and Fakolujo O. A. (2014). Image Edge Detection and Image Edge Enhancement: Numerical Experiment on High Pass Spatial Filtering. *International Journal of Computer and Information Technology* Vol. 3. No. 4: 772-781. (India) (Contribution: 70%).
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- (25) **Zubair A. R.** (2018). Texture Synthesis Based Adaptive Median Filter. *International Journal of Scientific & Engineering Research* Vol. 9. No. 5: 1300-1308. (USA) (Contribution: 100%).
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- (27) **Zubair A. R.** and Eneh C. U. (2018). Electrocardiograph: A Portable Bedside Monitor. *International Journal of Modern Research in Engineering and Technology* Vol. 3. No. 7: 1-5. (India) (Contribution: 80%).
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- (31) **Zubair A. R.** (2019). Image as a Signal: Review of the Concept of Image Frequency Estimate. *Computing, Information Systems, Development Informatics Journal* Vol. 10. No. 1: 73-86. (Nigeria) (Contribution: 100%).
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- (44) Adedigba A. P. and **Zubair A. R.** (2022). Performance Comparison of Blood Glucose Controllers for Diabetic Patients. *International Journal of Computer Applications*, Vol. 184. No. 8: 32-39. (USA) (Contribution: 50%).

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- (49) **Zubair A. R.**, Raji O. M., Onyeije A. L., Olaboade E. D. and Zubair J. A. (2022). Electronic Signal Processing for Hand Hygiene in Public Health: a Hand Washing Station with a Brain Box. *Journal of Multidisciplinary Engineering Science Studies (JMESS)*, Vol. 8. No. 7: 4527-4538. (India) (Contribution: 40%).
- (50) **Zubair A. R.** (2023). Experiments on Digital Filtering of Analog Signals: Pulse Amplitude Modulation and Delta Modulation. *Global Journal of Engineering and Technology Advances*, Vol. 16. No. 1: 083-098. (India) (Contribution: 100%).

(d) Technical Report

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XII Research Focus

Signals carry information and or energy. Signal processing is an electrical engineering sub-field that focuses on analyzing, modifying and synthesizing signals, such as sound, images, potential fields, seismic signals, altimetry processing, and scientific measurements. Signals are applied in communication, control, automation, security, production of goods and services, agriculture, medical diagnosis, and medical treatment. Signals are affected by the systems used to acquire, transmit, or process them. Furthermore, the conditions under which signals are acquired are frequently less than ideal. These non-ideal conditions also introduce noise, distortion, or other artefacts. The acquired or available signal in most cases is not exactly the same as the actual or true signal. In most areas of science, medicine and engineering, there is an increasing requirement to measure small or complex signals that are often obscured by noise or other forms of interference. Noise and other forms of interference have adverse and counterproductive effects such as wrong information communication and wrong medical diagnosis.

The main focus of my research is the formulation of techniques and development of algorithms for the recovery of true signals from the available corrupted signals. These techniques are solutions to complex inverse problems. Inverse problem theory is the mathematical theory describing how information about a parameterised physical system can be derived from observational data, theoretical relationships between model parameters and data, and prior information. Whereas the forward problem has a unique solution, because of the causality principle, the inverse problem may have many solutions - when different models of the system predict similar observations or no solution at all (inconsistent data). The contributions made have been reflected in publications on electrocardiogram (ECG) signal recovery, Spatial Domain & Frequency Domain Image Restoration, Spatial Filters & Adaptive Spatial Filters, Visible & Invisible Digital Watermarking, Image Texture Analysis & Image Retrieval, and Image Enhancement.

Signal Processing, Electronic Instrumentation, and Communication are applied in medicine for monitoring patients' vital signs for the purpose of diagnosis, treatment, and rehabilitation. Development of portable biomedical devices/systems in Africa for Africa as a research focus is an initiative to improve health care delivery in Africa and to respond to the COVID-19 Challenge. Quality control, save and accurate operations of these devices are taken into consideration. Development of Bedside Monitor, Electrical Safety Analyzer, Blood Glucose Meter, Sleep Inducer, Biofuel-powered autoclaving machine, multi-parameter portable healthcare monitoring device, Body Mass Index Machine, Baby Care System, Auscultation Simulator, and Hand Washing Station with a Brain Box are innovations in this direction.

Signals and Systems are characterised by certain arithmetic and logical expressions. Computer Aided Mathematical Analysis of systems and development of teaching aids and class projects for Outcome-Based Electrical and Electronic Engineering Education is a mini-research focus. Achievements in this area include Analysis of PWM Schemes in Power Electronics, Stranded Transmission Line Conductors, Rectangular Microstrip Antenna, and Root-Locus in Control systems. Innovative teaching aids, illustrative diagrams and class projects were developed for active learning of applied electricity, wavelet transformation technique, amplitude modulation and Low pass filter approximation functions.

Systems require energy to process signals. Energy is signal. Signal carries and control energy. Energy production and control especially from multiple renewable sources is a necessary research focus in Nigeria due to erratic power supply. Efforts in this direction have resulted in Signal Processing for Multi-Source Energy Flow Control scheme and Speech Processing for Control of Energy for support at old age and support for persons with disabilities in smart homes.

XIII Major Conferences Attended with Papers Read

- (a) IEEE EUROCON 2009 Conference, International Conference devoted to the 150th Anniversary of Alexander Popov, St. Petersburg, Russia, 18 - 23 May, 2009.
- (b) 2nd IEEE ICAST 2009 Conference, Accra, Ghana, 14 - 16 December 2009.
- (b) Fourth International Conference on Research and Development, University of Lome, Lome, Republic of Togo, 1 - 2 June, 2011.
- (c) IEEE 3rd International Conference on Electro-Technology for National Development (NIGERCON), Federal University of Technology, Oweri, Imo State, Nigeria, 7 - 10 November, 2017.
- (d) 13th ISTEAMS Multidisciplinary Cross-Border Conference, University of Ghana, Legon, Accra, Ghana, 24-26 October, 2018.
- (e) 1st ICEECE & AMF 1st International Conference on Electrical, Electronic, Computer Engineering & Allied Multidisciplinary Fields organized by the Department of Electrical and Electronic Engineering, University of Ibadan at NLNG Building Complex, Faculty of Technology, University of Ibadan, Ibadan, Nigeria, 30 November - 2 December, 2021.
- (f) 6th IEEE ICCA International Conference on Computing, Communication and Automation organized by Aurel Vlaicu University of Arad, Romania & Galgotias University, India at Galgotias University Greater Noida, NCR New Delhi, India, 17 - 19 December, 2021.
- (g) The 16th JKUAT Scientific, Technological and Industrialization Conference and Exhibition organized by Jomo Kenyatta University of Agriculture and Technology (JKUAT), Kenya at Council Room, JKUAT, Nairobi, Kenya & Virtually, 24-25 March, 2022.
- (h) The 6th International Conference on Computer Science, Engineering and Education Applications (ICCSEEA2023), Warsaw, Poland & Virtually, 17 - 19 March, 2023.

Dr. A. R. Zubair 25/10/2023