GHANA COMMUNICATION TECHNOLOGY UNIVERSITY

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNNOLOGY

INTERNATIONAL CONFERENCE ON INFORMATION SYSTEMS AND EMERGING TECHNOLOGIES (ICISET 2025)

THEME:

Emerging Technologies and Industrial Revolution For Sustainable Development

Conference Programme & Book of Abstracts

Venue: Ghana Communication Technology University (GCTU), Accra, Ghana

Date: 27th – 29th October 2025

A Taylor & Francis and Scopus Indexed Conference Publication

ICISET 2025

International Conference on Information Systems and Emerging Technologies

Theme:

Emerging Technologies and Industrial Revolution For Sustainable Development

Date:

27th – 29th October 2025

Venue:

Ghana Communication Technology University (GCTU), Accra, Ghana

Virtual via Zoom:
Meeting ID: 628 0071 5619
Passcode: 460077

Time:

9:00 am

Welcome to Ghana

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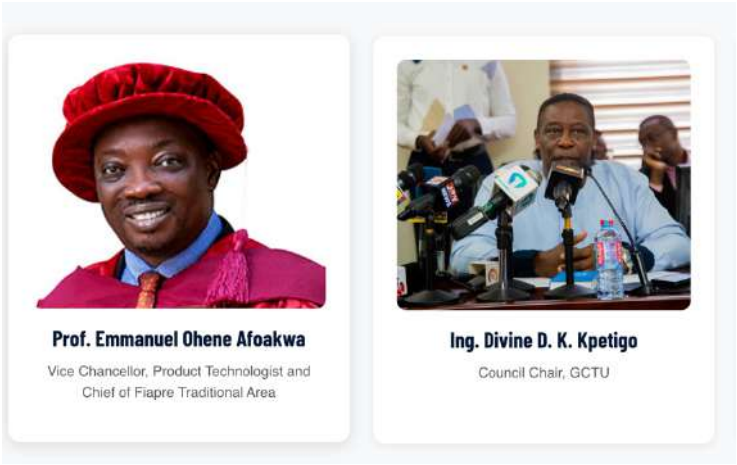
WELCOME MESSAGE

On behalf of the Ghana Communication Technology University (GCTU), we warmly welcome delegates, scholars, researchers, and industry practitioners to the 2025 edition of the International Conference on Information Systems and Emerging Technologies (ICISET). This Taylor & Francis and Scopus-indexed conference brings together multidisciplinary perspectives to explore the transformative potential of Artificial Intelligence (AI), Blockchain, Data Science, Internet of Things (IoT), and Digital Innovation in achieving Africa's sustainable development goals.

HOST, GCTU



Prof. Ebenezer Malcalm – Ag. Pro Vice-Chancellor, GCTU

Dr. William Leslie Brown-Acquaye – Dean, Faculty of Computing and Information Systems

Dr. Nusrat Jahan Abubakar, Director of University Relations - MC

DISTINGUISHED GUESTS

Hon. Haruna Iddrisu, Minister of Education, Republic of Ghana

Hon. Samuel Nartey George, Minister for Communication, Digital Technology and Innovations,

Mr. Divine Selase Agbeti, Director-General, Cyber Security Authority, Ghana

KEYNOTE SPEAKERS

1. **Prof. Mohammad Samarah** – Graduate Program Director, Software Engineering MPS, Professor of Practice, University of Maryland, Baltimore County (UMBC), USA
2. **Prof. Fungai Bhunu Shava** - Executive Dean, Faculty of Computing and Informatics, Namibia University of Science and Technology (NUST), Windhoek, Namibia
3. **H.E Rev. Dr. Princess A. K. Ocansey** - Executive Chairperson, SOS Global Investments and the Nekotech Center – Ghana / USA
4. **Prof. Kofi Sarpong Adu-Manu** – Associate Professor of Computer Science, University of Ghana
5. **Prof. Fransisca Oladipo** - Vice Chancellor, Thomas Adewunmi University, Oko, Nigeria
6. **Engr. Prof. Amevi Acakpovi** – Ag. Vice Chancellor, Accra Technical University
7. **Dr. Israel Edem Agbehadji –** Senior Lecturer, Faculty of Computing and Information Systems, Ghana Communication Technology University, GCTU.
8. **Dr. Emmanuel Freeman** – Head of Computer Science Department, Ghana Communication Technology University, GCTU.

CONFERENCE PLANNING COMMITTEE

1. **Dr. Emmanuel Freeman -** Ghana Communication Technology University, GCTU (**Conference Chair)**
2. **Prof. Jude Osakwe -** Namibia University of Science and Technology (NUST) – **(Conference Co-Chair)**
3. **Dr. Iyaloo Waiganjo –** Namibia University of Science and Technology (NUST)
4. **Prof. Ambrose Azeta -** Namibia University of Science and Technology (NUST)
5. **Dr. Nana Agyeman-Prempeh -** Ghana Communication Technology University
6. **Ms. Veronica Venyo Agblewornu -** Ghana Communication Technology University
7. **Ms. Sinte Mutelo -** Namibia University of Science and Technology (NUST)
8. **Dr. Ruhiya Abubakar -** Ghana Communication Technology University
9. **Dr. Prince Yaw Owusu Amoako -** Ghana Communication Technology University
10. **Prof Irja Shaanika -** Namibia University of Science and Technology (NUST)
11. **Mr. Isaac Baffour Senkyire -** Ghana Communication Technology University
12. **Dr. Israel Edem Agbehadji -** Ghana Communication Technology University
13. **Ms Josephina Muntuumo -** Namibia University of Science and Technology (NUST)
14. **Ms. Cynthia Ampadu Boateng -** Ghana Communication Technology University
15. **Ms. Fafali Afua Boadu -** Ghana Communication Technology University
16. **Mr. Henry Amoah -** Ghana Communication Technology University
17. **Mr. Wonder Susuassey -** Ghana Communication Technology University

WELCOME ADDRESS

BY THE AG. PRO VICE-CHANCELLOR AT THE OPENING CEREMONY OF THE INTERNATIONAL CONFERENCE ON INFORMATION SYSTEMS AND EMERGING TECHNOLOGIES

Prof. Ebenezer Malcalm

The Council Chair, Honourable Ministers of Education, Distinguished Keynote Speakers, Conference Chair and Committee Members, Esteemed Scholars and Researchers, Industry Partners, Students, and Invited Guests, Ladies and Gentlemen: Good morning, and a very warm welcome to you all.

On behalf of the Vice-Chancellor, the University Council, and the entire GCTU community, I am delighted to welcome you to the Fourth International Conference on Information Systems and Emerging Technologies (ICISET 2025). The Ghana Communication Technology University (GCTU) in collaboration with Namibia University of Science and Technology is hosting this 4th International Conference on Information Systems and Emerging Technologies from 27th to 29th October 2025. This conference serves as a forum for researchers and professionals to explore current advancements and developments in Information Systems.

It gives me great pleasure to see such a distinguished gathering of academics, researchers, policymakers, and industry leaders assembled here at the Ghana Communication Technology University to engage in deep intellectual exchange and collaboration.

This year's conference theme—"Emerging Technologies and Industrial Revolution for Sustainable Development"—could not be more relevant to the times we live in. The world is undergoing an unprecedented transformation driven by artificial intelligence, blockchain, quantum computing, and immersive digital technologies. These innovations present vast opportunities to accelerate sustainable development, but they also challenge us to rethink our educational models, research priorities, and ethical frameworks.

As an institution, GCTU remains at the forefront of these global transformations. Through strategic initiatives such as the Blockchain Innovation and Research Collaboration with the University of British Columbia (UBC), Canada, Durban

University of Technology, University of Johannesburg, Anhalt University, tech-oriented industries in our country, and the activities of the Faculty of Computing and Information Systems, the Engineering Faculty and the Business School, we continue to demonstrate leadership in technology-enabled education, research, and innovation. These efforts reflect our vision of preparing Africa's next generation of scientists, engineers, and entrepreneurs to thrive in the Fourth Industrial Revolution (4IR).

ICISET has, over the years, become a premier platform for scholarly engagement, connecting minds across disciplines and continents to explore how emerging technologies can be harnessed to solve local and global challenges. This year's conference continues that legacy—bringing together experts to discuss frontier issues in artificial intelligence, cybersecurity, blockchain, virtual and augmented reality, and data science, educational technology, business innovations, entrepreneurship, e-commerce, communication and media and among others.

I want to commend the Conference Chair, Dr. Emmanuel Freeman, and his dedicated team from Namibia University of Science and Technology (NUST) and GCTU for their tireless efforts in organizing this conference, and for sustaining the culture of academic excellence that GCTU is known for.

To our keynote speakers, we are honoured by your presence and your willingness to share your expertise. To our international and local delegates, we say Akwaaba—welcome to Ghana, and welcome to GCTU, a university of innovation, excellence, and transformation.

I urge all participants to engage meaningfully throughout the sessions, to network, and to collaborate beyond this conference. The partnerships and insights generated here will play a crucial role in shaping the future of sustainable digital transformation in Africa and beyond.

As we open this conference today, let us reaffirm our shared commitment to using science, technology, and innovation as instruments for inclusive and sustainable development.

Once again, I warmly welcome you all to GCTU and to ICISET 2025. May this conference be enriching, inspiring, and impactful.

Thank you, and God bless you all.

Prof. Ebenezer Malcalm
Ag. Pro Vice-Chancellor
Ghana Communication Technology University

Keynote Speaker

Mohammad Samarah, PhD

Mohammad Samarah, PhD, is a computer scientist and a software engineering practitioner with experiences in teaching, administration, industry, and research. His area of research interest is in the intersection of big data, intelligent applications, and real- time systems for healthcare, whole-body wellness, and education. He built many systems, applications, and tools including applications for data analytics and visualizations spanning learning management systems to electronic medical records to specialized research applications for the analysis of axon regeneration. Dr. Samarah received a bachelor's in engineering from Northern Arizona University in Computer Science and Engineering and holds a master's and doctorate degrees in Computer Science from Florida Institute of Technology.

Dr. Samarah's industry and academic experiences include senior leadership positions at Harris Corporation (now L3Harris) in Melbourne, Florida, senior engineering positions with Emulex Corporation in Seattle, and a founding member of Florida Polytechnic University college of engineering and college of innovation and technology in Lakeland, Florida. Dr. Samarah is a professor of practice of software engineering and the director of the University of Maryland Baltimore County (UMBC) Software Engineering graduate program working to promote a new vision for software engineering that software must be ethical, reliable, and beautiful.

He is the founder of the UMBC Ethical Software Lab (https://esl.umbc.edu), with a mission to verify the ethicality of software applications and software intensive products independently providing end-users with concise information regarding terms of service, privacy policy, and the use of their data and hardware resources. Dr. Samarah is married to Tammy with four children including his 12-year-old daughter, Bindie. He is a long-distance runner and have competed in the distances from the marathon to a 2-mile sprint. He is an avid reader and a podcast listener.

Keynote Speaker

Prof. Fungai Bhunu Shava

Professor Fungai Bhunu Shava's fields of specialisation are Human Computer Interaction, User Experience, Network Security, and Information Security in under-serviced communities. Her work focuses on the secure use of ICTs as enabling tools for socio-economic development in developing economies and societies including Child Online Protection. Professor Fungai Bhunu Shava has a PhD: Information Technology (NMMU), M.Sc. Computer Science (UZ), B.Sc. Computer Science & Maths. (UZ), Postgraduate Certificate in Higher Education (NUST).

She is currently the Acting Executive Dean, a Professor in Cybersecurity within the Faculty of Computing and Informatics, and the leader of the Digital Forensics and Information Security Research Cluster at Namibia University of Science and Technology (NUST).

She is the founding chairperson and current head of the administrative team of the Namibia National Cyber Security Competition since 2015. She is also an International Visitors Leadership Program (IVLP) alumni and an Application Security Specialist with IBM Security AppScan v8.7. She serves on the national cybersecurity stakeholder committees including the SADC Cyber-Infrastructure Technical Experts meetings, and regional coordinator of the Africa to International Cybersecurity Competition and the International Cybersecurity Challenge (AFRICC).

She has co-organised and spearheaded: Child Online Protection hackathons; WiSci STEAM Camp 2019 in collaboration with US Embassy and GirlUp; TechCamp Namibia: Cybersecurity for Everyone in collaboration with the USA government and Tech and Innovation Bazaars in collaboration with MTC. She participated in the Federal Department of Foreign Affairs, Switzerland (Geneva Dialogue on Responsible Behaviour in Cyberspace) as well as United Nations Institute for Disarmament Research (UNIDR) Cyber Stability Conferences.

Prof Shava actively contributes to Water security through her research work on designing Integrated Water Resource Management technologies. Furthermore, she contributed to Safety and Security Expo; Women in Computing Conferences, Google Developer's Circle, Namibia Internet Governance Forum (NamIGF), Child online Protection Taskforce, Namibia; IEEE and ACM chapters in Namibia among others.

Keynote Speaker

H.E Rev. Dr. Princess A. K. Ocansey

Her Excellency Rev. Dr. Asie Kabuki Ocansey is a globally recognized humanitarian, philanthropist, Presidential Advisor and thought leader in STEM, AI, Business Innovation and ethical leadership. A US White House Lifetime Achievement Awardee under President Biden and recipient of the US Ron Brown Award, she has dedicated her life to advancing STEM AI MBA higher education focused on African Youth, migration policy, and sustainable development across Africa.

As Executive Chairperson of SOS Global Investments and the NGO- Nekotech Center of Excellence—the latter which she co-founded with icons like Isaac Hayes, US action movie stars- Steven Seagal and Denzel Washington—and a key member of the African Union Labour Migration Advisory Committee, she advises African governments and Presidents on higher STEM AI MBA education financing strategy. Through the Nekotech Africa-US Presidential Forum, she has mobilized over $200 million in educational investments - for Malawi and Sierra Leone, focusing on STEM AI MBA education to empower African youth to accelerate the AU Agenda 2063 and the UN SDGs. Nekotech has partnerships with several universities in the US and is in collaboration with the Ghana Communication Technology University.

An accomplished author and a Rutgers University, NJ-USA trained Engineer, Dr. Ocansey has held leadership roles at USA Fortune 500 companies including Delmonte Corporation, PepsiCo and Johnson & Johnson. She was an esteemed member of the late UN Secretary General, Kofi Annan's: "12 Member Taskforce on ICT and Rural Africa's Development"- through the UNDP and UNEP-ICT.

While consulting for the Ghana Investment Promotion Center and the Ghana Export Promotion Authority, she pioneered Afrocentric retail in the US, driving a major job creation boost of 1000s jobs in Ghana, producing products for mega US companies like Avon Products, Macys, Pier One, JC Penny among others, catalyzing a multi million dollar national boost for the nation's export industry and tourism sectors through a partnership with USA QVC TV - with a viewership of over 70 million.

She co-hosted the popular Destination Africa, on QVC TV, showcasing Ghana, Ghanaian culture and made in Ghana Products. The show became a case study of telemarketing in many US universities. She is a best-selling author of several books, including- The Decade of African Intelligence & AI, Deadly Work or Decent Work?, Royal Love 777: Heal Me, Heal My World- Servant Leaders' Feet Washing Prayerthon, Purple Love: Honoring Amazing Caregivers and more. A devout Christian and mother of a Software Engineer, Funmi Serwa Babalola, she continues to drive change through innovation, integrity, and international collaboration—inspiring a new generation of ethical African servant leaders for the new industrial revolutions ahead!

Keynote Speaker

Prof. Kofi Sarpong Adu-Manu

Prof. Kofi Sarpong Adu-Manu is an Associate Professor of Computer Science at the University of Ghana, a visionary scholar, and a leading voice in Africa's digital transformation agenda. With a career that bridges academia, innovation, and policy, his work spans Artificial Intelligence (AI), Wireless Sensor Networks (WSNs), the Internet of Things (IoT), Educational Technology (EdTech), and cybersecurity—fields in which he has published extensively in top international journals such as ACM Transactions on Sensor Networks, Concurrency and Computation: Practice and Experience, and Journal of Sensors. His research has attracted over 1,600 citations on Google Scholar, underscoring its global academic impact.

A distinguished research fellow at the University of Rochester (USA) and Carl von Ossietzky University of Oldenburg (Germany), Prof. Adu-Manu has pioneered projects that harness AI and sensor-based technologies for environmental monitoring, smart water systems, and sustainable development. His leadership extends beyond research into consultancy for international agencies such as the World Bank, UNICEF, Commonwealth of Learning, and UNESCO, and the African Development Bank. He has spearheaded digital transformation, regulatory system development, and EdTech capacity-building initiatives across Africa.

He currently serves as the Vice President of the University Teachers Association of Ghana (UG Branch) and Lead Instructor for Artificial Intelligence at the Pan-African Doctoral Academy (PADA), where he mentors doctoral scholars from across the continent. He is also the Founder of Ladies in Tech Ghana, an initiative that empowers young women to thrive in technology and leadership. Driven by his vision "to be a transformative leader in computer science education and research", Professor Adu-Manu embodies the fusion of scholarship, innovation, and service. His keynote messages consistently challenge Africa to leverage AI, data, and emerging technologies to drive inclusive growth, educational excellence, and sustainable development for the continent and world.

Keynote Speaker

Prof. Francisca Oladipo

Professor Francisca Oladipo is a distinguished scholar of Computer Science and the current Vice-Chancellor of Thomas Adewunmi University in Kwara State, Nigeria. She also serves as Secretary-General of the Consortium of Universities in Kwara State (KU8+), and Vice-President and Secretary to the Board of VODAN-Africa, an international consortium of African, European, and Asian researchers advancing Afrocentric data systems that promote data ownership and sovereignty.

Prof. Oladipo previously held leadership positions as Director of Quality Assurance, Head of Department of Computer Science, and member of the Governing Council at the Federal University Lokoja, where she was the first woman to hold each of these roles. Her career includes appointments at Tilburg University (Netherlands), Kampala International University (Uganda), and Nnamdi Azikiwe University (Nigeria). She also served as Chief Technical Advisor to the Joint Admissions and Matriculation Board (JAMB) and a Facilitator with the Africa Centre of Excellence in Technology Enhanced Learning (ACETEL) at the National Open University of Nigeria.

As Executive Coordinator of the Virus Outbreak Data Africa Network (VODAN-Africa), Prof. Oladipo led the first successful deployment of machine-actionable FAIR Data Points across eight African nations during the COVID-19 pandemic—an initiative recognized in the 2021 UNESCO Engineering Report and awarded “Most Inspiring Initiative” at the Leiden Science Week 2022.

A globally respected thought leader in Artificial Intelligence, Data Science, and Open Science, she has advanced international projects funded by the Dutch Ministry of Foreign Affairs, Google, Carnegie Corporation, and others. She serves as PhD Advisor at the Network for Globalization, Accessibility, Innovation and Care (GAIC), Tilburg University, and sits on several advisory boards, including Woxsen University’s Women in Technology Fellowship and the School of Innovation and Management, India.
Her recognitions include the Emerging Scholar Award (Universitat Politècnica de València, Spain, 2024), multiple fellowships from the Association for Computing Machinery (ACM FAccT), and the Heidelberg Laureate Foundation. She is a Fellow of the Nigeria Computer Society, African Scientists Institute, and Pan-African Scientific Research Council, and a Chartered IT Practitioner.
A prolific researcher, curriculum innovator, and advocate for inclusivity in technology, Prof. Oladipo’s work bridges theoretical computer science with scalable, socially impactful solutions for emerging economies.

Keynote Speaker

Ing. Prof. Amevi Acakpovi

Ing. Prof. Amevi Acakpovi is a distinguished Electrical and Energy Systems Engineering Professor, the Acting Vice-Chancellor of Accra Technical University (ATU), and the current President of the IEC National Committee of Ghana. He is a Fellow Professional Engineer with the Institution of Engineering and Technology, Ghana, and a Senior Member of IEEE. He earned his first and second degrees in 2006 and 2009 from the University of Abomey-Calavi in Benin and a PhD in Energy Systems Engineering from the Open University Malaysia, Kuala Lumpur, in 2017. Prof. Acakpovi has extensive experience teaching and supervising MSc and PhD theses at various universities in Africa.

Prof. Acakpovi's research focuses on Hybrid Energy Systems, Mini and Microgrid Optimization, Smart Grid Modelling, and more. He has authored over 130 publications in top journals and conferences and has been a guest speaker and reviewer for several respected journals, seminars, and forums. His work in these areas has earned him numerous accolades, including awards for Leadership Excellence, Excellence in Research & Development, the Distinguished Professor Award in Electrical Engineering, and the Decade Researcher Award.

With his exceptional writing prowess and dynamic leadership skills, Prof. Amevi Acakpovi has secured grants totaling nearly half a million dollars. These include notable achievements such as securing funding for the Skills Development Fund project on two occasions and spearheading the establishment of ATU's Sustainable Energy Service Centre, among others. Since assuming the role of the acting Vice-Chancellor in July 2023, Prof. Acakpovi has transformed Accra Technical University (ATU) by fostering strategic collaborations, enhancing academic partnerships, and introducing innovative programs, including Master programs, for the first time in the history of ATU. Under his leadership, ATU has achieved significant milestones, including recognition by Times Higher Education in 2024 as the Top Technical University in Ghana, the 4th Best University in Ghana, and the 43rd Best University in Sub-Saharan Africa.

Prof. Acakpovi is the president of Technical Committee 77 on Electromagnetic Compatibility (EMC), which reports to the African Electrotechnical Standardisation Commission (AFSEC), a branch of the African Union. In this role, he has been instrumental in shaping the standards for electromagnetic compatibility in Africa. He is also the president of the African Organisation for Standardisation (ARSO) TC 80 on Solar Thermal Systems and Equipment, where he has led initiatives to promote the use of solar thermal systems in Africa. Additionally, he is a member of the Technical Committee 10 on Electrotechnical Products of the Ghana Standard Authority (GSA), where he has contributed to the development of standards for electrotechnical products in Ghana. His hobbies include playing basketball and watching movies, which provide a balance to his professional life and contribute to his well-rounded personality.

Keynote Speaker

Dr. Israel Edem Agbehadji

Dr. Israel Edem Agbehadji is a distinguished academic and researcher with over a decade of progressive experience in artificial intelligence, bio-inspired algorithms, and their applications in environmental and socio-technical systems. His research focuses on developing computational intelligence models that integrate explainable AI (XAI) and machine learning techniques into environmental monitoring, climate resilience, and smart waste management systems.

He is an Honorary Research Fellow at the Durban University of Technology (DUT), South Africa, where he was previously a Postdoctoral Research Fellow and a member of the ICT Society Research Group in the Faculty of Accounting and Informatics. His collaborative research at DUT contributed significantly to the advancement of sustainable computing solutions and intelligent decision-support frameworks for environmental systems.

Dr. Agbehadji is an active member of the Institute of Information Technology Professionals South Africa (IITPSA) and the Institute of Electrical and Electronics Engineers (IEEE), where he contributes to scholarly discourse in data-driven environmental informatics, IoT-based ecological intelligence, and AI ethics for sustainability.

Currently serving as a Senior Lecturer at the Ghana Communication Technology University (GCTU), Dr. Agbehadji's teaching and research philosophy emphasize bridging theory with practice—leveraging emerging technologies to address pressing societal challenges in waste management, resource optimization, and environmental policy.

His recent works include the development of hybrid bio-inspired algorithms for optimizing environmental data analytics and designing machine learning models that enhance transparency and interpretability in ecological monitoring. Through his mentorship and interdisciplinary collaborations, he continues to build capacity in Africa's growing AI research community, contributing to sustainable digital transformation.

Profile of Conference Chair

Dr. Emmanuel Freeman

Dr. Emmanuel Freeman is a seasoned computer scientist, educational technologist, and academic leader with over a decade of experience spanning higher education, applied research, and technology innovation. He currently serves as the Head of the Department of Computer Science and Head of the Centre for Online Learning and Teaching (COLT) at the Ghana Communication Technology University (GCTU). Dr. Freeman is also the Project Lead for the Blockchain Innovation and Research Initiative—a joint collaboration between GCTU and the University of British Columbia (UBC), Canada—which focuses on blockchain applications for social good, decentralized identity systems, smart contracts, and governance technologies. A professional IT practitioner, software developer, and business analyst, Dr. Freeman has demonstrated expertise in Artificial Intelligence (AI), Systems Engineering, Blockchain Systems, Data Science, and Educational Technology. His work bridges innovation and pedagogy, leveraging emerging technologies to enhance institutional efficiency, digital transformation, and human capital development.

Over the past eight years, Dr. Freeman has trained more than 1,000 academic and non-academic professionals in AI applications, e-learning administration, educational technologies, and digital research skills through initiatives with the Association of African Universities (AAU) and GCTU. He has also provided consultancy services and led projects in AI and AR/VR in STEM education, AI in Human Resource Management, e-Health, E-learning platforms, and smart web-based applications. With over 45+ scholarly publications, Dr. Freeman's research contributions span Artificial Intelligence, Blockchain Systems, Augmented and Virtual Reality, Nature-Inspired Algorithms, Big Data Analytics, Educational Technology, and Computer Science Education. He has presented at several international conferences and contributed to book chapters and collaborative research networks across Africa, Europe, and North America.

A member of the Institute of Information Technology Professionals South Africa (IITPSA), the Institute of Information Technology Professionals Ghana (IITPG), and the Institute of Electrical and Electronics Engineers (IEEE), Dr. Freeman's professional engagements reflect his deep commitment to advancing computing standards, innovation ethics, and professional practice across Africa and beyond.

A champion of digital transformation and applied innovation, Dr. Freeman's professional philosophy is grounded in advancing research, technology, and education as catalysts for Africa's participation in the Fourth and fifth Industrial Revolutions. He holds BSc. MIT, PgCert Higher Education Practice (Distinction), and PhD. Computer Science (UNISA).

Profile of Conference Co-Chair

Prof. Jude Odiakaosa Osakwe

Professor Jude Odiakaosa Osakwe works in the Faculty of Computing and Informatics at Namibia University of Science and Technology. With over two decades of distinguished academic and administrative experience spanning Nigeria and Namibia, Prof. Osakwe has established himself as a leading scholar in digital transformation and information systems. He holds a PhD in Informatics. He served as Director of ICT at Benue State College of Education, Oju, where he spearheaded digital transformation initiatives and served as Coordinator of the Joint Admissions and Matriculation Board (JAMB) of the institution. He also distinguished himself as a Visiting Lecturer at the National Open University of Nigeria. Osakwe is also a member of Open, Distance and eLearning Association of Nigeria (ODeLAN), and a member of the Scientific Blockchain Alliance in Germany.

Prof. Osakwe's research expertise encompasses ICT in Education, Digital Health, Big Data Analytics, Data Governance, E-Government, Business Intelligence, Data security, and Digital Business Analytics. His work addresses pressing technological challenges in developing countries, with emphasis on creating sustainable and contextually relevant digital solutions. He has successfully supervised numerous Masters students and PhD candidates to completion, guiding research across diverse domains including datasecurity frameworks, big data adoption in higher education, e-government system integration, business intelligence applications, mobile learning technologies, and data privacy in public sector organizations. Beyond direct supervision, he has examined numerous doctoral theses contributing to quality assurance and scholarly standards.

His scholarly impact is evidenced by an impressive portfolio of over 90 publications, including book chapters in internationally recognized volumes published by IGI Global and Taylor & Francis, numerous peer-reviewed journal articles published in Scopus-indexed journals, and extensive conference proceedings presented at major international forums. His citation profiles on Google Scholar, ResearchGate, Scopus, and IEEE Xplore reflect the broad reach and impact of his scholarly contributions.

Prof. Osakwe holds significant academic leadership positions, serving as Editorial Board member in 8 established Journals, and has chaired the International Conference on Information Systems and Emerging Technologies (ICISET) from 2022 through 2025. He acts as External Examiner for multiple institutions. Prof. Osakwe's work reflects a holistic commitment to leveraging digital tools for educational advancement, economic development, and improved quality of life in Africa and beyond.

CONFERENCE PROGRAMME

DAY 1 – MONDAY, 27 OCTOBER 2025

Venue: GCTU Main Auditorium

08:30 – 09:30 | Registration & Networking Coffee

09:30 – 10:30 | Opening Ceremony

Welcome Note from Conference Chair – **Dr. Emmanuel Freeman / Prof. Jude Odiakaosa Osakwe**

Welcome Address – **Prof. Ebenezer Malcalm** (Pro-Vice Chancellor, GCTU)

Address from GCTU Council Chair – **Ing. Divine D. K. Kpetigo**

Opening Speech – **Hon. Haruna Iddrisu**, Minister of Education, Republic of Ghana

Special Keynote Address – **Mr**. **Divine Selase Agbeti**, Director-General, Cyber Security Authority, Ghana

Group Photograph

10:30 – 11:00 | Coffee Break

10:30 – 12:30 | Keynote Session I

1. **Prof. Mohammad Samarah** – Graduate Program Director, Software Engineering MPS, Professor of Practice, University of Maryland, Baltimore County (UMBC), USA

   Topic: Software Engineering, AI, and the Future of Africa

2. **Prof. Fungai Bhunu Shava** - Executive Dean, Faculty of Computing and Informatics, Namibia University of Science and Technology (NUST), Windhoek, Namibia

   Topic: AI-enabled Cybersecurity for Emerging Technologies and Industrial Revolution for Sustainable Development

3. **H.E Rev. Dr. Princess A. K. Ocansey** - Exec. Chair - Nekotech Center: Africa-US Presidential Forum on STEM AI MBA, SOS Global Investments.

   Topic: Decade of Kingdom African Intelligence & AI

12:30 – 13:30 | Lunch Break

13:30 – 16:30 | PARALLEL SESSION 1 A: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Session Chair: Dr. William Brown-Acquaye

1. **Leveraging Machine Learning to Improve Patient Appointment Adherence: Evidence from a Ghanaian Healthcare Setting**
   Patrick Acheampong, Godson Kwashie Agorkpoh-Dei, Emmanuel Freeman, Kamal Kant Hiran

2. **Interpretable Machine Learning Framework for Malaria Diagnosis from Symptoms and Risk Factors**
   Kingsley Attai, Okure Obot, Daniel Asuquo, Moses Ekpenyong, Ekerette Attai, Kitoye-Ebire Okonny, Faith-Valentine Uzoka, Christie Akwaowo, Faith-Michael Uzoka

3. **Enhancing Learning Outcomes through Adaptive AI Strategies in Educational Technology**
   Jude Osakwe, Josephina Muntuumo

4. **A Deep Learning Framework for Detecting Multiple Bugs and Estimating the Detection Effort**
   Solomon Mensah, Patrick Kwaku Kudjo, Anas Hara, Elizabeth Akuafum Dick, Charles Jnr. Asiedu, Joseph Asampambilla

5. **A Deep Learning Model for Predicting Forex Prices**
   Patrick Kwaku Kudjo, Solomon Mensah, Selali Soku, Charles Jnr. Asiedu, Stephen Dotse

6. **Automata-Driven AI Proctoring Framework: Application of Automata Theory in Proctoring Systems**
   Prince Yaw Owusu Amoako, Ernest Mnkandla, Emmanuel Freeman

7. **Ethical Frameworks for Responsible AI Deployment in Public Sector Services: Insight from Ghana**
   Fred Amankwah-Sarfo, Philomina Ofori, Emmanuel Eli Fianu, Joseph Antwi Attoh

13:30 – 16:30 | PARALLEL SESSION 1 B: MOBILE AND WIRELESS COMPUTING

Session Chair: Prof. Ambrose A. Azeta

1. **Practical Implementation of Non-Gaussian Interference Models in Wireless Communication: Bridging Alpha-Stable Theory and Real-World Application**
   Emmanuel Mensah, Mukil Alagirisamy, Diva Midhunchakkaravarthy

2. **Routing Protocol Design and Architecture for WSNs and MANETs: A Methodological Perspective.**

Christian Wogbe Biekro, Michael Asante, James Ben Hayfron-Acquah, Frimpong Twum, Bright Selorm Anibrika

3. **Factors Influencing Adoption of Digitized Fare Systems in Public Transportation**
   Isaac Ayodo, Collins Oduor

4. **An Assessment of the Impact of System Post-Implementation Practices, Such as User Training and Data Quality for System Optimization, on ERP Success**
   Flavia Ongai, Collins Oduor, Austin Odera

5. **Multi-Hop Routing Technique for Heterogeneous Low-Energy Sensor Network**
   Prince Modey, Gaddafi Abdul-Salaam, William Leslie Brown-Acquaye, Emmanuel Freeman, Israel Edem Agbehadji, Richard C. Millham

6. **Management of Subscriber Data Based on User Data Consolidation for IMS Network: Case of a Mobile Network Operator**
   Francis Kwabena Oduro-Gyimah, Felix Baafi

7. **Adaptive Optimization of Quadrature Amplitude Modulation (QAM) in High-Density Networks Using Stochastic Geometry and Interference Modeling**
   Emmanuel Mensah, Mukil Alagirisamy, Diva Midhunchakkaravarthy

13:30 – 17:30 | PARALLEL SESSION 1 C: COMMUNICATION AND MEDIA

Session Chair: Prof. George Kofi Amoako

1. **Connecting the Dots Among Social Media Advertising, Brand Image, Brand Awareness and Purchase Intention of Millennials and Generation Z: The Moderating Role of Brand Loyalty**
   Patrick Acheampong, Rashid Iddrisu, George Kwabena Asamoah, Lawrence Yaw Kusi, George Adu Mensah, Jeffery Essel

2. **Visual Determinants of Digital User Engagement: The Moderating Role of Human Models on the Impact of Color Features in African Fashion Brands' Instagram Content**
   Crystal Dzebu, Bernard Adjei Buckman, Nathaniel Nartey

3. **Social Media Advertising, Brand Awareness and Purchase Intention for Eco-Friendly Products Among College-Going Millennials and Generation Zs: The Intervening Roles of Brand Loyalty and Fear-of-Missing-Out**
   George Asamoah, Patrick Acheampong, Samuel Kingsford Seglah, Prince Kofi Annan Assefuah, Rashid Iddrisu, Lawrence Yaw Kusi

4. **Examination of Ghana's Transition to a Digital Economy: Assessing the Impact of Digitalization on Employment and Career Development in Ghana**
   Nana Kofi Annan, Charles Asiedu Jnr, Benjamin Kumi, Leonard Kyei

13:30 – 17:30 | PARALLEL SESSION 1 D: COMPUTER SCIENCE AND INFORMATION TECHNOLOGIES IN EDUCATION

Session Chair: Prof. Stephen Asunka

1. **Evaluating the Readiness of a Higher Education Institution in Ghana for AI-Driven Transformation in Hybrid Teaching and Learning: A Combined TOE-Institutional Theoretical Approach**
   Fred Amankwah-Sarfo, Philomina Ofori, Emmanuel Eli Fianu, Dzordzoe Koffie Ocloo, Joseph Antwi Attoh

2. **Towards Sustainable Digital Administration in Higher Education: A Case Study of Ghanaian Universities**
   Mark Ofori Nketia, Lord Emmanuel Yamoah, Philip Anguah, Fredericka Dei Nikoi

3. **From Dusty Shelves to Digital Dreams: Libraries as Catalysts for Smart Knowledge Ecosystems in Africa**
   Aishatu Hassan Muhammad, Jude Osakwe

4. **Enhancing Learning Outcomes through Effective Data Management in Educational Technology**
   Jude Osakwe, Josephina Muntuumo

5. **Awareness and Perception of Librarians Towards Technological Innovations for Inclusive Service Delivery in Academic Libraries in Nigeria: Literature Review**
   Olubukola Ajiboye, Jibril Bello

6. **Building a Secure and Scalable Network for Healthcare Logistics in Ghana: The Case for GRE over IPsec**
   Charles Baah, Moses Aggor, Samuel Selorm Agbemenya, Johnson Danquah Asiedu and Rebecca Adwoa Amponsah

17:30 Cocktail – G6

DAY 2 – TUESDAY, 28 OCTOBER 2025

08:30 – 09:00 | Registration and Welcome Address

09:00 – 10:30 | Keynote Session II

1. **Prof. Kofi Sarpong Adu-Manu** – Associate Professor of Computer Science, University of Ghana

   Topic: Reimagining Africa's Digital Future: Harnessing AI, Blockchain, and IoT for Inclusive and Sustainable Industrial Growth

2. **Engr. Prof. Amevi Acakpovi** – Ag. Vice Chancellor, Accra Technical University

   Topic: Engineering the Future: Smart Grids, Microgrids and Sustainable Energy for Africa's Next Generation

10:30 – 11:00 | Coffee Break

11:00 – 13:30 | PARALLEL SESSION 2 A: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Session Chair: Prof. Kofi Sarpong Adu-Manu

1. **EfficientNet-Based Framework for Monitoring Student Engagement in Resource-Constrained Online Classrooms**
   Prince-Will Kwabena Edzi, Ben-Bright Benuwa, Stephen Opoku Oppong, Benjamin Ghansah, Charles Boabeng-Andoh, Kojo Agyekum Asiama

2. **Lecturers' Preparedness in the Use of AI Technologies in Higher Education in Ghana**
   Nathanael Abbey, Benjamin Ghansah, Stephen Opoku Oppong, Charles Buabeng Andoh, Ephrem Kwaa Aidoo, Kojo Agyekum Asiama, Ben-Bright Benuwa

3. **Intelligent Stock and Expiry Management System Based on Machine Learning**
   Nana Kofi Annan, Adetona Juvanus Akohouendo, Ian Yaw Asare

4. **Machine Learning for Personalized Adaptive Learning Styles Detection: A Bibliometric Analysis**
   Michael Kyei Kissi, Martin Mabeifam Ujakpa, Israel Edem Agbehadji, Emmanuel Freeman

5. **Predictive Modelling for Social Media Optimisation: Predicting the Maximum Engagement Rate on Instagram**
   Augustina Addo Nyinaku, Charles Adjetey, Sandro Kwame Amofa, Prince

Samuel Kyeremanteng, Prince Ofori, Hilary Ackah-Arthur, Kofi Sarpong Adu-Manu

11:00 – 13:30 | PARALLEL SESSION 2 B: BLOCKCHAIN, CRYPTOGRAPHY AND DISTRIBUTED SYSTEMS

Session Chair: Ms. Sinte Mutelo

1. **Enhancing Financial Services through Blockchain and Machine Learning Integration: An Analysis of Uptake and Effects in Ghanaian Financial Institutions**
   Anthony Vincent Arkhurst, Prince Kelvin Owusu, Gibson Afriyie Owusu, Zakaria Suleman, Stephen Crentsil Nyame, Joseph Kojo Asampanbilla

2. **Blockchain-Powered Educational Repository: A Comprehensive Review**
   Blessing Emmanuel Oladele, Adekunle Olugbenga Ejidokun, Abass Yusuf Aleshinloye, Chukwuemeka Odi Agwu

3. **Design and Simulation of a Blockchain-Based Security Framework in Traditional IoT Networks for Enhanced Data Security and Integrity**
   Emmanuel Apeli Afanyibo, Emmanuel Agbavito, Samuel Akwasi Danso, Isaac Osei Nyantakyi, Phinehas Quarshie Newman

4. **Patient-Centric EHR System Using Ethereum Blockchain**
   Richard Martey Adobau, Emmanuel Freeman, Abigail Wiafe

5. **Optimal Detection Strategies for Interference-Prone Metropolitan Wireless Communication Networks Under Non-Gaussian Noise Conditions**
   Emmanuel Mensah, Mukil Alagirisamy, Diva Midhunchakkaravarthy

6. **Fraud Awareness and Phishing Prevention: Proactive Tips to Turn Down Scammers' Fraudulent Activities**
   Paulus Kautwima, Rubben Nambinga

11:00 – 13:30 | PARALLEL SESSION 2 C: BUSINESS AND ENTREPRENEURSHIP

Session Chair: Prof. George Opppong Ampong

1. **Openness while incubating: How do incubators apply open innovation strategies for supporting startups?**
   Zornitsa Yordonava, Gratitude Charis, Patrick Acheampong

2. **Modelling Gender Differences in Celebrity Endorsement Effectiveness on Consumer Purchasing Intentions: A Structural Equation Approach**

Nana Agyeman-Prempeh, Richard Asravo, Evans Adjei, Joseph Afari Buabeng, Alex Antwi-Adjei, Micheal Owusu-Kyei

3. **Modelling a Social Commerce System Using Web Services**
   Ambrose A. Azeta, Patrick Omote, Bisola Ogunde

4. **Assessing the Mediating Influence of Financial Development on Income Inequality: Evidence from Selected Sub-Saharan Africa**
   Emmanuel Lord Yamoah, Emmanuel Attah Kumah Amponsah, Stephen Owusu-Afriyie, Thomas Appiah, Joseph Asare, Peter Besah Avevor, Eric Atta Appiadjei, Bright Ferguson-Laing

13:30 – 14:30 | Lunch Break

14:30 – 17:00 | PARALLEL SESSION 2 D: AUGMENTED AND VIRTUAL REALITY

Session Chair: Dr. Lempogo Forgor

1. **Bibliometric Review of Virtual Reality and Augmented Reality for an Adaptive E-Learning System in STEM Education: Trends, Challenges and Prospects**
   Isaac Frank Agidi, Freeman Emmanuel, Israel Edem Agbehadji

2. **Adoption of Immersive Technologies for Knowledge Retention and Transfer in Government: A Bibliometric Analysis**
   Thuthukani Bella Songwiqi, Nkosikhona Theoren Msweli

3. **A Metaverse Acceptance Framework for the Kenyan Banking Sector: A Fintech Perspective**
   Wanjiku Esther Wamagata

14:30 – 17:00 | PARALLEL SESSION 2 E: ICT FOR SUSTAINABLE DEVELOPMENT

Session Chair: Ms. Josephine Muntuumo

1. **Harnessing Emerging Technologies and the Fourth Industrial Revolution for Sustainable Development: The Role of Information and Knowledge Management in the Digital Era**
   Isaac Frank Agidi, Freeman Emmanuel, Israel Edem Agbehadji

2. **Emerging Technologies and Industrial Revolution for Sustainable Development: A Focus on Information Technologies and Education**
   Isaac Frank Agidi, Freeman Emmanuel, Israel Edem Agbehadji

3. **A Context-Aware Smart Learning Framework for Resource-Constrained Environments: The Case of Namibia University of Science and**

Technology
Munyaradzi Maravanyika

4. **Exploring Adaptive Storytelling Features for Enhancing Digital Literacy: A Study in Rural Primary Schools in Nyeri, Kenya**
   Tabitha Kihara, Jimmy Macharia, Collins Odour

5. **Task-Technology Fit Framework for Rural Namibia Drought Mitigation**
   Singwell Hondonga, Munyaradzi Maravanyika

6. **What Farmers Want: Insights into Digital Literacy Needs in Rural Namibia**
   Rubben Nambinga

14:30 – 17:00 | PARALLEL SESSION 2 F: DATA GOVERNANCE AND DISTRIBUTED SYSTEMS

Session Chair: Dr. Emmanuel Eli Fianu / Mr. Frank Boateng

1. **Distributed Databases into the Fifth Decade: Then, Now, and the Future**
   Rebecca Adwoa Amponsah, Richard Amankwah, Michael Tetteh Asare, Emmanuel Opare Nyante, Moses Aggor

2. **Bridging the Gap Between Distributed Database Management Systems and Cloud Computing**
   Michael Asare, Richard Amankwah, Rebecca Adwoa Amponsah

3. **Robust Data Governance Framework for AI-Enabled Smart Cities**
   Mercy Ziezo, Jude Osakwe

4. **Challenges and Opportunities of Data Governance in the Fourth Industrial Revolution**
   Jude Osakwe, Munyaradzi Maravanyika, Sinte Mutelo

5. **Exploring The Perception of Future Hospitality Professionals Towards Human-Robot Interaction in Hotel Environments**

   Joseph Kojo Asampanbilla, Anthony Vincent Arkhurst, Prince Kelvin Owusu, Dzordzoe Woerlorm Koffie-Ocloo and Isaac Ametemeh

17:00 Cocktail – G6

DAY 3 – WEDNESDAY, 29 OCTOBER 2025

09:00 – 10:30 | Special Book Launch

Special Address: Conference Chair

Author's Presentation / Book Overview - H.E Rev. Dr. Princess A. K Ocansey

Ceremonial Book Unveiling - Prof. Ebenezer Malcalm, Author, Prof. Mohammad Samarah, Prof. Jude Odiakaosa Osakwe, Prof. Fungai Bhunu Shava, Dr. Emmanuel Freeman

Closing Note from Author - H.E Rev. Dr. Princess A. K Ocansey

10:30 – 11:00 | Coffee Break

11:00 – 13:30 | Keynote Session III

1. **Prof. Fransisca Oladipo** - Vice Chancellor, Thomas Adewunmi University, Oko, Nigeria

2. **Dr. Israel Edem Agbehadji –** Senior Lecturer, Faculty of Computing and Information Systems, Ghana Communication Technology University, GCTU.

   Topic: Artificial Learning and Model Transparency

3. **Dr. Emmanuel Freeman** – Head of Computer Science Department, Ghana Communication Technology University, GCTU.

   Topic: Memory Optimization in Virtual Reality and Augmented Reality Images in Engineering and Computing Education

13:30 – 14:30 | Lunch Break

14:30 – 17:00 | PARALLEL SESSION 3 A: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Session Chair: Dr. Prince Yaw Owusu Amoako

1. **Predicting Teacher Depression in Resource-Constrained Settings: An Ensemble Model for Kenyan Schools**
   Gilbert Yegon, Collins Oduor, Edward Ombui

2. **Emotion-Aware Assistive Technologies for Individuals with Speech Impairment: A Systematic Review**
   Abigail Wiafe, Richard Martey Adobau, Philomina Pomaah Ofori, George Anni, Emmanuel Freeman, Adelaide Oduro-Asante

3. **Personality-Conditioned Multimodal Transformer for Depression Assessment in Elderly Populations**
   Prince Ofori, Prince Samuel Kyeremanteng, Charles Adjetey, Seth Laryea, Sandro Amofa, Kofi Sarpong Adu-Manu

4. **Expecting While Connected: Exploring the Influence of Digital Media on Pregnancy Experiences and Healthcare Support**
   Philomina Ofori, Prince Owusu, Emmanuel Fianu, Ethel Yiranbon, Fred Amankwah-Sarfo, Emmanuel Freeman

5. **Human Resource Information Systems Benefit in the Healthcare of the Western Province, South Africa**
   Emmanuel Udekwe, Chux Gervase Iwu, Chidi Chinedu Udekwe

14:30 – 17:00 | PARALLEL SESSION 3 B: HEALTH INFORMATICS AND MEDICAL IMAGING

Session Chair: Prof. Alfred Coleman

1. **A Hybrid BigGAN-ResNet Framework for Robust Detection and Classification of Parkinson's Disease in Medical Imaging**
   Christabel Ama Agyemang, Prince Samuel Kyerematenng, Charles Adjetey, Esther Adusei, Prince Ofori, Sandro Kwame Amofa, Kofi Sarpong Adu-Manu

2. **AI-Powered Severity Prediction for Knee Osteoarthritis Using Convolutional Neural Networks (CNNs) and Conditional Generative Adversarial Networks for Geriatric Care**
   Bernard Kwesi Antwi, Kofi Sarpong Adu-Manu, Prince Samuel Kyerematenng, Sandro Kwame Amofa

3. **Design and Implementation of a Real-Time Automatic Aid for Uterine Fibroid Detection and Staging Using YOLOv8**
   Nasiru Ismaila, Ishak Abdullah, Samuel Danso

4. **Utilization of Medical Images for Enhanced Breast Cancer Detection: A Comparative Study of Machine and Deep Learning-Based Approach**
   Wellington Amponsah, Freeman Emmanuel, Martin Mabeifam Ujakpa, Daniel Gyasi-Nyarko, Justice Williams Asare, Philomena Annanse, Gabriel Fredrick Anyane-Lah Amponsah

5. **Improving 2D Pancreas Segmentation in CT and MRI Images Using a Dual-Stage ResNet-Corollary ASPP Framework (ResEcD-Net)**
   Isaac Baffour Senkyire, Benjamin Ghansah, Emmanuel Freeman

6. **Enhancing Health-Care Systems in Ghana Through AI-Powered Remote Patient Health Monitoring Systems: A Systematic Literature Review**

Odeneho Baffoe-Kodom Agyemang, Alfred Coleman, Emmanuel Freeman, Emmanuel Akwah

14:30 – 17:00 | PARALLEL SESSION 3 C: DATA SCIENCE, DEEP LEARNING AND INTELLIGENT SYSTEMS

Session Chair: Dr. Israel Edem Agbehadji

1. **Feature-Based Music Genre Classification of Nigerian Folk Music Using Supervised Machine Learning**
   Adekunle Ejidokun, Temitayo Olutimi Ejidokun, Abass Yusuf Aleshinloye

2. **Application of Deep Learning Techniques for Automated Number Plate Detection and Recognition**
   Emmanuel Kyei, Jeffery Asamoah, Justice Williams Asare, Obed Appiah, Emmanuel Freeman, William Leslie Brown-Acquaye, Martin Mabeifam Ujakpa, Mpho Mzingelwa, Akwasi Asare

3. **Detection of Urinary Tract Infection Using UNet++ Architecture with Clinical Microscopic Datasets**
   Justice Williams Asare, Pious Ackon, Lukman Hamza, Kingsley Buabeng, Emmanuel Akwah Kyei, Emmanuel Freeman, Martin Ujakpa, Jude Odiakaosa Osakwe, Mpho Mzingelwa

4. **Driver Behavior Detection Using Deep Learning and UDP Streaming**
   David Amartey, Jude Sossah, Samuel Akwesi Danso

5. **Machine Learning Techniques in Sustainable Rice Crop Production: A Bibliometric Analysis**
   Theophilus Acquah, William Leslie Brown-Acquaye, Patrick Acheampong, Israel Edem Agbehadji, Emmanuel Freeman

14:30 – 17:00 | PARALLEL SESSION 3 D: CYBERSECURITY, IOT SYSTEMS AND SECURE SOFTWARE DEVELOPMENT

Session Chair: Prof. Eric Amankwa

1. **Data Privacy and Security in the Context of the 4th Industrial Revolution: African Perspectives**
   Jude Osakwe, Iyaloo Waiganjo

2. **Intelligent Arduino-Based and Analogue Cocoa Weighing Combined Scale System**
   Francis Kwabena Oduro-Gyimah

3. **Enhancing Cyber Hygiene through Human-Focused Information Security Practices in Maritime Enterprises: A Case Study of a West African Port**
   Emmanuel Opare Nyante, Frank Boateng, Fred Amankwah-Sarfo, Dzordzoe Woelorm Koffie-Ocloo, Nana Agyeman-Prempeh, Rebecca Adjoa Amponsah

4. **Baseline Study of Different Security Trend Analysis Methods to Secure IoT-Driven Irrigation System**
   Dauda Isiaka, Afolayan Obiniyi, Victoria Yemi-Peters, Joshua Agbogun

5. **Security Approaches in Agile Software Development: A Bibliometric Review**
   Emmanuel Mensah Azadagli, Alfred Coleman, Israel Edem Agbehadji, Richard C. Millham

6. **Development of an Integrated, IoT-Based Animal Husbandry Farm Water Management System**
   Joshua A. Abolarinwa, Ester Pn Ndadi

7. **Enhancing Campus Network Security and Robustness: A Case Study of Pentecost University**
   Moses Aggor, Seth Okyere-Dankwa, Rebecca Adwoa Amponsah, Kelvin Prince Owusu, Patrick Acheampong

8. **Design and Construction of a Smart Bin System Using IoT Devices and Machine Learning for Automatic Segregation of Biomedical Waste**
   Aba Aboawah Addo, Emmanuel Paa Kwesi Opare, Samuel Danso, Phinehas Newman, Isaac Nyantakyi

14:30 – 17:00 | PARALLEL SESSION 3 E: E-COMMERCE, FINANCE AND ENTREPRENEURSHIP

Session Chair: Dr. Nana Agyeman-Prempeh / Dr. Philomina Pomaah Ofori

1. **Improving Product Ranking Integrity in E-Commerce by Mitigating Sentiment Distortion Using a Sarcasm-Aware and Fake Review-Filtered Approach**
   Ebenezer Kofi Akrofi-Ansah, Abdul-Malik Musah, Charles Adjetey, Kofi Sarpong Adu-Manu

2. **The Effect of Treasury Bill Rates on Private Sector Development**
   Emmanuel Attah Kumah Amponsah, Lord Emmanuel Yamoah, Stephen Owusu Afriyie, Joseph Asare, Bright Ferguson-Laing, Eric Atta Appiadjei

3. **A Technology-Driven Framework for Controlling Corporate Ethical Practices and Financial Performance of Information Technology Engineering Firms: A Developing Economy Context**
   Nana Agyeman-Prempeh, Evans Adjei, Ruhiya Abubakar, Ahmed Antwi-Boampong, Eric Amankwaah, Frank Boateng

4. **The Impact of Sustainable Entrepreneurship on Poverty Alleviation in Africa: The Mediating Roles of Financial Inclusion and Social Innovation**

   Esther Asiedu, Ebenezer Malcalm

17:00 – 17:30 Closing Ceremony – Conference Auditorium

- Remarks from Conference Chair
- Remarks from Industry Players
- Announcement of ICISET 2026
- Remarks from Pro Vice-Chancellor, GCTU
- Closing Prayer – Rev. Michael Owusu Tabiri, University Chaplain

17:00 – 21:00 | DINNER & AWARDS SESSION

Venue: Great Hall

DAY 4 – THURSDAY, 30 OCTOBER 2025

- Tour of the City of Accra – University Transport
- Departure

ABSTRACTS

Connecting The Dots Among Social Media Advertising, Brand Image, Brand Awareness and Purchase intention of Millennials and Generation Z: The Moderating Role of Brand Loyalty

Patrick Acheampong, Rashid Iddrisu, George Kwabena Asamoah, Lawrence Yaw Kusi, George Adu Mensah, and Jeffery Essel

Abstract

The study examines how social media advertising [SMA] affects, if any, the purchasing intention [PI] for eco-friendly brands among millennials and generation Zs. It also assesses the intervening roles of brand awareness [BA], brand image [BI] and brand loyalty [BL] in such a relation between SMA and purchase intention. With explanatory research design in focus, the study applied the quantitative research approach to measuring the variables and analyzing the primary data via the PLS-SEM configuration. millennials and generation Zs in three public universities in Ghana provided the primary data via completion of structured questionnaires. Online and offline methods of data collection were employed. Convenience sampling was used for the selection of the respondents. 11,63 data points were analyzed as the individual level. Firms employing SMA for promoting their eco-friendly brands are positively influencing millennials and generation Zs moderately in terms of their PIs amid the intervening roles of BA, BI and BL. SMA contributes largely to predicting positive change in PIs for green brands. BA however, does not improve PI for green brands which is just a direct opposite of the case of BI. Brand loyalty interacts with SMA to improve the state of PI for advertised eco-friendly brands. Consideration of social media ads for purchase decision-making and social media account status are critical co-founding variables in the study context. The impact of SMA on PI is greatly enhanced via the extent of favorable BI formed by millennials and generation Zs. Contrarily, BA proves not to better transmit the effect of SMA on PIs for eco-friendly products among millennials and generation Zs.

Keywords: millennials, generation Z, social media advertising, brand image, brand awareness, brand loyalty, purchase intention

Openness While Incubating: How Do Incubators Apply Open Innovation Strategies for Supporting Startups?

Zornitsa Yordonava, Gratitude Charis, and Patrick Acheampong

Abstract

Open innovation strategies serve as crucial mechanisms for fostering innovation within organizations, particularly for those with limited resources, such as start-ups. This study addresses a recognized knowledge gap in the literature, focusing on the nuanced ways in which business incubators facilitate open innovation collaboration. The research employs a dual-method approach, combining bibliometric analysis with qualitative insights gathered from incubation managers across more than 10 countries spanning Africa, Europe, and Asia. The study explores and evaluates the applicability of 33 distinct open innovation strategies employed by incubators worldwide. Through the amalgamation of literature review findings and qualitative data, this research provides a comprehensive understanding of how incubators leverage open innovation to foster collaboration both internally among entrepreneurs and externally with external stakeholders. The insights gleaned from diverse geographical contexts contribute to a sophisticated understanding of the global landscape of open innovation strategies employed by incubators. Moreover, the research findings offer practitioners and academics valuable insights, thereby shaping a focused research agenda for further exploration of the topic. This study not only advances academic discourse but also serves as a practical guide for incubators seeking to optimize their open innovation practices on a global scale.

Keywords: open innovation, open innovation strategies, business incubators, startups

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Practical Implementation of Non-Gaussian Interference Models in Wireless Communication: Bridging Alpha-Stable Theory and Real-World Application

Emmanuel Mensah, Mukil Alagirisamy, and Diva Midhunchakkaravarthy

Abstract

This Study Investigates the Gap Between Mathematical Modeling and Practical Implementation of Wireless Communication Systems Operating Under Non-Gaussian Interference. Classical Systems Typically Assume Additive White Gaussian Noise (AWGN); However, Real-World Environments, Especially Metropolitan and Industrial Settings, Often Exhibit Impulsive Noise Characterized by Heavy-Tailed Distributions. To Address This, The Study Applies A-Stable And Generalized Gaussian Distributions (GGD) To Model Interference And Assesses Their Impact On System Performance

Using A MATLAB-Based DS-CDMA System With 16-QAM Modulation Over Varying Signal-To-Interference -Noise Ratios (SINR) From 0 Db To 20 Db. Simulation Results Reveal That As The Characteristic Exponent A Decreases From 2.0 To 1.2, Indicating Increasing Impulsiveness, The Bit Error Rate (BER) Rises Significantly. For Instance, at A = 1.5, The BER Degrades by An Order of Magnitude Compared to The Gaussian Case (A = 2.0). The Study Also Quantifies a Correlation Coefficient of only 7.28% Between Transmitted and Received Signals, Signifying Weak Signal Consistency Under Non-Gaussian Conditions. To Determine the Probability Distribution Function (PDF) Of the Interference, Numerical Modeling Techniques Were Employed, as A-Stable Distributions Lack Closed-Form Pdfs. Hence, A Study Successfully Fits Empirical Data to A Modified Weibull Distribution, Which Best Characterizes the Aggregated Interference in a Large-Scale Metropolitan Wireless Communication Network. This Numerical Approach Bridged the Analytical Gap Posed by the Intractability of the A-Stable PDF And Enabled Realistic Simulation of Wireless System Behaviour. The Study Concludes That Systems Designed Under Gaussian Assumptions Underestimate BER and Emphasizes the Need For A-Stable-Aware Detectors, Non-Gaussian BER Prediction Models, And Adaptive Modulation Schemes. The Findings Provide a Roadmap for Engineering Robust Next-Generation Communication Systems in Non-Ideal, Interference-Prone Environments.

Keywords: Non-Gaussian Interference, α-Stable Distribution, Bit Error Rate (BER), Signal-to-Interference-plus-Noise Ratio, Impulsive Noise, Signal Detection

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Adaptive Optimisation of Quadrature Amplitude Modulation (Qam) in High-Density Networks Using Stochastic Geometry and Interference Modeling

Emmanuel Mensah, Mukil Alagirisamy, and Diva Midhunchakkaravarthy

Abstract

This study addresses large-scale QAM optimization in a wireless communication network involving high user density and interference. The gap between theoretical QAM models and real-world applications was bridged by proposing a predictive interference model rooted in stochastic geometry. The application of the DS-CDMA framework, the study analyses interference patterns, evaluates SINR, and uses adaptive modulation methods to select appropriate QAM orders progressively. The simulation result indicates that the lower-order QAM scheme, particularly 16-QAM, provides a balanced trade-off between throughput and BER under various density conditions. Kruskal-Wallis and PERMANOVA statistical analyses confirm the importance of adaptive modulation in optimizing QAM performance. The findings from the study propose that real-time SINR-based modulation adjusts and intensifies network reliability and throughput, enabling the suitability in dense metropolitan and future 5G and 6G deployments.

Keywords: Wireless Communication, QAM Scheme, QAM, BER, SINR, Throughput

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Leveraging Machine Learning to Improve Patient Appointment Adherence: Evidence from A Ghanaian Healthcare Setting

Patrick Acheampong, Godson Kwashie Agorkpoh-Dei, Emmanuel Freeman, and Kamal Kant Hiran

Abstract

Patient appointment adherence is a vital determinant of healthcare delivery efficiency, yet missed appointments persist as a global issue, compromising both clinical outcomes and operational effectiveness. This study investigates the predictive potential of machine learning models, specifically a hybrid of Feed-Forward Neural Network (FFNN) and Support Vector Machine (SVM), to forecast appointment compliance within a Ghanaian healthcare context. The models were trained and evaluated using a structured dataset with imbalanced classes managed via SMOTE and evaluated using metrics such as accuracy, precision, recall, F1-score, and ROC-AUC. Results demonstrate the hybrid model's superior predictive performance, offering a practical approach to enhance scheduling efficiency, minimise wasted resources, and support data-driven patient engagement strategies in healthcare delivery.

Keywords: Machine Learning, Appointment, Hospital, Neural Network, Ghana

Optimal Detection Strategies for Interference-Prone Metropolitan Wireless Communication Networks Under Non-Gaussian Noise Conditions

Emmanuel Mensah, Mukil Alagirisamy, and Divya Midhunchakkaravarthy

Abstract

The complexities involved in detecting wireless signals in metropolitan scenes are compounded by factors such as high population density, multipath fading, and impulsive interference, which make it imperative to develop optimal and resource-efficient detection methods. A specific study analyses the performances of conventional as well as state-of-the-art detector types, such as Matched Filter (MF), Zero Forcing (ZF), Minimum Mean Square Error (MMSE), and Maximum Likelihood (ML) methods in practical urban wireless setups. Employing MATLAB simulation tools mimicking Rayleigh fading and an alpha-stable interference model, the detectors were analysed based on Bit Error Rate (BER), computational costs, and overall resilience. Empirical observations confirm that ML detection provides the optimal BER performance under conditions encountered due to Gaussian and non-Gaussian interference, though these come coupled with high computational costs. MMSE offers an excellent compromise between performance and simplicity, while MF and ZF exhibit high levels of decline in performance in the presence of urban interference. A comparison study of implementation costs against detection efficiency leads to the conclusion that ML detection through Software-Defined Radio (SDR) is the most scalable and responsive choice for metropolitan networks in the future. These observations highlight the optimal detection choice for future 5G and 6G applications.

Keywords: Maximum Likelihood Detection, Software Defined Radio, Metropolitan Wireless Networks, Bit Error Rate, Impulsive interference, Multiple Input Multiple Output System

Enhancing Learning Outcomes Through Adaptive AI Strategies in Educational Technology

Jude Osakwe and Josephina Muntuumo

Abstract

The integration of artificial intelligence (AI) in educational technology has revolutionised learning experiences, particularly through adaptive learning systems that personalise educational content based on individual learner characteristics. This systematic literature review examines the effectiveness of adaptive AI strategies in enhancing learning outcomes across diverse educational contexts, with particular attention to implementation in African educational systems. A comprehensive search of academic databases yielded 21 relevant studies published between 2019-2024, focusing on adaptive learning platforms, intelligent tutoring systems, and personalised learning analytics. The findings reveal significant improvements in student engagement, learning retention, and academic performance when adaptive AI strategies are implemented. However, challenges including technological infrastructure, teacher training, and cultural adaptation remain prevalent, particularly in low- and middle-income countries. The review identifies key success factors for adaptive AI implementation and provides recommendations for educational stakeholders seeking to enhance learning outcomes through technology-enhanced personalised education.

Keywords: Adaptive Learning, Artificial Intelligence, Educational Technology, Personalised Learning, Learning Analytics, Africa

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Expecting While Connected: Exploring The influence of Digital Media on Pregnancy Experiences and Healthcare Support

Philomina Ofori, Prince Owusu, Emmanuel Fianu, Ethel Yiranbon, Fred Amankwah-Sarfo, and Emmanuel Freeman

Abstract

Digital media has become a common place to inquire for information among different groups of people. And healthcare information is among the critical information sought after on various digital spaces. The aim of the study is to identify factors that influence pregnant mothers to use digital media for medical care information. Data for the study were gathered from expectant mothers at five (5) medical facilities using a questionnaire. Digital media has become a common place to inquire for information among different groups of people. And healthcare information is among the critical information sought after on various digital spaces. The aim of the study is to identify factors that influence pregnant mothers to use digital media for medical care information. Data for the study were gathered from expectant mothers at five (5)

medical facilities using a questionnaire. The study employed SmartPLS to analyze the data, using valid data from 580 respondents. The results revealed that performance expectancy [PE] significantly impacted user satisfaction [SAT] ($p<0.017$). PE had a positive significance on digital health information use behavior [DHIU]; meanwhile, PE had no significance on trust [TR]. The outcome also showed that facilitating conditions [FC] impacted SAT. Furthermore, FC affected TR significantly. On the contrary, DHIU was not impacted by FC. The study again showed that relative advantage [RA] had a positive effect on user satisfaction. On the other hand, relative advantage did not influence DHIU. The findings highlighted that SAT had a significantly positive effect on DHIU; however, TR did not have any effect on DHIU. It was evident that SAT fully mediated the relationship between RA and DHIU. It again mediated the relationship between FC and DHIU; however, the relationship between PE and DHIU was not mediated. TR did not mediate the relationship between FC and DHIU, as well as the connection between PE and DHIU. The findings provided evidence that digital healthcare information usage is influenced by various factors. Based on this finding, healthcare providers need to create reliable digital media platforms that promote accurate healthcare information for expectant mothers. This will help them provide accurate information so that those who seek healthcare on digital media will not feed on unreliable health information.

Keywords: relative advantage, trust, user satisfaction, performance expectancy, facilitating conditions, digital health information use behaviour

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A Systematic Review of Secure Data Synchronization Strategies for offline Learning Management Systems in Low-Bandwidth Environments

Michael Asare, Philomina Ofori, and Emmanuel Fianu

Abstract

Access to Learning Management Systems (LMS) in low-bandwidth environments remains a significant challenge, particularly in underserved and remote regions. While platforms like Moodle are widely adopted, their dependence on stable internet connectivity creates barriers to inclusive and continuous learning. This study presents a systematic literature review (SLR) of research conducted between 2010 and 2024 on secure and efficient data synchronization strategies for offline LMS platforms. 636 peer-reviewed articles were initially identified from Scopus and IEEE Xplore, filtered down to 382 full-text articles for thematic and comparative analysis. The review examines trends in offline web applications, synchronization models, adaptive bandwidth handling, and secure data exchange mechanisms. Key findings reveal a

lack of unified frameworks that combine offline interactivity, intelligent synchronization, and robust data security within LMS environments. This review highlights current technological gaps and outlines design principles for future frameworks tailored to constrained network conditions. The findings serve as a conceptual foundation for the design of a secure, bandwidth-aware synchronization framework suitable for enhancing Moodle's offline capabilities in developing regions.

Keywords: Moodle, offline learning, data synchronization, low-bandwidth systems, secure LMS, systematic literature review

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Real-Time Driver Drowsiness Detection Using Mediapipe and Machine Learning for Road Safety Enhancement

Charles Jnr. Asiedu, Patrick Kudjo, Nana Kofi Annan, and Priscilla Edinam Attah

Abstract

Driver drowsiness is a major contributor to road traffic accidents globally, especially during extended or nighttime driving. This study presents a real-time Driver Drowsiness Detection System leveraging computer vision and machine learning techniques to enhance vehicular safety. Utilizing MediaPipe for facial landmark tracking, the system extracts key fatigue indicators such as the Eye Aspect Ratio (EAR), Mouth Aspect Ratio (MAR), and head nod patterns. A machine learning model processes these features to classify drowsiness levels, triggering an audible alert to regain the driver's attention. The system was implemented using Python and OpenCV, and tested on standard datasets including MRL Eye and CEW. Results show promising accuracy and real-time responsiveness, making it suitable for mobile or embedded deployment. This solution contributes a lightweight, non-intrusive framework that advances current drowsiness detection methods and holds potential for integration into future smart transportation systems.

Keywords: Driver Drowsiness, MediaPipe, Machine Learning, Real-Time Monitoring, Computer Vision

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Evaluating The Readiness of A Higher Education Institution in Ghana for AI-Driven Transformation In Hybrid Teaching and Learning: A Combined Toe-Institutional Theoretical Approach

Fred Amankwah-Sarfo, Philomina Ofori, Emmanuel Eli Fianu, Dzordzoe Koffie Ocloo and Joseph Antwi Attoh

Abstract

Global higher education is being reshaped by the fast development of artificial intelligence (AI) and growing acceptance of hybrid teaching and learning models. Integration of artificial intelligence technologies into hybrid learning has great possibilities to improve institutional efficiency, student involvement, and teaching delivery in Ghana. Still, the degree to which higher education institutions (HEIs) are ready for this change is yet unknown. With an eye toward the integration of AI into hybrid teaching and learning environments, this paper assesses the artificial intelligence-readiness of a public HEI in Ghana. Combining the Technology-Organization-Environment (TOE) framework with Institutional Theory provides a thorough study of internal technical capacity, organizational structures, and external institutional pressures guiding the research. Using a case study approach and a mixed-methods design including in-depth interviews with academic and administrative players, the study results show that although artificial intelligence-enabled tools including intelligent tutoring systems, automated grading, and adaptive learning platforms are attracting more and more attention, the university has serious technological and organizational gaps. These comprise inadequate ICT infrastructure to enable AI-driven hybrid models, limited faculty training in AI applications, absence of institutional AI strategies, and poor alignment with Ghana's national digital and AI policy frameworks. From institutional theory angles, deep-rooted opposition to change, inflexible bureaucratic procedures, and lack of ethical and legal rules for artificial intelligence use in blended learning environments are further exposed. The paper ends with suggesting a context-specific AI Readiness Framework for Ghanaian HEIs that supports hybrid learning and teaching and learning. It advises institutional policy changes, faculty capacity-building projects, investments in AI-compatible infrastructure, and more active participation with national digital transformation projects. The results highlight that artificial intelligence readiness in hybrid learning is a complex organizational and institutional challenge needing coordinated strategic action rather than only a matter of technology acceptance.

Keywords: Artificial Intelligence, Hybrid Teaching and Learning, Higher Education, TOE Framework, Institutional Theory, Digital Transformation, Organisational Change, Educational Technology

Interpretable Machine Learning Framework for Malaria Diagnosis From Symptoms and Risk Factors

Kingsley Attai, Okure Obot, Daniel Asuquo, Moses Ekpenyong, Ekerette Attai, Kitoye-Ebire Okonny, Faith-Valentine, Christie and Faith-Michael Uzoka

Abstract

Malaria remains a significant global health challenge due to its high mortality and morbidity rates. While conventional diagnostic methods such as microscopy and Rapid Diagnostic Tests (RDTs) have proven effective, recent advancements in machine learning (ML) offer improved diagnostic accuracy. However, many ML models operate as “black boxes,” lacking transparency and interpretability, key factors for trust and adoption among medical professionals. This study proposes an interpretable machine learning framework for the timely and accurate diagnosis of malaria based on symptoms and risk factors. The framework integrates Explainable AI (XAI) techniques, specifically Local Interpretable Model-Agnostic Explanations (LIME), to enhance the transparency of model predictions. Three ML algorithms, Random Forest, XGBoost, and Decision Tree, were evaluated using a dataset comprising 3,350 malaria-positive and 1,518 malaria-negative cases, drawn from the New Frontiers in Research Fund (NFRF) project. The dataset included 15 clinically relevant risk factors and symptoms. To address class imbalance, the Synthetic Minority Over-sampling Technique (SMOTE) was applied, resulting in 2,699 instances each for both classes. Among the tested models, Random Forest achieved the highest performance with an accuracy of 0.8316 and a precision of 0.8302. LIME analysis revealed that five out of the fifteen risk factors significantly influenced malaria predictions, with underlying chronic illness emerging as the most predictive feature. This work demonstrates that interpretable machine learning models can provide both accurate and transparent malaria diagnoses, thereby supporting clinical decision-making and fostering trust in AI-assisted healthcare tools.

Keywords: Malaria Diagnosis, Explainable AI, Machine Learning, Local Interpretable Model-agnostic Explanations, Febrile Diseases

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Enhancing Financial Services Through Blockchain and Machine Learning integration: An Analysis of Uptake and Effects in Ghanaian Financial institutions

Anthony Vincent Arkhurst, Prince Kelvin Owusu, Gibson Afriyie Owusu, Zakaria Suleman, Stephen Crentsil Nyame and Joseph Kojo Asampanbilla

Abstract

Emerging technologies like blockchain and machine learning (ML) are revolutionizing the global financial ecosystem by improving client engagement, efficiency, security, and transparency. This study looks into how these technologies are being adopted, integrated, and used by Ghanaian financial institutions, including as commercial banks, fintech companies, and mobile money providers. To obtain a thorough grasp of current practices and perspectives, the study used a mixed-methods research approach that includes quantitative surveys from professionals in the financial sector and qualitative interviews with important IT managers and fintech specialists. The study looks at how ML is being used for credit scoring, fraud detection, consumer behaviour prediction, and personalized financial services, while blockchain is being investigated for safe transaction recording, fraud prevention, and smart contracts. The findings show that although there is increasing interest in and testing with these technologies, obstacles such high implementation costs, a lack of technical know-how, worries about data privacy, and ambiguous legislative frameworks are preventing mainstream adoption. Notwithstanding these obstacles, stakeholders acknowledge that blockchain and machine learning have enormous potential to enhance operational resilience, lower risk, and promote financial inclusion—particularly among underprivileged rural populations. By providing useful insights into the socio-technical enablers and constraints specific to Ghana's setting, the study adds to the continuing conversation on digital transformation in African financial institutions. In order to improve regulatory preparedness, increase technical ability, and create a supportive innovation ecosystem, it ends with strategic recommendations for financial institutions, governmental organizations, and development partners. The future of banking in Ghana and elsewhere may be completely reshaped by the combination of blockchain technology and machine learning.

Keywords: Blockchain technology, Machine Learning, Financial institutions, Digital transformation, Ghana

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Enhancing Learning Outcomes Through Effective Data Management in Educational Technology

Jude Osakwe and Josephina Muntuumo

Abstract

The integration of data management practices in educational technology has emerged as a critical factor in enhancing learning outcomes across various educational contexts. This systematic literature review examines peer-reviewed studies published between 2019 and 2024 to analyse the relationship between effective data management in educational technology and student learning outcomes. Using the PRISMA guidelines, the study conducted a comprehensive search across multiple academic databases including SpringerLink, Science Direct, IEEE Xplore, and educational journals. The review identifies four main themes: (1) learning analytics and predictive modelling, (2) data-driven decision making in educational systems, (3) privacy and ethical considerations in educational data management, and (4) technological infrastructure and implementation challenges. Results indicate that institutions implementing comprehensive data management frameworks report significant improvements in student engagement and academic performance metrics. However, significant challenges remain regarding data privacy, technical infrastructure, and educator training. The findings suggest that effective data management in educational technology requires a multi-faceted approach combining technological solutions, pedagogical frameworks, and institutional support systems. This review provides practical recommendations for educational institutions seeking to enhance learning outcomes through improved data management practices.

Keywords: Educational technology, Data management, Learning analytics, Educational data mining, Student outcomes, Systematic review

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Data Privacy and Security in the Context of the 4th Industrial Revolution: African Perspectives

Jude Osakwe and Iyaloo Waiganjo

Abstract

The Fourth Industrial Revolution (4IR) represents a transformative era characterised by the convergence of digital, physical, and biological technologies. As African nations embrace digital transformation, they face unprecedented challenges in ensuring data privacy and security while capitalising on the opportunities presented by emerging technologies. This research examines the intersection of data privacy, security, and the 4IR from African perspectives, analysing regulatory frameworks, technological implementations, and socio-economic implications. Through a comprehensive review of recent literature and policy developments, this study identifies key challenges including inadequate infrastructure, limited cybersecurity capacity, and evolving regulatory landscapes. The research highlights the African Union's Malabo Convention and Data Policy Framework as foundational instruments for continental data governance. Findings indicate that while Africa has made significant strides in digital transformation, achieving robust data privacy and security requires coordinated policy responses, capacity building, and innovative technological solutions that address the continent's unique contexts and challenges.

Keywords: Fourth Industrial Revolution, data privacy, cybersecurity, Africa, digital transformation, Malabo Convention

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Intelligent Arduino Based and Analogue Cocoa Weighing Combined Scale System

Francis Kwabena Oduro-Gyimah

Abstract

Falsification of analogue weighing scales has gradually decreased cocoa production in Ghana. These falsifications are due to adjustments made to the currently used analogue scale system. The study therefore proposes an intelligent Arduino based and analogue cocoa weighing combined scale system to replace the existing analogue weighing scale approach. The proposed system has a disc-like load cell attached to the platform of the analogue scale; it measures the weight and communicates to the microcontroller. The microcontroller displays the weight on a liquid crystal display (LCD), which subsequently stores the weight in a database. The system was designed and simulated using Proteus 8 Pro software together with Arduino IDE. The new hybrid weighing scale was tested with graded cocoa bean. The results obtained were accurate as compared to the existing analogue weighing scale system and also eliminated the human interface.

Keywords: intelligent, Arduino, database, weighing scale, cocoa beans

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Management of Subscriber Data Based On User Data Consolidation for IMS Network: Case of A Mobile Network Operator

Francis Kwabena Oduro-Gyimah and Felix Baafi

Abstract

The internet has been advancing at a rate that nobody could imagine where today not only are our computers connected but also our phones, televisions, cars and even our glasses. With the rise of more connected devices due to the use of mobile networks such as 3G, 4G, 5G and high-capacity fixed line networks to access information. The increase in service entities and the resulting user data types being scattered, database management system being standalone are making access difficult. Network operators are struggling to overcome data capacity bottleneck of a single-entry point, data duplication and inconsistency and to reduce CAPEX and OPEX. To address this issue, User Data Consolidation (UDC) is proposed to ensure the consistency of storage and data models. UDC is a layered solution for user data storage. The design has simplified the overall network topology and interfaces. A new facility User Data Repository (UDR) is considered for UDC. The designed UDC promoted service and network convergence and supported new services UE applications.

Keywords: User Data Consolidation, HSS, backend, IMS, mobile network

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Enhancing Cyber Hygiene Through Human-Focused information Security Practices in Maritime Enterprises: A Case Study of A West African Port

Emmanuel Opare Nyante, Frank Boateng, Fred Amankwah-Sarfo, Dzordzoe Woelorm Koffie-Ocloo, Nana Agyeman-Prempeh and Rebecca Adjoa Amponsah

Abstract

Cybersecurity has become a top priority for maritime businesses due to the growing digitisation of port operations. Existing information systems research has mostly focused on infrastructure resilience, compliance frameworks, and technical safeguards, frequently ignoring the human component of cybersecurity practice. This gap is particularly important in the maritime context because of the intricate interactions between logistical operations, technological systems, and human behaviour. With a focus on a significant maritime authority running a major commercial port in West Africa, this study tackles the underappreciated contribution of human-centric innovation to improving cyber hygiene. The following research questions serve as a guide for the study: (1) How do workers feel about and interact with the port's cybersecurity procedures? (2) What human-centered innovations have been put into practice or might be introduced to improve maritime operations' cyber hygiene? (3) How are cybersecurity behaviour and innovation adoption influenced by organisational, cultural, and infrastructure factors? The study uses a mixed-methods approach, combining quantitative survey data from operational staff with qualitative interviews with port officials and IT staff. Systemic vulnerabilities, innovation drivers, and behavioural patterns were investigated using statistical and thematic analyses. Effective cybersecurity is hampered by low cyber awareness, insufficient training, and procedural complexity, according to findings. As important interventions, the study suggests role-based digital access, behavior-aware training, and adaptive policy enforcement. Future research in human-centered information security in critical infrastructure sectors, workforce training, and policy formation are all impacted.

Keywords: Cyber hygiene, human-centred innovation, maritime cybersecurity, information systems, mixed methods, West African port.

Ethical Frameworks for Responsible AI Deployment in Public Sector Services: Insight from Ghana

Fred Amankwah-Sarfo, Philomina Ofori, Emmanuel Eli Fianu, and Joseph Antwi Attoh

Abstract

The aim of this study is to develop an ethical framework for the responsible deployment of Artificial Intelligence (AI) in Ghana's public sector, focusing on ensuring transparency, fairness, accountability, and public trust in AI-driven systems used in law enforcement, healthcare, and taxation. To improve efficiency, data-driven decision-making, and service delivery, AI and machine learning (ML) technologies are being incorporated into public sector services. However, there are ethical issues with the rapid adoption of these technologies, especially in taxation, healthcare, and law enforcement. With a focus on transparency, fairness, bias mitigation, accountability, and public trust, this study explores the ethical frameworks required for the responsible implementation of AI in Ghana's public sector. The study uses a mixed methods approach that includes policy analysis, expert interviews, and public opinion surveys, drawing on local governance contexts and best international practices. An exploratory factor analysis (EFA) was conducted using a structured survey comprising 20–30 items designed to measure a range of ethical concerns. This approach helped identify the underlying dimensions such as trust, bias mitigation, and transparency—that stakeholders consider essential for inclusion in an ethical framework. The factor groupings provided insight into the most critical ethical principles necessary for guiding responsible AI deployment in Ghana's public sector. The results show a significant disconnect between the creation and application of policies with majority of Ghanaian AI-related systems lacking explicit rules pertaining to stakeholder accountability and ethical governance. For instance, the use of many policing tools in law enforcement is still mostly unregulated, which raises questions about algorithmic bias and civil liberties. Similarly, AI-driven health and tax systems are frequently implemented without sufficient data security guidelines or openness controls, which reduces public confidence and oversight. Four fundamental principles inclusive stakeholder engagement, algorithmic transparency, independent auditing, and regulatory oversight form the basis of the study's proposed context-specific ethical framework. It also highlights how critical it is to match AI deployment plans with international digital ethics standards, Ghana's Data Protection Act, and constitutional requirements. A national AI ethics board should be established, public servants should receive training on AI accountability, and ethical audits should be incorporated into public sector AI procurement procedures. Ghana can take advantage of AI while preserving democratic principles and the public interest by incorporating ethical considerations into the development, implementation, and assessment stages of AI systems.

Keywords: Artificial Intelligence, Ethics, Public Sector, Ghana, Algorithmic Transparency, Responsible AI

Blockchain-Powered Educational Repository: A Comprehensive Review

Blessing Emmanuel Oladele, Adekunle Olugbenga Ejidokun, Abass Yusuf, and Chukwuemeka Odi Agwu

Abstract

The Implementation of Blockchain Technology in Educational Repositories Signifies A Revolutionary Change in the Administration, Storage, And Authentication of Academic Documents. This Comprehensive Review Explores the Developments and Uses of Blockchain-Powered Learning Repositories, Evaluating How They Might Improve Data Security, Openness, And Interoperability. In Addition to Examining How Blockchain Can Revolutionize Educational Systems by Guaranteeing the Integrity and Immutability of Academic Credentials, Enabling Decentralized Data Management, And Promoting International Collaboration, The Study Summarizes Significant Findings from Recent Research. Notwithstanding The Encouraging Advantages, The Review Also Discusses the Difficulties with Scalability, Legal Frameworks, And the Want for Standardization. While Blockchain Provides a Strong Alternative for Upgrading Educational Archives, The Analysis Finds That Further Research and Development Are Essential to Fully Grasp Its Potential and Get Over the Associated Challenges.

Keywords: blockchain, educational repositories, data security, academic records, decentralization, scalability, interoperability, credential authentication

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Feature-Based Music Genre Classification of Nigerian Folk Music Using Supervised Machine Learning

Adekunle Ejidokun, Temitayo Olutimi, and Abass Yusuf Aleshinloye

Abstract

As part of their cultural heritage, traditional music is relevant to men and conveys strong messages about the sociocultural, spiritual, and historical aspects of their communities. Traditional music is very interwoven with the identity of a culture—in Nigeria, that is, the Yoruba or the Igbos or any of the ethnic groups without exception. Each has its unique idiom, instrumentation, and, most importantly, cultural meanings stitched to these sounds. With modernization stepping in to the rapid beat of change, foreign sound genres have made Nigerian traditions more obscure. This is the reason

that the present study aimed at seeking a way that would involve Machine Learning (ML) technology to actually classify traditional music genres in Nigeria. The effect of traditional algorithms, namely logistic regression and K-Nearest Neighbor (KNN), was studied based on musical features such as rhythm, melody, timbre, and instrumentation through the use of a custom dataset compiled from various Nigerian ethnic groups for the evaluation of the modeled performance. The metrics used to perform the evaluation of algorithmic performance include accuracy, precision, recall, and F1-score. Logistic regression performs with 86% accuracy, while KNN shows an accuracy of 71%. The logistic regression model showed relative success with Waka, Juju, Highlife, and Apala but shows issues, particularly with Juju, limiting their effectiveness. Further studies should undertake observing more traditional machine learning algorithms, boosting algorithms, and deep learning algorithms to compare their performances.

Keywords: Music, ML, identity, culture, Nigeria, genre, accuracy, logistic regression

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Visual Determinants of Digital User Engagement: The Moderating Role of Human Models on The Impact of Color Features in African Fashion Brands' Instagram Content

Crystal Dzebu, Bernard Adjei Buckman, and Nathaniel Nartey

Abstract

Despite the recognized importance of visual content in social media marketing, a comprehensive empirical understanding of how specific visual characteristics and the presence of human models drive user engagement within the unique context of African fashion brands on Instagram remains elusive. This study examines how visual characteristics and the presence of human models influence user engagement with African fashion brand content on Instagram. Utilizing data from 3,151 posts across six prominent African fashion brands, the research employed Generalized Linear Models, including Negative Binomial and Zero-Inflated Negative Binomial regressions, to analyze the impact of color visual features (colorfulness, saturation, brightness, warm hue, contrast) on like and comment counts, while accounting for brand and time effects. Findings indicate that colorfulness, warm hue, and contrast positively enhance engagement. However, saturation surprisingly showed a negative effect. Crucially, the study reveals that human models do more than just increase engagement; they significantly modulate and amplify the positive influence of features like colorfulness, warm hue, and contrast, and even reverse the effect of brightness. Text length, conversely, negatively impacted engagement. These results provide valuable insights into visual content strategy for African fashion, highlighting the unique interplay

between specific visual attributes and image composition. The study contributes to marketing theory by demonstrating the complex moderating role of human presence, offering practical guidance for brands to optimize their digital visual communication and enhance audience resonance.

Keywords: Social Media Marketing, User Engagement, Human Models, Color Features, African Fashion, Zero-Inflated Negative Binomial

Towards Sustainable Digital Administration in Higher Education. A Case Study of Ghanaian Universities

Mark Ofori Nketia, Lord Emmanuel Yamoah, Philip, and Fredericka Dei Nikoi

Abstract

As higher education institutions increasingly embrace digital innovation, the integration of sustainability into administrative functions has become essential particularly in developing countries. This study examines the state of sustainable digital administration (SDA) in Ghanaian universities, focusing on the adoption of paperless systems, the enablers and barriers to implementation, and the impact on environmental and operational outcomes. Using a quantitative cross-sectional design and Structural Equation Modelling (SEM), data were gathered from 286 academic and administrative staff across five Ghanaian universities, including UG, KNUST, UCC, and GCTU. Findings reveal a high adoption of front-end digital systems such as student registration portals (97.67%) and e-staff records (94.67%), contrasted by lower uptake of document management systems (65%). Leadership commitment (influence score = 5/5) and institutional digital strategies (4/5) emerged as key enablers, while budget constraints (reported by 90% of respondents), insufficient training (89%), and infrastructural deficits (84%) were prominent barriers. SEM analysis showed that performance expectancy ($\beta = 0.41$, $p < .001$) and facilitating conditions ($\beta = 0.36$, $p < .001$) significantly influenced system usage. Actual usage in turn strongly predicted sustainability outcomes ($\beta = 0.51$, $p < .001$), with 62% of the variance in sustainability explained by the model. By extending the Unified Theory of Acceptance and Use of Technology (UTAUT) with sustainability constructs, this study offers empirical insights into the drivers and outcomes of SDA within resource-constrained higher education environments. It highlights the importance of strategic leadership, infrastructural investment, and digital literacy in advancing environmentally responsible digital transformation in African universities.

Keywords: Sustainability, digital administration, UTAUT, universities, SEM, paperless

Bibliometric Review of Virtual Reality and Augmented Reality for An Adaptive E-Learning System in Science Technology Engineering Mathematics (Stem) Education: Trends, Challenges and Prospects

Isaac Frank Agidi, Emmanuel Freeman, and Israel Edem Agbehadji

Abstract

The integration of augmented reality (AR) and virtual reality (VR) into adaptive e-learning systems has introduced transformative possibilities for science, technology, engineering, and mathematics (STEM) education. These immersive technologies offer new avenues for visualizing complex concepts, promoting experiential learning, and personalizing instruction. However, their pedagogical implementation within STEM learning environments presents a challenge that warrants systematic exploration. This study employs a bibliometric analysis to investigate global research trends, scholarly contributions, and thematic patterns related to the pedagogical challenges of integrating AR and VR in adaptive STEM education. Using a dataset of 245 peer-reviewed articles and conference proceedings retrieved from the Scopus database (2013–2024), the study identifies major research clusters, key, and keyword co-occurrence networks. Findings reveal a growing scholarly interest in immersive learning, particularly post-2020, with strong thematic emphasis on students' engagement, instructional design, and intelligent tutoring systems. Despite this growth, significant pedagogical barriers persist—including limited teacher readiness, absence of standardized instructional models, misalignment with curriculum goals, and insufficient strategies for inclusive and accessible learning. The analysis also highlights a geographic concentration of research in North America, Europe, and East Asia, underscoring global disparities in adoption and development. This study contributes to the academic discourse by mapping the pedagogical landscape of AR- and VR-enhanced adaptive e-learning and recommending future research directions. The results serve as a strategic guide for teachers, policymakers, and developers aiming to foster effective, equitable, and pedagogically sound immersive learning environments in STEM education.

Keywords: Adaptive E-Learning, Augmented Reality, Virtual Reality

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Harnessing Emerging Technologies and The Fourth Industrial Revolution for Sustainable Development: The Role Of Information and Knowledge Management in The Digital Era

Isaac Frank Agidi, Emmanuel Freeman, and Israel Edem Agbehadji

Abstract

This study examines the intersection of emerging technologies from the Fourth Industrial Revolution (4IR) and sustainable development, emphasizing the pivotal role of Information and Knowledge Management (IKM) in achieving meaningful outcomes. Leveraging a mixed-methods approach—including bibliometric analysis of 963 Scopus-indexed publications, a qualitative case study on Ghana's Smart Agriculture Initiative, and expert interviews—the research proposes and validates an integrated IKM-4IR framework. Findings reveal that while technologies such as artificial intelligence, the Internet of Things, and blockchain are advancing sustainable development goals (SDGs), their impact remains limited without structured knowledge mobilization and local capacity building. The Ghanaian case demonstrated a 28% increase in crop yields and a 35% reduction in post-harvest loss, underpinned by IKM strategies like training, digital tools, and localized content delivery. Expert insights emphasized the framework's scalability while also identifying challenges, including fragmented data systems and limited digital literacy. The validated framework comprises three layers: technological infrastructure, IKM mechanisms, and development outcomes—promoting inclusivity, adaptability, and measurable impact. This research fills a crucial gap by bridging the often-siloed domains of technology deployment and knowledge management, offering actionable insights for policymakers, practitioners, and researchers. The study concludes that embedding IKM into emerging technology strategies is not only beneficial but essential for equitable and sustainable progress in the digital era.

Keywords: Fourth Industrial Revolution (4IR), Emerging Technologies, Information and Knowledge Management (IKM)

Emerging Technologies and Industrial Revolution for Sustainable Development: A Focus on Information Technologies and Education

Isaac Frank Agidi, Emmanuel Freeman, and Israel Edem Agbehadji

Abstract

The Fourth Industrial Revolution (4IR) represents a paradigm shift driven by rapid technological advancements such as Artificial Intelligence (AI), the Internet of Things (IoT), Blockchain, and Extended Reality (XR). These innovations are transforming every aspect of human life, especially the way education is delivered and accessed globally. Education, a cornerstone of sustainable development, stands to gain immensely from these digital innovations—yet disparities in infrastructure, policy, and digital literacy continue to limit equitable deployment, particularly in developing regions. This paper explores the strategic intersection of emerging technologies and education as a tool for achieving the United Nations' Sustainable Development Goals (SDGs), with emphasis on Goal 4 (Quality Education) and Goal 9 (Industry, Innovation, and Infrastructure). Using a mixed-methods approach, we reviewed over 100 academic and policy sources, conducted case studies across three African universities, and developed the Sustainability-Aligned Technological Education Model (SATEM). This framework aligns technology adoption with sustainability objectives, focusing on access, equity, pedagogy, data ethics, and policy integration. Validation through pilot implementation and expert feedback revealed substantial gains in student engagement, faculty technology adoption, and sustainability literacy. The findings suggest that context-sensitive frameworks like SATEM can bridge the digital divide and facilitate responsible tech integration in education. The paper concludes by identifying policy gaps, ethical challenges, and opportunities for cross-sector collaboration that must be addressed to realize education's full potential as a driver of sustainable development in the 4IR era.

Keywords: Emerging Technologies, Fourth Industrial Revolution, Information Technology

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Social Media Advertising, Brand Awareness and Purchase Intention for Eco-Friendly Products Among College-Going Millenials and Generation Zs: The Intervening Roles Of Brand Loyalty and Fear-Of-Missing-Out

George Asamoah, Patrick Acheampong, Samuel Kingsford Seglah, Prince Kofi Annan Assefuah, Rashid Iddrisu, and Lawrence Yaw Kusi

Abstract

The research investigates the influence of social media advertising (SMA) on the purchase intention (PI) of environmentally sustainable products among the youth of Ghana. Further, it incorporates brand awareness (BA), brand loyalty (BL), and fear of missing out (FOMO). A total of 1,163 respondents were sampled and analyzed with results indicating that SMA increases brand awareness (BA) while purchase intention (PI) is not. FOMO functions as a positive moderator on the link between SMA and BA but not on PI, whereas personal FOMO weakens the effect of SMA on BA. SMA significantly improves PI which is also emphasized by brand allegiance. The implications indicate the need for developing loyalty measures and exploiting central FOMO to increase the chances of increasing the use of environmentally sound products.

Keywords: Eco-friendly brands, social media advertising, brand loyalty, brand awareness, fear- of-missing-out, Millennials, Generation Zs

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From Dusty Shelves to Digital Dreams, Libraries as Catalysts for Smart Knowledge Ecosystems in Africa

Aishatu Hassan Muhammad, and Jude Osakwe

Abstract

African libraries are undergoing unprecedented transformation in the digital age, evolving from traditional repositories to dynamic catalysts for smart knowledge ecosystems. This transformation is critical for fostering educational advancement, cultural preservation, and socio-economic development across the continent. This systematic literature review examines how libraries in Africa are transitioning into smart knowledge ecosystems, identifying key drivers, challenges, and opportunities in this digital transformation journey. Following PRISMA guidelines, we conducted a comprehensive systematic literature review of peer-reviewed articles published between 2020-2025. Six databases were searched using predefined keywords related to African libraries, digital transformation, and knowledge ecosystems. A total of 3,847 articles were initially identified, with 45 studies meeting inclusion criteria after rigorous screening. The findings reveal five key themes: (1) Digital Infrastructure Development

and Challenges, (2) Knowledge Management as a Change Enabler, (3) Professional Development and Digital Literacy, (4) Cultural Preservation through Digital Innovation, and (5) Collaborative Networks and Partnerships. Libraries are emerging as crucial nodes in Africa's digital transformation, despite facing significant challenges including funding constraints, infrastructure limitations, and skills gaps. African libraries are successfully transitioning from passive repositories to active facilitators of smart knowledge ecosystems. However, sustained investment in digital infrastructure, professional development, and collaborative partnerships is essential to fully realize their potential as catalysts for continental development.

Keywords: African libraries, digital transformation, knowledge ecosystems, systematic literature review, digital literacy, library innovation

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Application Of Deep Learning Techniques for Automated Number Plate Detection and Recognition

Emmanuel Kyei, Jeffery Asamoah, Justice Williams Asare, Obed Appiah, Emmanuel Freeman, William Leslie Brown-Acquaye, Martin Mabeifam Ujakpa, Mpho Mzingelwa, and Akwasi Asare

Abstract

Automatic Number Plate Recognition (ANPR) systems have recently gained a lot of attention due to their numerous applications, such as managing traffic flow, enforcing laws, collecting tolls, and facilitating parking. They can also be used to monitor and trace stolen vehicles involved in criminal activities. However, ANPR systems encounter specific challenges, particularly in dusty environments, which are prevalent in developing nations where roads are often untarred. Moreover, the diverse array of license plate formats encompassing factors like size, background, character dimensions, and plate texture pose difficulties, especially in busy locations or congested highways. Despite these hurdles, ANPR systems remain crucial tools for efficiently managing and monitoring vehicles. This study introduces a novel dataset comprising 11,326 images containing license plates and vehicles, captured across various locations in Ghana. The dataset encompasses license plates viewed from diverse angles and distances relative to the camera, while also representing varied lighting and weather conditions. This diversity makes the dataset highly suitable for training effective and robust license plate detectors adaptable to different scenarios and environments. The focus of this study revolves around the implementation of Automatic License Plate Recognition (ALPR) systems in developing nations. The proposed ALPR system results in a compact 6-megabyte model with a mean average precision rate of 95%, and a recall of 91%. We carried out thorough experiments to compare our proposed approach's accuracy against existing techniques. The findings from these experiments indicate that our method exhibited superior performance in localizing and recognizing non-standard license plates when compared to other methods.

Keywords: Traffic flow, texture pose, dimensions, detectors, congested highways, license plates

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Machine Learning Techniques in Sustainable Rice Crop Production: A Bibliometric Analysis

Error! Reference source not found. Theophilus Acquah, William Leslie Brown-Acquaye, Patrick Acheampong, Israel Edem Agbehadji and Emmanuel Freeman

Abstract

This study presents a comprehensive bibliometric analysis of global research on machine learning (ML) applications in sustainable rice crop production from 2020 to 2025. Using data from 3,481 publications retrieved from the Scopus database and analyzed through Biblioshiny, the study examines publication trends, influential contributors, collaboration patterns, and thematic developments. The findings reveal steady research growth, with precision agriculture, machine learning, and crops emerging as core themes. Advanced techniques such as deep learning and convolutional neural networks represent promising yet underdeveloped research areas. While moderate international collaboration is evident, greater global partnerships, particularly involving underrepresented regions, are needed. Thematic and conceptual structure analyses highlight fragmented research efforts, signaling the need for more integrated, interdisciplinary approaches. This study provides valuable insights to guide future research and foster the effective application of ML in advancing sustainable rice production.

Keywords: machine learning, sustainable rice production, precision agriculture

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Detection Of Urinary Tract Infection Using UNet++ Architecture with Clinical Microscopic Datasets

Justice Williams Asare, Pious Ackon, Lukman Hamza, Kingsley Buabeng, Emmanuel Akwah Kyei, Emmanuel Freeman, Martin Mabeifam Ujakpa, Jude Odiakaosa Osakwe, and Mpho Mzingelwa

Abstract

Urinary tract infection (UTI) is a significant global health problem, especially because it affects millions of people each year. UTIs occur when harmful bacteria enter the urinary tract, which includes the bladder, kidneys, urethra, and ureters. These infections can cause a range of symptoms, such as abdominal pain, frequent urges to urinate, and painful urination. If untreated, serious UTIs may lead to systemic

infections like sepsis or kidney damage. Traditionally, UTIs are diagnosed through urine culture, a laboratory method that detects bacterial growth in a urine sample. Although urine culture is the most reliable diagnostic tool, it is slow and often takes several days to yield results. This study used a dataset of 300 urine microscopy images from the Rodare Dataset Repository. To enhance the representation of urinary cells and reduce class imbalances, the dataset was carefully curated. Qualified medical personnel manually annotated 3,562 urinary cells, ensuring data accuracy. We applied Kohler illumination and global white balance daily to maintain image consistency. The training process consisted of three phases. The first involved training the model from scratch for 50 epochs. The second phase involved fine-tuning for a further 32 epochs, selecting the checkpoint with the lowest validation loss. The model's performance was measured using six common metrics: Intersection over Union (IoU), Precision, Recall, Area Under the Curve (AUC), and the Dice coefficient from the normalized confusion matrix. In real medical settings, the results show that deep learning models improve UTI detection and make it more practical. The findings of this study support the broader adoption of deep learning in healthcare by offering a cost-effective and scalable diagnostic solution for UTIs.

Keywords: Urinary tract infection, urine culture, microscopy, deep learning, detection

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Factors influencing Adoption Of Digitized Fare Systems in Public Transportation

Isaac Ayodo and Collins Oduor

Abstract

The adoption of digitized fare systems in public transportation has the potential to enhance efficiency, security, and convenience for commuters and transport operators. However, in Nairobi, Kenya, the transition from cash-based payments to digital fare systems has been slow due to challenges such as perceived security risks, lack of trust, infrastructure limitations, and stakeholder resistance. This study investigates the key factors influencing the adoption of digitized fare systems in Nairobi's public transport sector. A descriptive research design was employed, incorporating a quantitative approach to analyze responses from 372 participants, including commuters, transport operators, and policymakers. The study examined the impact of perceived security, performance expectancy, social influence, ease of use, perceived trust, top management support, and relative advantage on the adoption of digital fare systems. Data was collected through structured questionnaires and analyzed using SPSS version 26, applying descriptive and inferential statistical techniques such as regression analysis and correlation modeling. The findings indicate that perceived

security, ease of use, and relative advantage significantly influence commuter adoption of digitized fare systems. Social influence and top management support were also identified as critical factors shaping adoption trends, while trust in service providers and the cost of implementation emerged as key barriers. The study recommends enhancing cybersecurity measures, improving system reliability, increasing public awareness, and ensuring strong stakeholder engagement to facilitate widespread adoption. These findings contribute to the growing body of knowledge on digital payment adoption in public transport and offer practical recommendations for policymakers, transport operators, and technology providers to improve urban mobility in Nairobi.

Keywords: Digitized fare systems, public transportation, electronic payments

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An Assessment of The Impact of System Post-Implementation Practices, Such as User Training and Data Quality for System Optimization, On ERP Success

Flavia Ongai, Collins Oduor, and Austin Odera

Abstract

The business ecosystem is speedily shifting with the adoption of technologies such as Enterprise Resource Planning (ERP) systems that require improved efficiency in the production process. With increased adoption of the ERP system, there has been need to evaluate its implementation and consequently gain insight on the benefits and potential flaws that have existed with the implementation of the system. Kenya has seen a significant adoption of the ERP systems especially in the Manufacturing sector. This study therefore sought to evaluate the implementation of the ERP system in selected manufacturing companies in Kenya. Despite extensive studies on ERP implementation, several research gaps remain, particularly in specific contexts like Kenyan manufacturing companies. Identifying these gaps is crucial for guiding future research and improving ERP systems' adoption and success rates. Many studies examine ERP implementation in general business contexts but fail to address specific industries like manufacturing, which has unique requirements, such as production scheduling, inventory control, and supply chain integration. There is a limited attention to post-implementation practices like continuous user training, system optimization, and measuring long-term benefits, which can reveal critical factors for sustaining ERP success and maximizing return on investment (ROI) as opposed to most research which focuses on the adoption and initial implementation of ERP systems. Research often overlooks how organizations manage employee resistance during ERP adoption, particularly in cultures where hierarchical structures or limited IT literacy may impede change. Understanding how to address resistance and foster user acceptance is

critical for successful implementation. Emerging technologies like IoT, AI, and block chain can be integrated with ERP systems to enhance functionality, these technologies have the potential to revolutionize ERP systems, but their practical applications and challenges remain underexplored. The study objectives were geared towards answering questions on information systems experiences, ERP systems environment, system post implementation and the dependent variable being evaluating the ERP implementation. This study serves as a valuable resource for ERP resellers and manufacturing companies considering ERP adoption, providing insights into best practices and lessons learned. The research design used in the study was exploratory with two sampling techniques used for the study namely purposive in selecting the manufacturing companies then randomly selects the study participants. The study sampled 87 participants from the three selected companies which was deemed sufficient to achieve theoretical saturation, given the study's focus on qualitative insights from IT departments and ERP end users. The study used structured questionnaires to answer the study objectives. Data was collected via Google forms shared randomly across various participants. Data was analyzed using statistical software package SPSS v25. Presentation of the data was done using bar graphs, pie charts and tables for the descriptive statistics while inferential statistics were done using cross tabulations and the Ordinary Least (OLS) multiple linear regression model to determine the relationship between the independent variables and the dependent variable. The descriptive results obtained showed that majority of the respondents were from the ICT department at (28%). Additionally, the organization had used the ERP system between 6-10 years at 48%. The reliability test done using the Cronbach Alpha test was used to determine the reliability of the data instruments. The results showed an internal consistency of 0.917 among four items which are the four variables for the study. The inferential statistics using the OLS regression model showed that information system experience and system post implementation was statistically significant at 95% confidence interval level. Additionally, all the three independent variables had positive beta coefficients implying they have positive relationship with ERP implementation success. The PoC results confirmed that a strategically implemented ERP system can significantly enhance operational efficiency and decision-making in manufacturing companies. Additionally, Proof of Concept (PoC) and validation tests provided valuable insights into the proposed ERP implementation framework, emphasizing key outcomes. Recommendations for further studies would be a longitudinal times series study to assess the impact of ERP implementation over time and also conduct a comparative study across East Africa in manufacturing companies. Secondly, intensifying training programs, Role-Specific training and developing of customized training materials tailored to different user roles, ensuring relevance and engagement. Companies should also focus on integrating emerging technologies like IoT and AI to maximize ERP capabilities. Finally, effective change management strategies should be prioritized to address employee resistance and enhance user adoption.

Keywords: Enterprise Resource Planning (ERP), Framework, ERP Implementation, Proof of Concept (POC), Return on Investment (ROI), System Optimization, Operation Efficiency, Training programs, Post Implementation practices, Role specific training, Change management strategies, Decision making

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A Technology-Driven Framework for Controlling Corporate Ethical Practices and Financial Performance Of Information Technology Engineering Firms: A Developing Economy Context

Nana Agyeman-Prempeh, Evans Adjei, Ruhiya Abubakar, Ahmed Antwi-Boampong, Eric Amankwaah and Frank Boateng

Abstract

As evidenced by the prevalence of code of ethics manuals in organizations, corporate ethics has become increasingly important in developing economies. Recent research, however, emphasizes the negative effects of unethical behavior that goes unchecked, such as the loss of shareholder and investor confidence and employment losses for affected employees. This emphasizes the importance of investigating ethical issues and instituting robust ethical frameworks to avert crises. This research sought to establish a technology-driven framework for influencing the ethical practices of corporations and their effect on financial performance. Considered as independent variables were the ethical code, diagnostic controls, and interactive controls. Employees of sixteen IT engineering companies were interviewed in a semi-structured format through a purposive sampling method. The results showed that a significant positive relationship exists between the corporate code of ethics, reputation, brand equity, and financial performance after the data was thematically analyzed. Based on the findings, a thematic framework to guide corporate ethical practices was developed, considering the challenges and hazards that managers could apply to mitigate potential obstacles through adherence to the negative effects on the relationship between ethics and financial performance. In conclusion, a strong organizational code of ethics predicts high shareholder value by generating increased value and recurring revenue. Thus, to increase shareholder value, it is recommended that IT engineering companies prioritize a code of ethics and demonstrate ethical business practices, as well as dwell on the prospects of AI technology to leverage compliance with the code of ethics by employees. Also, this study further contributes to the comprehension of the significance of ethics in promoting financial performance and provides implementation guidance for organizations.

Keywords: corporate ethics, code of conduct, financial performance, ethical practices

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Modelling Gender Differences in Celebrity Endorsement Effectiveness On Consumer Purchasing intentions: A Structural Equation Approach

Nana Agyeman-Prempeh, Richard Asravo, Evans Adjei, Joseph Afari Buabeng, Alex Antwi-Adjei and Micheal Owusu-Kyei

Abstract

The rapid use of celebrities for advertisements has induced changes in many spheres of the modern competitive marketing environment and the creation of strong product perceptions. This study investigates the effect of celebrity endorsement on the purchasing intention of consumers of Fast-Moving Consumer Goods (FMCG) from a gender perspective in Ghana, using the structural equation model (SEM) and cross-sectional data gathered from a survey. The study found that source credibility, such as trustworthiness, is essential for celebrity endorsements for both males and females. Additionally, the attractiveness of the celebrity endorsing an FMCG has a positive effect on females, whereas expertise is an important testimonial strategy for celebrity endorsement among males. It was found that celebrity endorsements have a strong effect on purchase intentions for both genders, though the effect was higher for females. The study recommends that companies trying to influence female purchase intentions should focus on making the FMCG attractive, whereas for males, they should use celebrities who know the product.

Keywords: Fast-Moving Consumer Goods, Celebrity endorsement, Gender, Source Credibility

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Improving 2D Pancreas Segmentation in CT and MRI Images Using A Dual-Stage ResNet-Corollary ASPP Framework (ResEcD-Net)

Isaac Baffour Senkyire, Benjamin Ghansah, and Emmanuel Freeman

Abstract

Accurately segmenting the pancreas using CT and MRI scans yields more reliable and quantitative representations than simple cross-sectional diameter measures, potentially leading to precision segmentation-based biomarkers. This enables physicians to identify pancreatic problems by visual analysis of multi-planar images for independent evaluations. Nonetheless, the pancreas's irregular morphology, inadequate image contrast, and pixel-level boundary specifications render correct segmentation problematic, contributing to the labor-intensive, laborious process, high costs, and occasional nonviability across extensive datasets when manually outlining the organ. Moreover, significant inter-patient heterogeneity in the size, location, and lobulated architecture of the pancreas poses difficulty even for experienced

radiologists. We propose a Novel ResNet Encoder-Corollary Atrous Spatial Pyramid Pooling-Decoder Network (ResEcD-Net) to address this challenge in automatic pancreatic segmentation on 2D CT and MRI data. Our proposed network examines its generalizability on both CT and MRI pancreatic images and represents an enhancement over our prior EcD-Net (Senkyire et al., 2024). The ResEcD-Net incorporates a novel asymmetric Corollary Atrous Spatial Pyramid Pooling Module (aCASPP-Module) for the effective extraction of local and global spatial information, as well as the identification of the pancreas at different scales during coarse segmentation. Additionally, it employs a novel ResNet for fine segmentation to guide and extract the region of interest (ROI) from the detected coarse image. Our proposed ResEcD-Net outperforms existing state-of-the-art techniques on the publicly available National Institute of Health (NIH) pancreas dataset, achieving the highest Dice Similarity Coefficient of 90.44%, and 86.03% on the T1-weighted (T1W) MRI pancreas dataset, along with the highest Intersection over Union of 81.33% on the T1-weighted and 83.02% on the T2-weighted (T2W) MRI datasets.

Keywords: Pancreas, Pancreas Segmentation, Deep Learning, ResNet, Atrous Spatial Pooling, CT, MRI

Human Resource information Systems Benefit in The Healthcare of the Western Province, South Africa

Emmanuel Udekwe, Chux Gervase Iwu, and Chidi Chinedu Udekwe

Abstract

The identification of Human Resource Information Systems (HRIS) benefits has been in demand in research, and as human resource management is regarded as a significant section for maintaining a workforce in organisations. Ultimately, this impacts the United Nations' Sustainable Development Goals (SDGs) and Vision 2030. However, a further demand for studies to identify HRIS benefits in healthcare is also on the increase, yet to be accomplished. This study was conducted in an African country to identify several obstacles depriving HRIS of benefits in healthcare. A qualitative research study was conducted involving several employees in multiple healthcare facilities who were interviewed. Psychometric testing was carried out to assess the reliability and validity of the data used in the research. Study approvals were granted by the Department of Health and the affiliated institution. The findings showed HRIS benefits were not accomplished due to reasons such as paper-based processes, flawed salary management, inadequate awareness among healthcare practitioners, lack of system interface and confidence among healthcare workers. The study concludes that technology, such as HRIS, supports better healthcare delivery

and achieves SDG. A further recommendation is guidelines and future research activities on HRIS benefits in healthcare practices for nationwide growth and accomplishment.

Keywords: HRIS benefit, Human resource information systems, System Confidence, System interface, Healthcare

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Adoption Of Immersive Technologies for Knowledge Retention and Transfer in Government: A Bibliometric Analysis

Error! Reference source not found. Thuthukani Bella Songwiqi and Nkosikhona Theoren Msweli

Abstract

This paper presents a bibliometric analysis of the global adoption of immersive technologies, specifically Virtual Reality (VR) and Augmented Reality (AR), for knowledge retention and transfer in government. Covering the period from 2002 to 2025, it provides a comprehensive overview of key trends, influential, co-hip networks, and leading countries and regions contributing to this field. Drawing on data from the Scopus database, the study maps the current research landscape, highlighting dominant themes, emerging patterns, and gaps in the literature. The findings reveal that immersive technologies can enhance training outcomes, improve knowledge retention, and increase operational efficiency in governmental contexts. However, challenges such as technological limitations, high costs, and adoption barriers remain significant. Based on these insights, the paper outlines strategies for effectively adopting and implementing immersive technologies in government. It further recommends avenues for future research, including: (1) examining the role of immersive technologies in specific governmental functions, (2) assessing their impact on knowledge retention and transfer across various sectors, and (3) developing robust frameworks for evaluating their effectiveness in public administration. By situating immersive technologies within the broader discourse on Knowledge Management, this study contributes valuable perspectives for policymakers and managers seeking to leverage these tools to enhance governance and service delivery.

Keywords: immersive technologies, knowledge retention, knowledge transfer, government, virtual reality, augmented reality, bibliometric analysis
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A Metaverse Acceptance Framework for The Kenyan Banking Sector: A Fintech Perspective

Wanjiku Esther Wamagata

Abstract

Over the past few years, digital innovations like mobile banking have transformed how financial services are accessed in Kenya. However, the potential of immersive technologies such as the metaverse remains largely unexplored in the local banking sector. This study investigates the factors that might influence the willingness banking institutions to adopt metaverse-based banking services as one of its channels of service delivery. By combining elements from the UTAUT and TOE frameworks, the research developed a localized conceptual model tailored to Kenya's digital banking environment. Using a structured online survey, the study collected quantitative data from employees and stakeholders in Kenya's commercial banking space. The results, analyzed through Structural Equation Modelling (SEM), revealed that factors such as technological compatibility, digital literacy, perceived usefulness, and the availability of infrastructure significantly impact metaverse acceptance. Interestingly, while individual and environmental aspects emerged as key predictors, organizational factors like top management support and financial investment showed minimal statistical influence in this context. These findings offer practical guidance for Kenyan banks considering future investments in immersive banking technologies. Institutions are encouraged to focus on customer readiness, regulatory collaboration, and phased implementation to ensure meaningful adoption. As Kenya's digital ecosystem continues to mature, understanding what drives acceptance of emerging technologies like the metaverse becomes not only relevant but necessary for strategic planning and innovation.

Keywords: Fintech, Banking, Metaverse, Emerging Technology, TOE, UTAUT

Predicting Teacher Depression in Resource-Constrained Settings: An Ensemble Model for Kenyan Schools

Gilbert Yegon, Collins Oduor, and Edward Ombui

Abstract

Depression among educators in Kenya's basic learning institutions presents a critical challenge that impacts teacher well-being and student outcomes. Key features such Mentally exhaustion at work, large class sizes, lack of administrative support, lack of mental health support, limited resources, and systemic pressures exacerbate mental health burdens. Traditional self-reporting methods for identifying depression are subjective, creating barriers to timely interventions. This research aimed to identify

depression regressors among teachers, develop and validate an ensemble model for early detection, and create deployment strategies for integration into resource-constrained settings. The methodology included data collection from sampled teachers, selection of key features, development, training and testing of the ensemble model. The Model performance was validated by comparing the two models XGBoost and Random Forest. The results show that Random Forest performs better with RMSE of 2.679 than XGBoost of 2.708. The ensemble model outperforms single model with a score of 2.653. Furthermore, a comparison of R2 were tested between the three models and ensemble model also outperform others with an index of 0.507 against 0.497 of random forest and 0.480 for XGboost.

Keywords: ensemble model, teacher depression, cognitive behavior, Job demand and resource

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Baseline Study of Different Security Trend Analysis Methods To Secure Iot Driven Irrigation System

Dauda Isiaka, Afolayan Obiniyi, Victoria Yemi-Peters, and Joshua Agbogun

Abstract

In order to advance precision agriculture and handle global issues like water shortage, climate change, and food security, it is becoming more important to secure IoT-driven irrigation systems. With an emphasis on identifying and reducing physical and cyber dangers, this study examines the security tactics and artificial intelligence (AI) approaches used in smart irrigation systems. High-impact academic databases such as ScienceDirect, SpringerLink, ACM DL, Web of Science, Scopus, EBSCO, SciencePG, and IEEE Xplore were used to do a thorough literature assessment. Seven (7) of the 4,680 papers in the original pool, which covered the years 2020–2025, were judged to be highly relevant according to predetermined inclusion and exclusion criteria. The results show that while 29% of the examined research address physical and cyber dangers, 57% concentrate on cybersecurity risks and 14% on physical vulnerabilities. The most common approaches to artificial intelligence (AI) and machine learning (ML) include reinforcement learning, protocol-based frameworks, hybrid models, supervised techniques (Decision Trees, Support Vector Machines, Random Forests), and unsupervised techniques (K-Means Clustering, for example). However, because of computing limitations and a lack of data, hybrid solutions and reinforcement learning are still neglected. Furthermore, only 15% of assessments take security robustness into account, and only a small percentage address real-time performance measurements like latency or throughput. Instead, 71% of assessments

depend on conventional accuracy metrics (such as MAE, RMSE, and R^2). Major gaps in dataset standardization and the utilization of real-world field data were shown by the majority of research, which used simulated environments to obtain data. Critical limits in multi-layered protection and model generalizability are identified in this work. Decentralized, lightweight, and explainable AI techniques should be the focus of future research, enhanced by edge-based intelligent security frameworks and publicly available datasets.

Keywords: IoT security, Smart irrigation, Machine learning in IoT, secure protocols, agriculture cybersecurity

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A Context-Aware Smart Learning Framework for Resource-Constrained Environments: The Case of Namibia University of Science and Technology

Munyaradzi Maravanyika

Abstract

Smart learning systems face significant implementation challenges when deployed in resource-constrained environments typical of developing countries. This paper presents a novel context-aware smart learning framework specifically designed to address infrastructure limitations and organisational constraints in developing country contexts. The study was conducted at the Namibia University of Science and Technology with 70 distance learners and 8 educational technology experts to develop and validate the Smart Recommender Framework for Differentiated Teaching and Learning (SRF-DTL). The framework incorporates adaptive content delivery algorithms, offline-capable learning modules, and organisational maturity assessment components. Key technical contributions include a bandwidth-adaptive content delivery system, a context-aware recommendation engine, and an organisational readiness assessment model. The framework addresses critical gaps in existing smart learning architectures by integrating technical solutions with organisational and cultural adaptation mechanisms.

Keywords: Smart Learning Systems, Educational Technology, Digital Divide, Context-Aware Computing, Developing Countries, Adaptive Learning

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Exploring Adaptive Storytelling Features for Enhancing Digital Literacy: A Study in Rural Primary Schools in Nyeri, Kenya

Tabitha Kihara, Jimmy Macharia, and Collins Odour

Abstract

This paper investigates the impact of adaptive storytelling features such as branching narratives and personalized feedback on digital literacy outcomes among learners in selected rural primary schools in Nyeri County, Kenya. The research is grounded in the growing importance of digital tools in education and the specific need to equip rural learners with 21st-century skills. Using a mixed-methods approach, the study evaluates how adaptive storytelling technologies influence engagement, comprehension, and critical thinking in information literacy. Findings suggest that adaptive features enhance learner motivation, foster deeper comprehension, and support differentiated learning paths. The results underscore the need for contextualized digital interventions in rural educational settings.

Keywords: Adaptive storytelling, digital literacy, branching narratives, personalized feedback

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Task-Technology Fit Framework for Rural Namibia Drought Mitigation

Singwell Hondonga, and Munyaradzi Maravanyika

Abstract

This paper presents a Task–Technology Fit (TTF) and Design Science Research Methodology (DSRM) framework for developing a context-aware AI-driven virtual assistant to support drought mitigation among small-scale farmers in rural Namibia. Rural communities continue to experience challenges such as delayed dissemination of drought information, limited access to agricultural extension services, and inadequate localized decision-support systems. The framework integrates TTF principles to align farmers' information tasks such as drought forecasting, crop planning, and water management with AI technology characteristics, including multilingual interfaces, offline functionality, and localized content delivery. Using DSRM ensures a systematic, iterative process for the design, development, and evaluation of the virtual assistant, emphasizing contextual adaptation, participatory design, and empirical validation. The framework comprises three interconnected layers: Rural Context Analysis, Contextual AI Design, and Rural Deployment and Evaluation, guiding the process from problem identification to performance assessment. A mixed-method evaluation combining quantitative and qualitative techniques validates the fit between user needs and AI capabilities. The framework

contributes to rural information systems literature and offers a scalable, inclusive, and sustainable approach to improving drought preparedness and agricultural resilience in drought prone regions.

Keywords: Namibian Small-Scale Farmers, Drought Mitigation, AI Virtual Assistant, Rural Information Systems

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Emotion-Aware Assistive Technologies for Individuals With Speech Impairment: A Systematic Review

Abigail Wiafe, Richard Martey Adobau, Philomina Pomaah Ofori, George Anni, Emmanuel Freeman, and Adelaide Oduro-Asante

Abstract

Despite the advancement of emotion recognition in human-computer interaction (HCI), its integration into assistive technologies for individuals with speech impairment remains unexplored. This systematic review synthesizes existing research on emotion-aware assistive technologies (EAAT), highlighting current methodologies, emotional evaluation models, and identified technical, ethical and usability challenges. The findings revealed a prevalent reliance on categorical emotion models, limited emotional range recognition, and a substantial gap concerning data availability, adaptive personalization, and computational efficiency. Although the incorporation of facial, gestures and prosodic cues in multimodal systems can improve recognition, processing complexity is still significant. Furthermore, ethical concerns such as privacy, consent protocols, cognitive load and user variability are often underreported in most studies. These findings emphasize the need for inclusive, user-centered design and robust ethical standards, providing a roadmap for developing emotional intelligent systems that improves the services of users with speech impairments.

Keywords: Multimodal emotion recognition, Speech impairments, Inclusive design, Adaptive user interfaces

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EfficientNet-Based Framework for Monitoring Student Engagement in Resource- Constrained Online Classrooms

Prince-Will Kwabena Edzi, Ben-Bright Benuwa, Stephen Opoku Oppong, Benjamin Ghansah, Charles Boabeng-andoh, and Kojo Agyekum Asiama

Abstract

This study investigates the application of EfficientNet deep learning architectures for the detection of student engagement in virtual learning environments, using a publicly available dataset from Kaggle. Specifically, two variants, EfficientNetB0 and EfficientNetB7, were evaluated across multiple classification metrics to assess their suitability for this task. Experimental results indicate that EfficientNetB0 achieved consistently strong performance, attaining an accuracy of 98.11%, while also offering computational efficiency. By contrast, EfficientNetB7, though computationally more demanding, demonstrated potential advantages for complex datasets requiring deeper feature extraction. These findings highlight the practical value of lightweight architectures such as EfficientNetB0 in resource-constrained educational contexts, while highlighting opportunities for deploying larger variants in scenarios with more complex engagement signals. Overall, the study contributes to the growing body of research on the integration of deep learning into educational technologies, demonstrating that EfficientNet models, particularly B0, provide an effective balance between predictive performance and computational cost in the monitoring of student engagement in online learning platforms.

Keywords: EfficientNet, Student Engagement Detection, Virtual Learning Environments, Deep Learning, Educational Technology

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Lecturers' Preparedness in The Use of AI Technologies in Higher Education In Ghana

Nathanael Abbey, Benjamin Ghansah, Stephen Opoku Oppong, Charles Buabeng Andoh, Ephrem Kwaa Aidoo, Kojo Agyekum Asiama, and Ben-Bright Benuwa

Abstract

This study examines lecturers' preparedness to integrate Artificial Intelligence (AI) technologies in higher education within four Ghanaian institutions: the University of Education, Winneba (UEW), Ghana Communication Technology University (GCTU), the College of Community Health Nursing, and the University of Cape Coast (UCC). Employing a quantitative research design, data were collected from 267 lecturers using a structured questionnaire and analyzed through descriptive statistics, analysis

of variance (ANOVA), multiple regression, and chi-square tests. The results revealed significant institutional differences in AI awareness, with GCTU lecturers demonstrating the highest levels. Technological competence and access to institutional training were identified as the most influential predictors of preparedness, whereas personal readiness and general technical skills exerted minimal effects. These findings highlight the critical role of institutional support and targeted professional development in advancing AI adoption in higher education. They call for evidence-based policy interventions to foster equitable and sustainable integration across diverse academic contexts.

Keywords: Artificial Intelligence, Higher Education, Lecturers' Preparedness Ghana, Technological Competence, Training

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Multi-Hop Routing Technique for Heterogeneous Low-Energy Sensor Network

Prince Modey, Gaddafi Abdul-Salaam, William Leslie Brown-Acquaye, Emmanuel Freeman, Israel Edem Agbehadji and Richard C. Millham

Abstract

A significant challenge in wireless sensor networks is the energy depletion of sensor nodes. This study presents a multi-hop K-BCO routing technique that employs adaptive k-mean bee clustering optimization and Fuzzy Logic to enhance energy efficiency in data transmission in heterogeneous sensor networks. The multi-hop K-BCO method was evaluated against established techniques, including adaptive energy routing, fuzzy logic-based energy management, and fuzzy logic with cross-layer techniques, focusing on average energy consumption and average run time. The multi-hop K-BCO technique showed an average energy consumption of 5.634 Joules and an average run time of 0.035 seconds, outperforming other protocols. Also, multi-hop K-BCO demonstrated consistent energy costs across networks with 350 to 500 sensors, indicating scalable efficiency and highlighting its potential to reduce energy consumption while enabling fast data transmission, thereby extending the operational longevity of wireless sensor networks.

Keywords: Routing, Wireless Sensor Network Communication, Clustering, Data Packet Transmission.

A Deep Learning Framework for Detecting Multiple Bugs and Estimating The Detection Effort

Solomon Mensah, Patrick Kwaku Kudjo, Anas Hara, Elizabeth Akuafum Dick, Charles Jnr. Asiedu and Joseph Asampambilla

Abstract

Bug reports are essential in the development and maintenance of software. Bug tracking systems allow testers to submit bug reports which allow for report analysis and assignment of reports to fixers to address them. A given bug x is described as multiple bugs when it is reported by more than two bug reporters. It is described as a duplicate bug when it was reported by two reporters. In a given pool of bug reports from a tracking system, estimating the effort required to identify multiple bugs is a challenge. Although previous studies have made several attempts to solve the problem, there is a need to introduce an effort estimation framework to detect multiple bugs in software projects, specifically open-source projects. This will help reduce the effort software testers spend in analyzing bug reports and also improve software reliability and productivity. The objective of this study is to develop a deep learning framework to detect multiple bugs and estimate the effort required in identifying such bugs in open-source projects. To achieve this goal, this study implements the bugDetector tool, which uses bug information and code feature to find similar bugs. It will first extract features from bug information in a bug tracking system; next it locates bug methods in source code and extracts bug method code features. Additionally, the model calculates the similarities between each overridden and overload method, and finally, it determines which method may cause potential related or similar bugs. The proposed system was evaluated using two large open-source projects, namely Mozilla Firefox and Eclipse, and assessed using Deep learning algorithms (Bidirectional LSTM, LSTM, and CNN) and conventional Machine learning algorithms (SVM and Random Forest). The experimental results show that the deep learning method, namely the Bidirectional LSTM algorithm yielded improved performance for multiple bug detection across the two-study datasets. In relation to the effort required for detecting multiple bugs, we observed that it ranges between 1255.7 to 1383.2 days on average.

Keywords: Duplicate bugs, Effort estimation, Bug detection, Deep learning, Open-source projects

Automata-Driven AI Proctoring Framework: Application Of Automata Theory in Proctoring Systems

Prince Yaw Owusu Amoako, Ernest Mnkandla, and Emmanuel Freeman

Abstract

The increasing adoption of AI-driven proctoring systems in open distance learning necessitates frameworks that ensure transparency, scalability, and accountability in real-time exam monitoring. This research explores the application of automata theory as a foundational model for structuring AI proctoring workflows into discrete, auditable states and transitions. By representing complex proctoring processes such as identity verification, environment assessment, active monitoring, and suspicious activity flagging as finite automata, the proposed framework facilitates rigorous tracking and control of system states while enabling clear audit trails. The automata-driven approach enhances modularity and scalability, allowing for robust handling of uncontrollable events and strict enforcement of examination policies through defined legal and illegal states. Furthermore, it addresses ethical challenges by improving the transparency and traceability of AI decision-making processes, ultimately balancing automation efficiency with necessary human oversight. This study demonstrates that automata theory provides a systematic, efficient, and ethically sound foundation for developing next-generation AI proctoring systems aimed at upholding academic integrity in remote education environments.

Keywords: Automata-driven, AI proctoring, Open distance electronic learning, Remote examination.

ROBUST DATA GOVERNANCE FRAMEWORK FOR AI-ENABLED SMART CITIES

Mercy Ziezo and Jude Osakwe

Abstract

This paper presents a comprehensive analysis of data governance frameworks for artificial intelligence (AI)-enabled smart cities, addressing the critical challenges of balancing technological innovation with privacy protection, ethical considerations, and regulatory compliance. As urban populations continue to grow and smart city initiatives proliferate globally, the need for robust data governance mechanisms becomes increasingly urgent. This research examines current approaches to data governance in AI-enabled smart cities, identifies key challenges and opportunities, and proposes a holistic framework that integrates technical, legal, and ethical dimensions. The study draws upon recent academic literature and real-world implementations to provide evidence-based recommendations for policymakers, urban planners, and technology providers. The proposed framework emphasises human-centric design, transparency,

accountability, and sustainability while enabling innovation and efficient service delivery. Key findings indicate that successful data governance in smart cities requires multi-stakeholder collaboration, adaptive regulatory mechanisms, and continuous monitoring of ethical implications throughout the AI system lifecycle.

Keywords: smart cities, data governance, artificial intelligence, privacy protection, GDPR compliance, urban governance, ethical AI

Development of An integrated, IoT-Based Animal Husbandry Farm Water Management System

Joshua A. Abolarinwa and Ester Pn Ndadi

Abstract

This paper addresses the critical issue of ensuring consistent access to drinking water by farm animals, which is essential for their welfare and procreation. The traditional water monitoring method is laborious and inefficient, especially on large farms where water supplies may be located far from living quarters. To address this problem, the research is aimed at designing and developing an Internet of Things (IoT-enabled) water management system for farm animals using Raspberry Pi technology. The system leverages IoT technology to monitor and manage water resources by providing real-time updates on water levels and enabling automated refill. Key components include a water level sensor, which tracks the water trough levels and activates the pump as needed, and an ultrasonic sensor, which ensures the water tank has an adequate supply for the pump. A mobile application provides remote monitoring capabilities, allowing for manual intervention in cases of system failure and sending alerts for any detected malfunctions. Core functionalities such as real-time water monitoring, automated refill, and network-based control were successfully implemented, with solutions to challenges like power management through separate power supplies and relay switches. This work demonstrates a reliable and efficient solution for automated water management, supporting the well-being of livestock while optimising farm operations.

Keywords: Water, IoT-based, Monitoring, Management, Farm, Animal

Modelling A Social Commerce System Using Web Services

Ambrose A. Azeta, Patrick Omote, and Bisola Ogunde

Abstract

The potential for social commerce is understandable given that there are an estimated 2.46 billion social media users worldwide. The development of Web 2.0 and information and communication technology (ICT) has led to a contemporary trend in e-commerce called social commerce. It has drawn attention from companies, marketers, and scholars worldwide. Designing and creating social commerce systems that integrate and make use of web services is the goal of this research. Based on their ability to facilitate communication between client and server applications, web service components are among the most reliable choices to be used. They are usually regarded as a program that is accessible to other apps via the network. There is a need to integrate social media and e-commerce websites because some of their services are redundant. Furthermore, web services, platform independence, service-oriented architecture, and component reuse on the same platform have not been adequately leveraged by existing Social Commerce websites. This study's goal is to use Web Services to model a social commerce system. Web services were used to model the social commerce system. Several tools, including PHP, Apache Tomcat, MySQL for the database, and ISO's usability standard (ISO 9241-11, 1998), were used. To create a model of a social commerce system using web services, the research combines a number of technologies, including server-side scripting and web-based system development, as well as system design and modeling using the Unified Modeling Language (UML). A five-point rating system was used to administer the questions. One represents strongly disagree, two disagree, three are undecided, four agree, and five highly agree. Each of the sixty responses to the questionnaires that were distributed was collected and analyzed. Table 3 displays the descriptive statistics of the respondents' personal information. According to gender, 9 (45%) are women and 11 (55%) are men. However, Table 5 provided an average of 3.47 for user satisfaction, 2.84 for efficiency, and 3.76 for effectiveness. Based on the aforementioned study, it can be concluded that the developed prototype system has "Average Usability," as evidenced by its overall average rating of 3.356. Therefore, it has become essential to move e-commerce websites from only buying and selling to a more dynamic integration of social media tools due to the growing demand for adaptable e-commerce sites that integrate social media information. This will improve business prospects and draw in more clients.

Keywords: Social network analysis, E-commerce Social commerce, Web base user interface

What Farmers Want: insights into Digital Literacy Needs in Rural Namibia

Error! Reference source not found. Rubben Nambinga

Abstract

As agriculture becomes increasingly digital, small-scale farmers in rural Namibia risk being left behind due to limited digital literacy. This study investigates what rural farmers want and need in order to effectively engage with digital tools that can enhance their productivity and resilience. Drawing on responses from a cross-sectional survey of 40 smallholder farmers across five diverse Namibian regions, the research explores their preferred formats for digital literacy training, priority content areas, and the barriers they face in accessing such education.The results reveal an overwhelming willingness to participate in training, particularly through in-person workshops, printed manuals, and flexible, short learning sessions. Farmers identified high-priority topics such as agricultural mobile applications, digital financial tools, and basic internet navigation. However, systemic challenges, such as cost, poor connectivity, and lack of local training facilities, limit uptake. Respondents proposed actionable solutions, including localized training centers, subsidized programs, and community-driven delivery models. These insights underscore the urgent need for context-sensitive, inclusive digital literacy initiatives that are co-designed with farmers. The study concludes that meaningful progress toward rural digital empowerment must prioritize accessibility, affordability, and cultural relevance in training design and implementation.

Keywords: Digital Literacy, Smallholder Farmers, Rural Namibia, Agricultural ICT Training

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Fraud Awareness and Phishing Prevention: Proactive Tips To Turn Down Scammers' Fraudulent Activities

Paulus Kautwima and Rubben Nambinga

Abstract

The research explores cybersecurity awareness and behaviours in Namibia, particularly targeting phishing awareness among University of Namibia (UNAM) staff. The study's primary aim is to assess employee responses to simulated phishing attacks using the "Phony Phish" system. This experimental study employs a penetration testing methodology, in which phishing emails were distributed to selected UNAM staff members. Participants were chosen through a targeted sampling technique, focusing on those who frequently use information systems, with 50 emails sent to this cohort, of which 40 were successfully delivered. The response rate

indicated substantial susceptibility to phishing tactics, as a significant portion of participants engaged with the fake phishing links. Data was collected through tools integrated within the Phony Phish system, including HTML forms, PHP scripts, and an Apache server, which logged victim responses. Furthermore, responses were analysed to evaluate participant tendencies to disclose sensitive information or follow unauthorized links. The findings underscore notable vulnerabilities, including poor password practices and inadequate attention to cybersecurity protocols. The study provides crucial insights for policymakers and IT departments at UNAM, advocating for strengthened cybersecurity training, enforcement of robust IT policies, and regular updates to security measures to protect institutional information assets.

Keywords: Cybersecurity, Phishing, Human Behaviour, Information Security, Awareness.

Assessing The Mediating influence Of Financial Development On income inequality: Evidence From Selected Sub-Saharan Africa

Emmanuel Lord Yamoah, Emmanuel Attah Kumah Amponsah, Stephen Owusu-Afriyie, Thomas Appiah, Joseph Asare, Peter Besah Avevor, Eric Atta Appiadjei and Bright Ferguson-Laing

Abstract

This paper examines the effects of financial development on income inequality and poverty. The results of both cross-country and panel data regressions suggest that inequality and poverty are reduced not only through enhanced loan markets, but also through more developed stock markets. The study show that ethnic diversity and the distribution of land are significant and robust determinants of both income inequality and poverty. Finally, the study found evidence that government spending leads to a reduction in income inequality in high income countries. In low-income countries, however, the study found no significant effect. The study recommends policymakers to implement comprehensive strategies that not only enhance financial access but also address systemic inequalities to ensure sustainable economic development in Ghana and across Sub-Saharan Africa.

Keywords: Financial development, inequality, poverty, Sub-Sarahan Africa

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Challenges and Opportunities of Data Governance in The Fourth Industrial Revolution

Error! Reference source not found. Jude Osakwe, Munyaradzi Maravanyika, and Sinte Mutelo

Abstract

The Fourth Industrial Revolution (4IR) has transformed organisational operations through the integration of cyber-physical systems, artificial intelligence, and the Industrial Internet of Things (IIoT). This transformation has generated unprecedented volumes of data, necessitating robust data governance frameworks to manage, secure, and derive value from these digital assets. This research examines the multifaceted challenges and emerging opportunities of data governance in the 4IR context through a systematic analysis of current literature and industry practices. The study reveals that while data governance presents significant challenges including privacy concerns, cybersecurity threats, and regulatory compliance complexities, it also offers substantial opportunities for competitive advantage, innovation, and operational excellence. Key findings indicate that organisations implementing comprehensive data governance frameworks report 92% improvement in security effectiveness compared to traditional approaches. The research contributes to the growing body of knowledge on digital transformation and provides practical insights for organisations navigating the complexities of data governance in the digital age.

Keywords: data governance, fourth industrial revolution, Industry 4.0, cybersecurity, data privacy, regulatory compliance

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A Deep Learning Model for Predicting Forex Prices

Patrick Kwaku Kudjo, Solomon Mensah, Selali Soku Charles Jnr. Asiedu, and Stephen Dotse

Abstract

The foreign exchange market is an intricate market impacted by several factors, such as trade wars, geopolitical tensions, and major economic decisions by industry players and government officials. Due to its complicated nature, investors and financial institutions risk significant losses if the right techniques are not employed to predict forex prices. Previous studies have shown that only 2% of retail traders are able to consistently predict market trends accurately. This study uses the traditional machine learning algorithms and deep learning models, known for their superior predictive powers, to predict forex prices for three major currency pairs: EUR/USD, GBP/USD, and GBP/JPY across three different timeframes, namely one hour, four hour and daily

time frames. The Logistic Regression model, Convolutional Neural Network, Long-Short-Term Memory, and a hybrid CNN/LSTM model were the models used for our study, and evaluated using MAE, RMSE, and Coefficient of Determination (R^2). The experimental results shows that the logistic regression model consistently outperformed the CNN, LSTM, and hybrid CNN/LSTM models. In relation to the EUR/USD 1-hour period, for instance, Logistic Regression outperformed CNN (R^2 = 0.9494), LSTM (R^2 = 0.9794), and CNN-LSTM (R^2 = 0.9932) with an MAE of 0.0007, RMSE of 0.0011, and R^2 of 0.995. Similar patterns were seen in the results for GBP/USD and GBP/JPY, where Logistic Regression consistently maintained the lowest error rates and the maximum predicted accuracy. The findings further suggest that most accurate results for EUR/USD were obtained when utilizing a single lagged characteristic of historical pricing instead of adding more lagged variables. We recommend further analysis of the logistic regression model and a potential hybrid combination with well-known techniques like the LSTM and XGBoost.

Keywords: Deep Learning, Artificial Intelligence, Machine Learning, hybrid models

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Distributed Databases into The Fifth Decade: Then, Now, and The Future

Rebecca Adwoa Amponsah, Richard Amankwah, Michael Tetteh Asare, Emmanuel Opare Nyante and Moses Aggor

Abstract

This study explores the evolution of distributed databases over the past four decades and the future trend into the fifth decade. The study examines the historical context, current state, and future trends of some selected distributed database services including Google Cloud Spanner, Amazon DynamoDB, Microsoft Azure Cosmos DB, Apache Cassandra, and MongoDB Atlas. Additionally, the study explored the significant features such as data distribution, scalability, fault tolerance, replication, partitioning, concurrency control, and flexible consistency models deployed by each distributed database service. Furthermore, a comparative analysis was drawn on the paradigm, architecture, theoretical framework, deployment environment, and fragmentation techniques implemented by the services over the past four decades and the way forward. Finally, the study analyzes the advancements and challenges in the field. This study aims to provide insights into how distributed databases have transformed and forecasting the future trend as technology gets evolving. The study serves as insightful guide to database administrators, IT leaders, e-commerce and e-business organizations as well as research bodies in making informed decisions

concerning distributed database selection and management strategies. The future trend identified such as AI and machine learning integration, edge computing, autonomous databases, serverless architecture, blockchain integration will serve as a guide that and providing roadmaps for organizations seeking to optimize their distributed database infrastructure to catch up with technology and business requirements

Keywords: distributed databases, DDBMS trends, database paradigms, database architecture, Google Cloud Spanner, Amazon DynamoDB, Microsoft Azure Cosmos DB, Apache Cassandra, MongoDB Atlas

The Effect of Treasury Bill Rates on Private Sector Development

Emmanuel Attah Kumah Amponsah, Lord Emmanuel Yamoah, Stephen Owusu Afriyie, Joseph Asare, Bright Ferguson-Laing and Eric Atta Appiadjei

Abstract

Annual data from 2000 to 2019. The specific objectives of the study were to examine the impact of treasury bills and treasury bill rate on private credit. Treasury bills were disaggregated into their various components and used as explanatory variables along with other essential macroeconomic variables. The study was conducted in the light of the crowding out effect hypothesis. The behavior of variables was captured in an autoregressive distributed lag (ARDL) model. The result of the estimated model shows that treasury bills held by commercial banks, treasury bills held by the public and treasury bill rate have significant negative effect on credit to private sector, showing that treasury bills have a crowding out effect on private sector credit. It is recommended that treasury bill rate should be set to align with other rate of return on short term financial asset in the financial system to allow for fair competition between public sector and private sector debt instrument and thus limit the crowding out effect and that the issuing of treasury bills should be justified with the existence of excess liquidity in the financial system.

Keywords: Treasury bill, Private sector Development, Domestic debt, Crowding out

Bridging The Gap Between Distributed Database Management Systems and Cloud Computing

Michael Asare, Richard Amankwah, and Rebecca Adwoa Amponsah

Abstract

The intersection of distributed database systems and cloud computing platforms is revolutionizing modern data management by bringing greater flexibility, scalability, and performance. This study presents the synergy of technologies through an analysis of influential developments, architectural structures, and performance outcomes based on a critical evaluation of recent research. Referring to three important studies, Singh (2023), Mansouri et al. (2023), and Tama \& Mark (2024), we recognize common problems like wastage of energy, security threats, and data synchronization in dispersed cloud environments. The work recognizes new trends like serverless and green computing, provides a comparison of experimental setups, and proposes improvements to edge-cloud deployments' resource control. This review proposes approaches to bridging the gap between technology and practicality.

Keywords: Distributed Databases, Cloud Computing, Edge Computing, Resource Utilization, Database Management Systems (DBMS), Energy Efficiency, Scalability, Serverless Architectures, Hybrid Cloud

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Machine Learning for Personalized Adaptive Learning Styles Detection: A Bibliometric Analysis

Michael Kyei Kissi, Martin Mabeifam Ujakpa, Israel Edem Agbehadji and Emmanuel Freeman

Abstract

Diverse learners' preferences and cognitive strategies influence academic success. However, the lack of understanding of students' preferred learning styles affects quality of teaching and learning. This study undertook a bibliometric analysis of existing literature on detecting student learning styles from 2015 to 2025. A total of 420 research articles were retrieved from the Scopus database using specific search string. Based on the inclusion and exclusion criteria, 158 research articles were analyzed using the adapted research search strategy. Findings show that the field of study is a growing sector that requires more research publications to make accurate and precise decisions on detecting learner preferences.

Keywords: Learning styles, Learner models, Adaptive learning, Personalized learning, Machine Learning, Learner Preferences, Higher Education, Learning Algorithms

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A Hybrid Biggan-Resnet Framework for Robust Detection and Classification of Parkinson's Disease in Medical Imaging

Christabel Ama Agyemang, Prince Samuel Kyerematenng, Charles Adjetey, Esther Adusei, Prince Ofori, Sandro Kwame Amofa and Kofi Sarpong Adu-Manu

Abstract

Parkinson's disease (PD) is a progressive neurodegenerative disorder characterised by motor and cognitive impairments, often diagnosed through subjective clinical evaluation, which can lead to delayed or inaccurate detection. This study aimed to develop a hybrid deep learning framework that integrates the generative capability of BigGAN with the discriminative power of ResNet50 for the robust detection and classification of PD using medical imaging data. This study adopted an experimental design comparing a baseline ResNet50 classifier trained on real MRI data with a hybrid BigGAN–ResNet50 model trained on both real and synthetic data. BigGAN was employed to generate realistic synthetic MRI images to address class imbalance and data scarcity, whereas ResNet50 was fine-tuned for binary classification (PD vs. non-PD). The model performance was assessed using accuracy, precision, recall, and F1-score metrics on the NTUA Parkinson Dataset. The baseline ResNet50 achieved high sensitivity toward PD cases but performed poorly on non-PD samples owing to dataset imbalance. The hybrid BigGAN–ResNet50 framework significantly improved the classification performance, achieving 99.60% accuracy, perfect recall for non-PD cases, and enhanced generalisation across both classes. The integration of synthetic data improved the minority class sensitivity and reduced the diagnostic bias, yielding stable and interpretable feature representations. The proposed hybrid BigGAN–ResNet50 framework effectively addressed class imbalance and enhanced diagnostic accuracy in PD detection. Its generative–discriminative design demonstrates the clinical potential for a reliable and interpretable AI-assisted diagnosis of neurodegenerative diseases. Further validation on larger multimodal datasets is recommended to ensure broader applicability.

Keywords: Parkinson's Disease, BigGAN, ResNet50, Deep Learning, Medical Imaging, Data Augmentation, Classification

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Examination Of Ghana's Transition to A Digital Economy: Assessing the Impact of Digitalization on Employment and Career Development in Ghana

Nana Kofi Annan, Charles Asiedu Jnr, Benjamin Kumi and Leonard Kyei

Abstract

This study examines Ghana's transition to a digital economy by assessing the impact of digitalization on employment and career development. Utilizing a quantitative approach with a sample of 200 respondents across diverse sectors, the research investigates three core objectives: the effect of digitalization on employment, identification of digital skill gaps and training needs, and evaluation of policy frameworks and institutional support for workers. Findings reveal that digitalization has created new employment opportunities and improved productivity. However, it has also led to job displacement, increased workload without proportional compensation, and heightened income inequality, particularly affecting mid-career professionals and women. A significant digital skills gap exists, with 85% of respondents feeling inadequately trained despite frequent skill updates, and employer-provided training remains insufficient. Awareness and accessibility of government digital policies are low, limiting their effectiveness in supporting workforce adaptation. The study concludes that for Ghana to benefit from digital transformation fully, targeted interventions are needed to bridge skill gaps, enhance policy communication, and promote inclusive practices addressing gender and generational disparities. The findings provide evidence-based insights to inform policymakers, employers, and educators in fostering sustainable and equitable digital economic growth.

Keywords: Ghana's Transition, Digital Economy, Digitalization, Employment, Career Development

Intelligent Stock and Expiry Management System Based On Machine Learning

Nana Kofi Annan, Adetona Juvanus Akohouendo, and Ian Yaw Asare

Abstract

The following study focuses on the difficulties encountered by Small and Medium Enterprises that handle and manage perishable products in sectors such as food and pharmaceuticals. During this study, it emerged that losses often occur not due to staff negligence, but also and above all due to the lack of tools available to assist in rapid decision-making and monitoring. To remedy this, a computer software that uses artificial intelligence to highlight products close to the expiration date and also propose actions accordingly, such as the withdrawal of the product or its promotion if expired.

This system incorporates Excel features that, unlike traditional spreadsheets, the system offers more direct assistance with visual syntheses that allow managers to understand the stock situation with just a glance. In practice, the first tests carried out have shown us that the application has the potential required to effectively help in the fight against economic losses by helping to identify risky products in time and has formulated easy-to-apply suggestions. Although the system is still in prototype stage and not yet tested and assessed on a large scale, it shows performance and potential to reduce waste of perishable products by assisting in rapid decision making and assisted monitoring in daily stock management.

Keywords: artificial intelligence, decision support, stock management, expiry prediction

Predictive Modelling for Social Media Optimisation: Predicting The Maximum Engagement Rate on Instagram

Augustina Addo Nyinaku, Charles Adjetey, Sandro Kwame Amofa, Prince Samuel Kyeremanteng, Prince Ofori, Hilary Ackah-Arthur, and Kofi Sarpong Adu-Manu

This study seeks to address the decline in Instagram engagement rates, which have decreased to 0.5% in 2023, by developing a predictive model capable of forecasting the maximum engagement rate on Instagram posts within 24 hours. This model offers a data-driven alternative to traditional heuristic-based optimisation strategies. Utilising a dataset comprising 100,000 public Instagram posts from 2022 to 2024, we developed features such as follower metrics, posting time, caption semantics, hashtags, and alignment with trending topics. An Extreme Gradient Boosting (XGBoost) regression model was trained and evaluated in comparison to linear regression and Random Forest benchmarks, using the Mean Squared Error (MSE) and R-squared (R^2) metrics for assessment. The XGBoost model demonstrated superior performance compared to the benchmark models, with a Mean Squared Error (MSE) of 3398.46 and an R^2 value of 0.916, thereby accounting for 91.6% of the variance in engagement. An analysis of feature importance identified content category, posting frequency, and the use of strategic hashtags (#AI, #SocialMediaMarketing, and #ClimateAction) as the most significant predictors of success. Engagement levels were highest on weekends and during times of heightened public interest in global events. This study presents an innovative and scalable framework that integrates real-time contextual signals, including trending news and viral topics, with historical engagement data within a robust machine-learning pipeline. This framework serves as a practical and prescriptive tool for content creators and marketers, addressing challenges such as algorithmic visibility reduction and increasing advertising costs. It advances beyond descriptive analytics to provide actionable and predictive insights.

Keywords: Instagram engagement, predictive analytics, XGBoost, social media optimisation, machine learning

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Design and Simulation of A Blockchain-Based Security Framework in Traditional IOT Networks for Enhanced Data Security and Integrity

Emmanuel Apeli Afanyibo, Emmanuel Agbavito, Samuel Akwasi Danso, Isaac Osei Nyantakyi, and Phinehas Quarshie Newman

Abstract

The advent of fifth generation (5G) networks has significantly boosted the deployment of Internet of Things (IoT) integration into our everyday life since it provides an avenue for massive interconnectivity between devices and humans alike. These IoT networks however remain vulnerable to security risks due to their centralized access control models that introduce single points of failure (SPOF) and increase exposure to risks like man-in-the-middle, replay, and Sybil attacks. This paper proposes a blockchain-based security framework that integrates Elliptic Curve Cryptography (ECC), smart contract automation, Multi-access Edge Computing (MEC) and a Proof-of-Reputation (PoR) consensus mechanism to enhance data security and integrity. Smart contracts perform device registration request validation checks and ECC-generated key pairs provide added data security. MEC nodes reduce computational overhead by filtering and distributing tasks across various nodes and PoR is responsible for the dynamic assignment of reputation trust scores to IoT devices based on their past behavior. The TON_IoT simulation results depict a system security level of 96.12%, with an attack detection rate of 96.67%. These results indicate significant improvements over conventional centralized models. This framework provides enhanced data security, trust and integrity for IoT environments.

Keywords: Internet of Things (IoT), Single Point of Failure (SPOF), Elliptic Curve Cryptography (ECC), Smart Contract, Multi-Access Edge Computing (MEC), Proof of Reputation (PoR).

Design and Construction of a Smart Bin System Using IOT Devices and ML for Automatic Segregation of Biomedical Waste

Aba Aboawah Addo, Emmanuel Paa Kwesi Opare, Samuel Danso, Newman Phinehas and Isaac Nyantakyi

Abstract

Biomedical waste mismanagement remains a critical challenge in developing countries such as Ghana, where up to 83% of healthcare facilities do not segregate waste properly. This leads to increased risks of infection, environmental pollution, and higher treatment costs. Conventional waste management systems rely heavily on manual segregation, which is prone to human error and unsafe handling practices. This study presents an IoT and AI-enabled Smart Bin System designed to automate biomedical waste segregation and monitoring. The system integrates a Raspberry Pi as the central controller, a camera module for capturing waste images, and ultrasonic sensors for monitoring bin fill levels. Waste items are classified into four categories (general, infectious, sharps, and pharmaceutical) using the RF-DETR deep learning model, trained and fine-tuned on a biomedical waste dataset via the Roboflow platform. Classified outputs trigger servo motors to actuate the appropriate bin lids. Data is synchronized with Firebase Realtime Database, while a web application (HTML, CSS, AngularJS) provides real-time monitoring, logs, and notifications. The RF-DETR model achieved a mean Average Precision (mAP@50:95) of 93.6%, with precision and recall of 91.2% and 89.0%, respectively. Hardware testing confirmed reliable servo actuation and fill-level detection within 2cm accuracy. The web application successfully displayed live bin statuses and triggered alerts with data synchronization latency under 5 seconds. These results demonstrate that the Smart Bin System is both feasible and effective, offering a scalable solution to improve biomedical waste management in healthcare facilities. This innovation automates segregation, has the potential to reduce human error and contamination risks, and promote sustainable healthcare practices. While effective for current needs, further high-quality research is required to enhance dataset size, model robustness, and deployment in diverse settings for long-term waste management solutions.

Keywords: Smart Bin, Biomedical Waste, IoT, Machine Learning, RF-DETR, Raspberry Pi, Firebase

Personality-Conditioned Multimodal Transformer for Depression Assessment in Elderly Populations

Prince Ofori, Prince Samuel Kyeremanteng, Charles Adjetey, Seth Laryea, Sandro Amofa, and Kofi Sarpong Adu-Manu

Abstract

Depression in older adults is frequently underdiagnosed during routine care. We address this gap by proposing a Personality-Conditioned Multimodal Transformer (PC-MulT), which personalises audiovisual depression assessment by adapting to individual expressive baselines. PC-MulT integrates three components: (i) Feature-wise Linear Modulation (FiLM) that conditions sequence encoders on a learned personality/context vector; (ii) bidirectional cross-modal attention to capture corroboration and dissonance between audio and visual cues; and (iii) attention-based Multiple Instance Learning (MIL) to aggregate variable-length interview segments to subject-level predictions. The model was trained and evaluated on the MPDD-Elderly clinical interview dataset using subject-wise splits. Evaluation employed macro-F1 and PR-AUC for classification, and MAE for PHQ-9 and HAMD-24 regression, with ablation quantifying component contributions. PC-MulT achieved state-of-the-art performance: binary screening F1 = 1.000 and PR-AUC = 1.000; tri-class severity macro-F1 = 0.9879; regression errors MAE = 1.033 (PHQ-9) and MAE = 2.099 (HAMD-24). The ablation study showed that FiLM contributed the most (−6.33 percentage point (pp) drop in F1 when removed), followed by cross-modal attention (−3.12 pp) and MIL (−2.45 pp). The architecture is compact (~2.1M parameters) with a low inference latency (~50 ms/clip). Embedding personality conditioning within multimodal transformers yields a robust, interpretable, and deployable depression assessment for older adults. Future studies should pursue cross-cultural generalisation, fairness auditing, uncertainty reporting, and prospective clinical studies to establish real-world impact.

Keywords: depression detection, multimodal transformer, personality, FiLM, multiple instance learning, elderly, clinical AI

Security Approaches in Agile Software Development: A Bibliometric Review

Emmanuel Mensah Azadagli, Alfred Coleman, Israel Edem Agbehadji, and Richard C. Millham

Abstract

Integrating security into Agile Software Development remains a persistent challenge, with scholarly efforts lacking coherence and thematic consolidation. This review systematically maps the research landscape of security approaches in agile software development using 1,918 publications indexed in Scopus (2020–2025) to examine the intellectual structure, research trends and emerging themes. Thematic mapping using Biblioshiny 5.0 classifies Software Design as the most developed and central theme, while Security remains marginal, often embedded within wider methodological discourse. Software Engineering and Open-Source Software occupy foundational and niche positions, respectively. Artificial Intelligence appears to be a transitional theme, suggesting growing relevance but limited integration into Agile security practices. Trend analysis indicates a shift from foundational themes such as design and implementation toward emerging topics, including adversarial machine learning, data quality, and generative adversarial networks. Despite this evolution, thematic fragmentation and weak author collaboration networks persist. These results would seem to suggest a need for a more cohesive research agenda. A reasonable approach could be to embed security as a core design principle and explore AI-driven mechanisms for adaptive threat modeling and secure development pipelines. The analysis presents a structured foundation for advancing both academic discourse and practical innovation in secure Agile development.

Keywords: Agile Software Development, Security Approaches, Agile Security, Secure Software Development, Bibliometric Review

Driver Behavior Detection Using Deep Learning and UDP Streaming

David Amartey, Jude Sossah, and Samuel Akwesi Danso

Abstract

Mobile phone use, eating, and sleepiness are all significant contributing factors to distracted driving-related traffic accidents, which continue to be a serious worldwide problem. A deep learning-based driver behavior detection system that can recognize risky driving behaviors in real time is designed and put into use in this study. The system integrates UDP streaming for real-time monitoring and makes use of a Convolutional Neural Network (CNN) trained on a labelled dataset of driver behaviors.

Techniques for data augmentation and preprocessing were used to increase the robustness of the model. According to experimental results, the suggested system has a high precision and recall across the majority of behavior classes and an overall accuracy of about 94%. Minor misclassifications between visually similar actions, like texting and phone use, are revealed by a confusion matrix analysis. Low-latency inference is made possible by the integration with UDP, which makes the system suitable for in-car use. By providing an affordable, real-time driver monitoring framework with potential uses in ADAS and upcoming autonomous driving systems, this work advances intelligent transportation systems (ITS).

Keywords: CNN, Driver behavior detection, UDP streaming

Design and Implementation of a Real-Time Automatic Aid for Uterine Fibroid Detection and Staging Using Yolov8

Nasiru Ismaila, Ishak Abdullah and Samuel Danso

Abstract

Uterine fibroids are the most common tumors of the female reproductive system. They are benign but cause major health problems, including infertility, abnormal bleeding, and pelvic pain. Diagnosis is often based on ultrasound, MRI, or CT. Each of these methods has drawbacks. Ultrasound depends on operator skill. MRI is expensive and less available in low- resource hospitals. CT exposes patients to radiation and offers limited staging accuracy. This study presents a real-time computer-aided diagnosis system using the YOLOv8 deep learning model. A dataset of 250 annotated ultrasound scans was collected and used to train the model. The system outputs bounding boxes, fibroid size, stage classification, and echogenic type. It was deployed as a web-based application for clinical use. Results show a precision of 95.4%, recall of 91%, and F1-score of 93%. These outcomes exceed those reported by previous models. The work demonstrates that AI systems can deliver reliable and affordable diagnostic support in gynecology.

Keywords: Uterine Fibroids, YOLOv8, Ultrasound, Image Detection, Staging, AI system, Medical imaging, Real-time diagnosis, Deep learning, Convolutional Neural Networks (CNNs), Sensitivity and Specificity, Precision & Recall, mAP (mean Average Precision)

Improving Product Ranking integrity in E-Commerce By Mitigating Sentiment Distortion Using A Sarcasm-Aware and Fake Review-Filtered Approach

Ebenezer Kofi Akrofi-Ansah, Abdul-Malik Musah, Charles Adjetey, and Kofi Sarpong Adu-Manu

Abstract

E-commerce platforms rely on user reviews for product rankings. However, sarcasm and fake reviews distort sentiment signals, affecting ranking reliability. This study developed a framework to enhance ranking integrity by addressing sarcasm-induced polarity shifts and review authenticity. The pipeline comprised (i) sarcasm detection (tone and polarity) using RoBERTa-DAPT, (ii) fake-review classification using ERNIE + BiLSTM with metadata fusion, and (iii) sentiment classification via the SieBERT model. Large-scale Amazon product review datasets were used for experimentation, and model improvements were statistically validated using correlation ranking metrics to simulate marketplace ranking behaviour. A baseline aggregation formula was defined as Rbase=0.625Sraw+0.25(M/5)+0.125V, where Sraw represents mean raw sentiment, M is the normalized star rating, and V denotes normalized log review volume. The enhanced, trust-weighted ranking was subsequently expressed as Rfinal=0.50Scorr+0.20(M/5)+0.10V+0.20A, where Scorr is sarcasm-corrected sentiment, and A=1−avg (fake score) represents review authenticity. The proposed framework demonstrated strong predictive and corrective capabilities. The dual-head RoBERTa-DAPT model, comprising sarcasm tone and polarity heads, achieved an accuracy of 0.841 and F1 = 0.848 for tone detection, with an overall harmonic mean (H-Mean) of 0.981 across both heads; the fine-tuned SieBERT sentiment model attained F1 = 0.960; and the ERNIE + Metadata fake-review classifier achieved F1 = 0.950. Ranking analysis showed that 13 of 15 products (86.7%) changed their position following correction, with moderate baseline alignment (Kendall's τ = 0.4476; Spearman's ρ = 0.5464). Approximately 37% of the reviews exhibited polarity inversion after sarcasm correction. Integrating sarcasm correction and fake review filtering improves e-commerce ranking fairness and reliability. The framework advances theory through joint sarcasm-authenticity modelling while introducing a hybrid transformer-metadata design for distortion-aware ranking.

Keywords: sarcasm detection, sarcasm tone, sarcasm polarity, fake reviews, sentiment analysis, e-commerce ranking

AI-Powered Severity Prediction for Knee Osteoarthritis Using Convolutional Neural Networks (CNNs) and Conditional Generative Adversarial Networks for Geriatric Care

Bernard Kwesi Antwi, Kofi Sarpong Adu-Manu, Prince Samuel Kyerematen and Sandro Kwame Amofa

Abstract

Knee Osteoarthritis (OA) is a leading cause of disability among the elderly, with diagnosis primarily relying on the subjective and time-consuming Kellgren-Lawrence (K-L) grading of radiographic images. This study presents an automated, deep learning-based framework for accurate and interpretable knee OA severity prediction. We propose the integration of a Convolutional Neural Network (CNN) and a Conditional Generative Adversarial Network (cGAN) to address key challenges: the subjectivity of manual grading and the severe class imbalance in medical datasets. Our Enhanced OA Classifier employs a DenseNet121 backbone augmented with attention mechanisms and an ordinal regression head to respect the ordered nature of the K-L grades. To mitigate data imbalance, the cGAN generates high quality synthetic knee X-ray images for underrepresented severity classes. Trained and evaluated on the Osteoarthritis Initiative (OAI) dataset, our model achieved a state-of-the-art quadratic weighted Cohen's Kappa of 0.8415 and a Mean Absolute Error (MAE) of 0.370 on an independent test set, indicating "almost perfect" agreement with expert radiologists and clinically minor prediction errors. Visual explanations via Grad-CAM validated that the model focused on anatomically relevant regions. This study demonstrates the viability of an integrated CNN-GAN framework as a robust, accurate, and transparent tool for automating knee OA diagnosis with significant potential to improve geriatric care.

Keywords: Knee Osteoarthritis, Deep Learning, Convolutional Neural Networks, Generative Adversarial Networks, Severity Prediction, Medical Image Analysis, Explainable AI Intelligence

Patient-Centric EHR System Using Ethereum Blockchain

Richard Martey Adobau, Emmanuel Freeman, and Abigail Wiafe

Abstract
Traditional electronic health records (EHR) systems suffer from critical security vulnerabilities, privacy concerns, and interoperability challenges owing to their centralized architectures, Over 2,100 healthcare data breaches reported in the United States since 2009, and approximately 86% of patients expressing concerns about data security. This study addresses these challenges by designing and implementing a novel patient-centric EHR system using Ethereum blockchain technology combined with an InterPlanetary File System (IPFS) for secure, scalable, and interoperable healthcare data management. This study employed Design Science Research (DSR) methodology to develop a functional prototype integrating Ethereum smart contracts for access control with IPFS for decentralized storage, implementing role-based access control (RBAC) mechanisms that empower patients to dynamically manage permissions for healthcare providers to access their medical records. Performance evaluation demonstrated successful IPFS operations with upload and download success rates exceeding 99% across various file sizes, while security assessments revealed no critical vulnerabilities.

Keywords: Electronic Health Records (EHR), Blockchain Technology, Ethereum, Smart Contracts, Patient-Centric Healthcare

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Enhancing Health-Care Systems in Ghana Through AI-Powered Remote Patient Health Monitoring Systems: A Systematic Literature Review

Odeneho Baffoe-Kodom Agyemang, Alfred Coleman, Emmanuel Freeman, and Emmanuel Akwah

Abstract
Artificial Intelligence (AI) is being integrated into Remote Patient Monitoring (RPM) systems to improve healthcare accessibility, efficiency, and quality of care. In Ghana, where rural and underserved communities face challenges due to limited infrastructure, inadequate personnel, and high chronic disease burdens, AI-powered monitoring offers a pathway to improved service delivery. This study systematically reviewed the role of AI-powered RPM in enhancing healthcare delivery, following PRISMA 2020 guidelines. A comprehensive search was conducted on PubMed, Springer Nature Link, and Web of Science, covering publications from 2013 to 2025.

Findings show that AI-powered RPM systems can improve early detection of health risks, chronic disease management, and clinician decision-making. However, most studies were limited to small-scale pilots, lacked standardized evaluation metrics, and did not account for infrastructural realities in low-resource settings. In conclusion, AI-powered RPM has strong potential to transform Ghana's healthcare system, but its sustainability will depend on large-scale trials.

Keywords: Artificial Intelligence, Remote Patient Monitoring, Healthcare, IoT, Telemedicine, Ghana

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Utilization Of Medical Images for Enhanced Breast Cancer Detection: A Comparative Study Of Machine and Deep Learning-Based Approach

Wellington Amponsah, Freeman Emmanuel, Martin Mabeifam Ujakpa, Daniel Gyasi-Nyarko, Justice Williams Asare, Philomena Annanse and Gabriel Fredrick Anyane-Lah Amponsah

Abstract

Globally, breast cancer continues to be one of the leading causes of death for women. Reducing treatment costs, increasing treatment results, and increasing survival rates all depend on early detection. This study proposes a deep learning-based method of detecting breast cancer by utilizing medical images by comparing it performance to machine learning concepts. This study investigated the comparative performance of the customed Convolutional Neural Network (CNN), K-Nearest Neighbors (KNN), Support Vector Machine (SVM), Gradient Boosting, and eXtreme Gradient Boosting (XGBoost) algorithms for breast cancer image classification. The models were trained over 200 epochs using 8923 dataset that was divided into 70% training, 15% validation, and 15% testing. Key performance parameters including accuracy, precision, recall, F1-score, AUC, and training and prediction times were used to evaluate the performance of the models. The developed CNN model has a high degree of accuracy, precision, and recall, which indicates its potential as a tool and proving its effectiveness in early diagnosis. The achievement of a 0.9963% accuracy and an Area Under the Curve (AUC) score of approximately of 1.0 is important discoveries. The development process, performance indicators and useful implications for diagnosing breast cancer are all presented in this paper. The CNN demonstrated its strong suitability for crucial applications such as automated, extremely accurate breast cancer diagnosis from medical images, showing good accuracy and speed of inference despite a longer training time

Keywords: Breast cancer, Diagnosis, Treatment, Image Classification, Epochs

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Exploring The Perception of Future Hospitality Professionals Towards Human-Robot Interaction in Hotel Environments

Joseph Kojo Asampanbilla, Anthony Vincent Arkhurst, Prince Kelvin Owusu, Dzordzoe Woerlorm Koffie-Ocloo and Isaac Ametemeh

Abstract

The hospitality industry is evolving rapidly, with service delivery increasingly influenced by technological innovation. Among these advancements, human-robot interaction (HRI) is becoming a key area of interest. This study explores the perceptions of future hospitality professionals toward the use of robots in hotel environments, focusing on their attitudes, expectations, and concerns. By examining these perspectives, the research aims to inform the design and integration of robotic technologies in a way that supports both workforce readiness and guest satisfaction. A qualitative approach was adopted, combining surveys with focus group discussions involving hospitality students from multiple universities. The survey measured attitudes toward robot functions, trust in robotic systems, and perceived threats to job security, while focus groups provided deeper insight into participants' emotional responses and underlying beliefs. Data was analyzed using descriptive statistics and thematic content analysis. Findings reveal a generally positive outlook toward HRI, with participants highlighting benefits such as improved efficiency and enhanced guest experiences. Nonetheless, concerns around job displacement and the need for adequate training were notable. Differences in perception were influenced by participants' familiarity with technology and prior exposure to service robots, underscoring the role of education in shaping acceptance. In conclusion, future hospitality professionals appear cautiously optimistic about HRI. The study emphasizes the need for balanced implementation, one that leverages technological advancements while supporting workforce development. These insights are valuable for strategic planning in the digital transformation of the hospitality industry, highlighting the critical role of education in preparing students for an evolving service landscape.

Keywords: Human-Robot Interaction, Hospitality Technology, Service Robots, Future Hospitality Professionals

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Routing Protocol Design and Architecture for WSNs and MANETs: A Methodological Perspective

Christian Wogbe Biekro, Michael Asante, James Ben Hayfron-Acquah, Frimpong Twum and Bright Selorm Anibrika

Abstract

Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks (WSNs) are products of wireless communication technology. Because MANETs offered scalability, mobility, and self-organization, they could be used in scenarios where traditional wired infrastructure was either unavailable or impractical. WSNs were made up of stationary or mobile sensor nodes that tracked physical or environmental variables and transmitted the information they gathered to a central location. Nonetheless, there were still unanswered questions and research gaps in areas including network administration, routing efficiency, energy optimization, security, and privacy. The purpose of this paper is to investigate novel approaches to combining MANETs and WSNs for efficient data transfer in applications involving hybrid networks. The study used NS-3, OPNET, and OMNeT++ simulation tools to evaluate routing protocols under different conditions. Adaptive routing algorithm for hybrid MANETs and WSNs integrated architecture incorporated traditional DSDV with adaptive behaviour performed better. It avoided routing loops by using proactive updates to maintain the routing table current.

Keywords: MANET, WSN, Routing Protocol Design, Adaptive Routing Algorithm

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Enhancing Campus Network Security and Robustness: A Case Study of Pentecost University

Moses Aggor, Seth Okyere-Dankwa, Rebecca Adwoa Amponsah, Kelvin Prince Owusu, and Patrick Acheampong

Abstract

This paper investigates the impact of global computer and network security incidents such as Denial-of-Service (DoS) attacks, ARP poisoning, and DNS spoofing on campus IT infrastructure, with a focus on Pentecost University (PU) in Ghana. As the university integrates digital technologies into its educational mission, the complexity of its network has increased due to the growing number of users, endpoints, and applications. The study aims to enhance the security and resilience of PU's Campus Area Network (CAN) by implementing preventive strategies and modern network design principles. main objectives include optimizing IT security, improving network segmentation, and ensuring seamless wireless connectivity. The scope covers router and firewall configurations, intrusion detection systems, server hardening, antivirus

deployment, risk assessments, and user education. A structured methodology was employed, involving analysis of the existing network, design and implementation of a new CAN architecture, and performance evaluation. The research highlights the effectiveness of VLAN segmentation, hierarchical network design, and cloud-integrated storage solutions in mitigating security threats. It concludes with strategic recommendations for data protection, disaster recovery, and business continuity planning, emphasizing the need for adaptive security frameworks in academic environments.

Keywords: Network Security, Campus Area Network, VLAN Segmentation, Intrusion Detection Systems, Cloud Storage, Business Continuity, ARP Poisoning, DNS Spoofing, Wireless Connectivity

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Awareness and Perception of Librarians towards Technological innovations for Inclusive Service Delivery in Academic Libraries in Nigeria: Literature Review

Olubukola Ajiboye and Jibril Bello

Abstract

The study examined Awareness and Perception of Librarians towards Technological innovations for Service Delivery in Academic Libraries in Nigeria which was guided by three research objectives: the awareness and perception of librarians towards technological innovations, benefits and barriers to inclusive service delivery in academic libraries in Nigeria. Many librarians believe that the development of AI and robotics will put librarians' and other information workers' jobs in jeopardy. While others embrace this transformation toward application of technology by providing maker space competencies. The benefits include taking stressful and complex work that humans may struggle and cannot do, help to timely search for relevant documents, provide solutions to pressing challenges such as shelving of books and other library materials, cataloguing and acquisition of library materials, among others. However, the barriers to inclusive service delivery in academic libraries in Nigeria include erratic electric power supplies, inadequate funding, and inadequate telecommunication infrastructure around campus among others. Recommendations include professional librarians creating high level of awareness technological innovations among themselves for better service delivery and the management of each university to motivate professional librarians for inclusive service delivery which will bring efficiency in library service delivery.

Keywords: Technological Innovations, Inclusive Service Delivery, Perception, Awareness, Academic Librarians

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Building a Secure and Scalable Network for Healthcare Logistics in Ghana: The Case for GRE over IPsec

Charles Baah, Moses Aggor, Samuel Selorm Agbemenya, Johnson Danquah Asiedu and Rebecca Adwoa Amponsah

Abstract
This study explores the implementation of a secure network infrastructure leveraging GRE over IPsec to enhance encrypted, authenticated, and efficient data transmission across health care logistics operations. While GRE offers flexibility in routing and encapsulation, its lack of native encryption is a notable weakness. Conversely, IPsec provides robust security but can be rigid in dynamic routing environments. By combining the strengths of both protocols, the hybrid configuration was evaluated using tools such as Ping, Wireshark, iPerf, and SolarWind. Results demonstrated a 40% reduction in latency and a 50% increase in throughput, significantly improving operational efficiency. Post-deployment vulnerability scans revealed an 80% decrease in critical security issues, affirming the protocol's effectiveness in protecting sensitive healthcare data. Additionally, the infrastructure supported seamless scalability, accommodating increased data loads and endpoints without performance degradation. The findings advocate for broader adoption of hybrid tunneling protocols in similar contexts where balancing performance and security is paramount.

Keywords: Security, encryption, bandwidth utilization, latency, throughput, Generic Routing Encapsulation (GRE), Internet Protocol Security (IPsec)

The Impact of Sustainable Entrepreneurship on Poverty Alleviation in Africa: The Mediating Roles of Financial Inclusion and Social Innovation

Esther Asiedu and Ebenezer Malcalm

Abstract
This study examines the impact of sustainable entrepreneurship on poverty alleviation, focusing on the mediating roles of financial inclusion and social innovation in Ghana's Upper East and Upper West Regions. Using a survey-based quantitative approach with 765 respondents, the findings confirm that sustainable entrepreneurship reduces poverty by creating jobs and economic opportunities while improving access to financial services. However, financial illiteracy and barriers to resource utilization may hinder the effectiveness of financial inclusion in poverty reduction. The study also highlights the role of social innovation in addressing poverty, emphasizing the need for ethical business models. Furthermore, the indirect effects reveal complex relationships among sustainable entrepreneurship, financial inclusion, and social innovation, with financial inclusion alone proving insufficient for poverty reduction. The findings suggest

that integrating financial services with socially innovative solutions can enhance the impact of sustainable entrepreneurship in alleviating poverty.

Keywords: Sustainable entrepreneurship, poverty alleviation, financial inclusion, social, innovation

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