



THE 9TH NATIONAL CONFERENCE ON COMMUNICATIONS



02ND-03RD
OCT 2025



Theme:

**Harnessing Digital Innovation to Power Sustainable
Local Solutions for Uganda's Development Goals**



ISBAT UNIVERSITY

A CHARTERED UNIVERSITY



RANKED AMONG **TOP #10**
AFRICAN UNIVERSITIES WITH
THE BEST TEACHING SKILLS 2024
(TIMES HIGHER EDUCATION)



Admissions Open

APPLY NOW

* February/March (Spring) | August/September (Fall) Intake

* Subject to Availability of Seats, the Seats are Limited

**STUDY
ON CAMPUS
OR ONLINE**



ALL OUR
PROGRAMMES
ARE ACCREDITED
AND APPROVED
BY THE UNCHE

PROGRAMMES OFFERED AT MAIN CAMPUS

► FACULTY OF GRADUATE STUDIES AND RESEARCH

Doctor of Philosophy (PhD) By Research in Information & Communication Technology
Doctor of Philosophy (PhD) By Research in Business & Management Studies

► FACULTY OF BUSINESS & COMMERCE

MBA - Master of Business Administration
MSc.DFT- Master of Science in Digital Finance and Technology
PGDBA - Post Graduate Diploma in Business Administration
BBA - IM - Bachelor of Business Administration (International Marketing)
BBA - IB - Bachelor of Business Administration (International Business)
BHM - Bachelor of Hotel Management
BSc.AE - Bachelor of Science in Applied Economics
BSc.AF - Bachelor of Science in Accounting & Finance

*(Credit Exemption available for CPA / ACCA qualified or pursuing students)

HEC - Higher Education Certificate in Business

► FACULTY OF ENGINEERING

BE. RAI - Bachelor Of Engineering in Robotics and Artificial Intelligence
BE-EC - Bachelor of Engineering in Electronics & Communication
BS-CE - Bachelor of Science in Computer Engineering
HEC - Higher Education Certificate in Physical Science

► FACULTY OF INFORMATION & COMMUNICATION TECHNOLOGY

MSc.IT - Master of Science in Information Technology
MSc.CSF- Master of Science in Cyber Security & Forensics
PGDIT - Post Graduate Diploma in Information Technology
BSc.AIT - Bachelor of Science in Applied Information Technology
BSc.VFX - Bachelor of Science in Animation & Visual Effects
BSc.NCS - Bachelor of Science in Networking and Cyber Security
BSc.AI & ML - Bachelor of Science In Artificial Intelligence And Machine Learning
BSc.CS - Bachelor of Science in Computer Science
DIT - Diploma in Information Technology
DSE - Diploma in Software Engineering
DMA - Diploma in Multimedia and Animation
DHN - Diploma in Hardware and Networking
DNCS - Diploma in Networking and Cyber Security
HEC - Higher Education Certificate in Information Technology

► FACULTY OF HEALTH SCIENCE

MPH - Master of Science in Public Health
MPH-HI - Master of Science in Public Health - Health Informatics
MPH-EB - Master of Science in Public Health - Epidemiology & Biostatistics
BMLT - Bachelor of Medical Laboratory Technology
BMIT - Bachelor of Medical Imaging Technology
HEC - Higher Education Certificate in Health Science

* **SCHOLARSHIPS AND BURSARIES AVAILABLE**

* Terms and Conditions Apply

APPLY NOW

Visit Our
Website



www.isbatuniversity.ac.ug

MAIN CAMPUS

Plot 11A, Rotary Avenue, Lugogo Bypass, Kololo,
P. O. Box 8383, Kampala - Uganda

CONTACT US ON

Mobile: +256 776 373 548
Landline: +256 414 237 524/5/6
Email: info@isbatuniversity.com

CITY CAMPUS

First Floor, Conrad Plaza Plot 22 Entebbe Road
P.O Box 8383, Kampala - Uganda

CONTACT US ON

Mobile: +256 709646549
Landline: +256 414 234028/9, +256 414 233429
Email: info.cc@isbatuniversity.com

ABOUT NCC 2025

The National Communication Conference (NCC) 2025, scheduled to take place on October 02 – 03, 2025 in Kampala under the theme “Harnessing Digital Innovation to Power Sustainable Local Solutions for Uganda’s Development Goals.”

Following are the thematic areas of this conference:

- Digital Innovation for Social Impact
- Tech for Sustainable Livelihoods
- Environmental Sustainability through Technology
- Future Skills and Digital Literacy for the SDGs
- Civic Tech and Digital Governance

This flagship event will convene leading scholars, practitioners, students, Industry/corporate professionals, and policymakers to discuss pressing communication issues, showcase research outcomes, and explore the transformative role of communication in national development.

The NCC 2025 is of immense significance to Uganda as it aims to:

- Serve as a national platform for showcasing peer reviewed research addressing Uganda’s ICT challenges and highlighting potential solutions.
- Create an environment that foster constructive discourse among diverse stakeholders, including industry experts, policymakers, and academics
- Offer networking opportunity that connect emerging professions with seasoned industry practitioners and esteemed training institutions.
- Support the development of national ICT strategies aligned with Uganda’s Vision 2040 and NDP-IV.
- We believe that this event will provide a unique opportunity to engage students, researchers and industries to work together with key developments in the nation building.



Theme:

Harnessing Digital Innovation to Power Sustainable Local Solutions for Uganda’s Development Goals

CONFERENCE PROGRAMME

DAY 1: THURSDAY, 2ND OCTOBER, 2025

8:00 – 9:00 am	Arrival and Registration of Participants	
9:00-10:00 am	Inaugural Session	1. Uganda National Anthem, East Africa Anthem 2. Prayer 3. Welcome Remarks by Professor K M Mathew, Vice Chancellor, ISBAT University 4. Remarks by Eng. Christine Mugimba, Director ICT and Recerch, UCC 5. Remaks by Hon'ble Fred Omach Mandir, Chancellor,ISBAT University 6. Opening Remarks by the Hon. Nyombi Thembo,Executive Director, UCC 7. Inaugural Address by the Hon'ble Minister of ICT and NG, Govt. of Uganda 8. Vote of Thanks by Professor. Openjuru L.George, Vice Chancellor, Gulu University
10:30 – 10:45 am	Group Photo	
10:45 - 11:15 am	Tea Break	Press briefing to Media Hon.Minister of ICT, ED UCC, Chancellor, CED, VC – ISBAT University and VC, Gulu University
11:15 – 11:40 am	Keynote Speech	Ms. Sylvia Wairimu Mulinge, CEO, MTN Uganda MTN Uganda
11:40 – 12:00 pm	Innovation Demos	Short Profile Videos – Promoting Local Solutions
PANEL SESSION		
12:00 – 1:00 pm	Panel Discussion 1	Unlocking Social impact Through Digital innovation: From Pilots to Scalable Solutions in Health, Education and Social Services
	Session Moderator :	Speakers:
	Professor Pius Coxwell Achanga, VC, Mountains of the Moon University	1. Dr. Rose Nakasi, Principal Investigator, Health Lab in Makerere University 2. Mr. Winston David Agaba, Managing Director, UBC 3. Dr. Arthur Mugweri, Commissioner MIS,minister of Finance
1:00 – 2:00 pm	Lunch Break and Networking	
2:00 – 2:30 pm	Invited Talk	Mr. Arvind Kakkar CEO Lyca Mobile Uganda

PARALLEL TECHNICAL SESSIONS FOR PAPER PRESENTATION

2:30 – 4:00 pm	In Main Hall Technical Session 1 Technical Talk 1: Digital Innovation for Social Impact Professor Jude T. Lubega, Vice-Chancellor , Nkumba University Presenters: 1. Rodgers Mutegeki 2. Shongo Aaron On'osala 3. Twesigye Keith 4. Krishi Tejas Patel 5. Nakisisa George	In Boardroom 1 Technical Session 2 Technical Talk 2 Technology for Sustainable Livelihoods Professor Olive Sabiiti, Vice-Chancellor Cavendish University Uganda Presenters: 1. Kayima Brian 2. Katende Chris 3. Tumwesigye Arthur 4. Mpagi Yunusu 5. Putshu Lunghe Samuel 6. Mark Mukwaya	In Boardroom 2 Technical Session 3 Technical Talk 3: Environmental Sustainability Through Technology Dr. Abel Kamgara, Head of Department Electrical & Electronics Engineering, Kyambogo University Presenters: 1. Matovu William 2. Mugenyi Charles 3. Aber Kevin 4. Kwagala Moris Owen 5. Stanley Mugisha
Technical Session Chair:	Technical Session Evaluation Team: 1. Dr. Mayur Kumar Chhipa, Head-ODEL and Engineering Dept. ISBAT University 2. Dr. Fred Mukasa, Kampala University 3. Dr. Denise Birabwa, Kyambogo University	Technical Session Evaluation Team: 1. Dr. Godfrey Kibalya, Busitema University 2. Assoc. Professor Oyo Benedict, Gulu University 3. Dr. Peter Mbabazi, ISBAT Univesity	Technical Session Evaluation Team: 1. Dr. Giju Paul, AR, ISBAT University 2. Dr. Edwin Mugume, Makerere University 3. Dr. Tabo Olok Geoffrey, Gulu University
4:00 – 4:30 pm	Innovation Exhibition		
4:30 – 5:00 pm	Tea Break and Dispersal		
6:30 – 9:00 pm	Cocktail Reception (Invited Guest)		

CONFERENCE PROGRAMME

DAY 2: FRIDAY, 3RD OCTOBER , 2025

08:00 – 09:00 am	Arrival and Registration of Participants	
09:00 – 09:30 am	Welcoming and Recap of Day-1	Dr. Mayur Kumar Chhipa, Co-Chair, Technical Program Committee, ISBAT University
09:30 – 10:30 am	Parallel Technical Sessions for Paper Presentation	
	In Main Hall	In Boardroom 1
TECHNICAL SESSION		
Technical Session Chair:	Technical Session 4 Technical Talk 4: Future Skills and Digital Literacy for the SDGS Mr. Ronald Bakakimpa, Head of Cyber Security, Uganda Communication Commission Presenters: - Godfrey Drani - Mujuni Urbans - Tekirya Brighton - Zacharie Masimango - Mwakambaya - Collin Agaba	Technical Session 5 Technical Talk 5: Civic Technology and Digital Governance Eng. Vincent Olema Post Chair IEEE Uganda Sector Presenters: - Flavia Kyeyago Ouma - Magere David - Okello Andrew Peters - Jonathan Cula - Namurinda Alex - Hareesh Kumar
	Technical Session Evaluation Team:	Technical Session Evaluation Team:
	- Dr. Tabo Olok Geoffrey, Gulu University - Dr. Tonny Ssettumba, Makerere University - Dr. Vai Bahau Tyagi Dean Faculty of ICT ISBAT University	- Dr. Ronald Niwareeba, Kyambogo University - Dr. Jonathan Serugunda, Makerere University - Mrs. Florence H. Kiingi, Nkumba University
10:30 – 11:00 am	Tea Break	
11:00 – 11:30 am	Opening Remarks	Dr. Aminah Zawedde, Permanent Secretary to the ICT Ministry
11:30 – 11:45 am	Keynote Speech	Mr. Soumendra Sahu, Managing Director, Airtel Uganda
11:45 – 1:00 pm	School ICT Clubs Innovation Presesntation	Finalists from the Secondary School Regional ICT Club Competitions
1:00 – 2:00 pm	Lunch Break and Networking	

PANEL SESSION

2:00 – 3:00 pm	Panel Discussion 1	Environmental Sustainability through Technology: Harnessing Digital Innovation for Climate Resilience and Natural Resource Management
	Session Moderator :	Speakers:
	Mr. Nicholas Mbonimpa CEO RENU	1. Dr. Abubaker Matovu Waswa, Head of the Department of Electrical and Computer Engineering, Makerere University 2. Ms. Rebecca Mukite, Head Communication and Infrastructure Services, UCC 3. Dr. Julianne Susanne Sansa, Senior Lecturer, Makerere University
3:00 – 4:00 pm	Panel Discussion 2	Building Uganda's Future Workforce: Advancing Digital Literacy, Future Skills, and Innovation for the UDGs
	Session Moderator :	Speakers:
	Professor John Mugisha Vice Chancellor Bishop Stuart University Mbarara	1. Dr. Dominic Lali, Deputy Secretary General, UNATCOM 2. Dr. Hatwib Mugasa, Executive Director, NITA Uganda 3. Dr. Dorothy Okello, Dean, School of Engineering, Makerere University

VALEDICTORY SESSION

4:00 – 5:30 pm	Valedictory Session	1. Conference Summing Up by Dr. Pradeep Kumar, Chair, TPC 2. Award Ceremony • Best Papers • Best Posters • Winners, School ICT Club Competition • Winners, Innovation Demos 3. Remarks by Eng. Christine Mugimba, Director ICT and Research, UCC 4. Closing Remarks by the Hon. Nyombi Thembo, Executive Director, UCC 5. Validatory Address by Dr. Charity Basaza Mulenga, Chairperson UCC Board 6. Vote of Thanks by Prof. David Okello Owiny, DVC, Gulu University
5:30 – 5:45 pm	Photo session of Winners with dignitaries	
5:45 – 6:00 pm	Tea and Departure at Leisure	



Hon Dr. Chris Baryomunsi

Minister for ICT and National Guidance

It gives me great pleasure to welcome you to the 9th National Conference on Communications (NCC), a platform that continues to inspire dialogue, collaboration, and innovation in Uganda's ICT sector.

The theme of this year's conference, "Harnessing Digital Innovation to Power Sustainable Local Solutions for Uganda's Development Goals", resonates deeply with our national aspirations as outlined in Vision 2040, the Digital Uganda Vision, and the National Development Plan (NDP IV).

As a country, Uganda recognizes the transformative role of digital technologies in accelerating socio-economic development. By leveraging innovation, we can enhance service delivery, create employment, and empower communities with practical and scalable solutions tailored to local needs. Importantly, digital innovation provides us with the means to address challenges in agriculture, health, education, governance, and financial inclusion while ensuring no one is left behind.

I commend the Uganda Communications Commission (UCC), academia, industry, and development partners for creating this knowledge-sharing platform. Let this conference be a catalyst for actionable outcomes that strengthen our innovation ecosystem and position Uganda as a leader in digital transformation within the region. Together, let us continue to innovate for sustainability, resilience, and inclusive growth.

With sincere regards,
Hon Dr. Chris Baryomunsi
Minister for ICT and National Guidance



**George William
Nyombi Thembo**
Executive Director Of UCC

On behalf of the Uganda Communications Commission, I warmly welcome you to the 9th National Conference on Communications (NCC). This conference has become a flagship platform for advancing research, knowledge exchange, and collaboration between government, academia, and industry stakeholders.

The theme, “Harnessing Digital Innovation to Power Sustainable Local Solutions for Uganda’s Development Goals”, reflects UCC’s commitment to fostering an enabling environment for research, innovation, and investment in the ICT sector. Digital innovation is not just about new technologies; it is about developing inclusive and sustainable solutions that improve livelihoods, strengthen service delivery, and drive Uganda’s competitiveness in the global digital economy.

Through initiatives such as the National Communications Testbed, regulatory sandboxes, and our research and innovation frameworks, UCC continues to champion experimentation and practical application of emerging technologies. These efforts are designed to empower innovators, bridge gaps between industry and academia, and create tangible solutions that align with our development goals.

As we convene at this year’s conference, I encourage all participants to engage actively, share insights, and forge partnerships that will advance Uganda’s digital transformation agenda. Together, we can ensure that innovation becomes a driver of sustainable development and a pillar of Uganda’s future.

With sincere regards,
George William Nyombi Thembo
Executive Director Of UCC



**Varghese
Mundamattam**
*Chairman Board of
Directors ISBAT University*

It is both a privilege and a pleasure to extend my warm greetings to all distinguished guests, researchers, academicians, industry leaders, and participants gathered for the 9th National Conference on Communications (NCC-2025), being held from 2nd to 3rd October 2025.

The focus of this year's conference theme: "Harnessing Digital Innovation to Power Sustainable Local Solutions for Uganda's Development Goals" emphasizes our joint objective in using technology as a driver for solving some of the most pressing social, economic problems facing Uganda.

At ISBAT University, we firmly believe that communication technologies form the backbone of our interconnected world. They are reshaping how societies engage, how industries innovate, and how nations progress toward sustainable development. In this context, NCC-2025 provides a vital platform to deliberate on emerging trends, share groundbreaking research, and foster collaboration between academia and industry.

It will surely boost-up the efforts of Vision Uganda 2040 and supports the NDP-IV. We also take this opportunity to thank the Executive Director and staff of Uganda Communications Commission (UCC) for having entrusted ISBAT University in partnership with Gulu University to host such a significant conference.

I am delighted to note that this conference has attracted a vibrant community of thought leaders and practitioners committed to advancing the frontiers of communication. The exchange of ideas and perspectives here will not only enrich academic discourse but also inspire innovative solutions with far-reaching impact.

On behalf of the Board of Directors, ISBAT University, I extend my best wishes to all participants for fruitful deliberations, meaningful collaborations, and a truly memorable conference experience.

With sincere regards,
Varghese Mundamattam,
Chairman Board of Directors ISBAT University



**Hon.
Fred Jachan Omach
Mandir**
The chancellor ISBAT University

It is with immense pride and great pleasure that I welcome you all to the 9th National Conference on Communications (NCC-2025), being held from 2nd to 3rd October 2025. This distinguished gathering of scholars, researchers, industry experts, and students reflects the spirit of collaboration and innovation that drives progress in the ever-evolving field of communications.

In today's world, technologies play significant role to bridge communities, foster inclusivity, and empower nations to thrive in the digital era. A conference of this stature provides a vital platform for the exchange of pioneering ideas, the presentation of impactful research, and the building of networks that will inspire transformative solutions for the future.

At ISBAT University, we are deeply committed to advancing knowledge, nurturing innovation, and empowering the next generation of leaders. Hosting NCC-2025 is a reaffirmation of this commitment, and I commend the organizers, partners, and participants for their dedication to advancing both academic excellence and practical relevance in the communications domain.

I am confident that the deliberations of this conference will open new pathways of thought, foster meaningful collaborations, and contribute significantly to the advancement of communication technologies for the greater good of society.
I extend my best wishes for a highly successful and memorable NCC-2025.

With warm regards,

Hon.Fred Jachan Omach Mandir
The chancellor ISBAT University



PROF. OPENJURU L. GEORGE

*Vice Chancellor
Gulu University*

Gulu university is pleased to collaborate with ISBAT University to organise NCC 2025. We are grateful to UCC for entrusting this responsibility to ISBAT and Gulu University.

The theme: Harnessing Digital Innovation to Power Sustainable Local Solutions for Uganda's Development Goals, is very important at the present context of Uganda. Uganda is developing day by day in the technological field specially in the communication sector.

I am sure, the conference and interaction will emerge into specific points for advancement in the communication sector.

I wish you all the best wishes and fruitful deliberation.
May God bless you all

PROF. OPENJURU L. GEORGE
Vice Chancellor
Gulu University



Professor K. M. Mathew

*The Vice Chancellor
ISBAT University
Chairperson, Organising
Committee, NCC-2025*

I have great pleasure to welcome you all for the 9th National Conference on Communications (NCC-2025) being held from 02nd to 03rd October 2025, at ICT Hub Nakawa. On behalf of the Organising Committee, We extend our warmest greetings to all the distinguished Guest, Delegates, Researchers, and Experts from Academia, Industry Leaders, policy makers, Scholars and students joining us for this significant event.

We also take this opportunity to thank the ED and Officials of Uganda Communications Commission (UCC) for entrusting this responsibility to ISBAT University in Collaboration with GULU University for Organising this Conference. It would not have been possible to conduct this event without the invaluable support and guidance from the UCC Officials.

This year's conference theme — “Harnessing Digital Innovation to Power Sustainable Local Solutions for Uganda's Development Goals” — reflects our shared commitment to leveraging technology to address the pressing socio-economic challenges facing Uganda today. NCC-2025 provides a unique platform for Industry leaders and Expert from Academia, innovators, and practitioners to exchange knowledge, share experiences, and co-create ideas that align with the national development agenda and the Sustainable Development Goals (SDGs).

The conference will feature insightful discussions and presentations across the following thematic areas:

- Digital Innovation for Social Impact
- Tech for Sustainable Livelihoods
- Environmental Sustainability through Technology
- Future Skills and Digital Literacy for the SDGs
- Civic Tech and Digital Governance

By exploring these key themes, NCC-2025 aims to foster multi-stakeholder collaboration and inspire actionable solutions that are contextually relevant to Uganda's development priorities. Participants will have the opportunity to engage with leading experts, present their research, network with peers, and learn about emerging trends that are shaping the future of communications and digital transformation in Uganda and beyond.

I thank founding Chairman ISBAT University, The Patron and Members of the Organising Committee for the guidance and support to plan and executive this Conference in an exemplary way. With Sincere Thanks, It is worth mentioning the voluminous effort of Chairperson and the members of the TPC Committee, Sponsorship committee Publicity committee and ICT School competition committee.

It is for the First time that in the Last Nine years, we have received around 100 technical Papers for the conference. I thank all the Presenter and Evaluation team for their laborious task to Review, edit and select the papers. All the approved papers will be published in the IJBST Journals of the ISBAT University shortly.

On behalf of the Organising Committee, UCC, ISBAT and GULU University, I extend my Heartfelt welcome to all Dignitaries, Invited Guest, participants, Sponsors, and Paper Presenters. The event is also Live Telecasted for the benefit of Scholars you are not able physically present here, I am Sure that you all will benefit greatly from those deliberations and Interactions. We are confident that your contributions will enrich the discussions and outcomes of the conference, and that together, we will chart a path toward a digitally empowered and sustainable Uganda.

We wish you a productive and rewarding experience at NCC-2025. May God Bless you All,

Prof. K.M. Mathew, PhD.
Vice Chancellor, ISBAT University
Chairperson, Organising Committee
9th National Conference on Communications (NCC-2025)

“Vision Is the Art of Seeing What Is Invisible To Others”

ADVISORY BOARD MEMBERS NCC-2025

NAME	ROLE	ENTITY	SECTOR
1. Dr. Edwin Mugume	Lecturer	Makerere University	Academia
2. Dr. Rosaline Nyongarwizi Akol	Lecturer	Makerere University	Academia
3. Dr. Godfrey Kibalya Mirondo	Lecturer	Busitema University	Academia
4. James Beronda	Director UCUSAF	UCC	UCC
5. Denis Kahindi	Director Home Broadband	Airtel Uganda	Industry
6. Barbarb Birungi	Director	Hive Colab	Industry

ORGANIZING COMMITTEE - NCC 2025

MEMBER	INSTITUTION	POSITION
1. Hon. Fred Jachan Omach Mandir	ISBAT University	Patron
2. Prof. KM Mathew	ISBAT University	Chair
3. Prof. Openjuru L. George	ISBAT University	Co- Chair
4. Dr. Pradeep Kumar	ISBAT University	TPC - Chair
5. Dr. Mayur Kumar Chhipa	ISBAT University	Secretary
6. Mrs. Deepa Tojan	ISBAT University	Member
7. Mr. Harreesh Kumar	ISBAT University	Member
8. Dr. Giju Paul	ISBAT University	Member
9. Dr. Peter Mbabazit	ISBAT University	Member
10. Dr. Robert Mindila	ISBAT University	Member
11. Ms. Jane Achanga	ISBAT University	Member
12. Dr. Tyagi V.B	ISBAT University	Member
13. Mrs. Juliet Nabbale	ISBAT University	Member
14. Dr Oyo Benedict	GULU University	Member
15. Perez Matsiko	GULU University	Member
16. Dr. Abubaker M. Waswa	CEDAT Makerere	Member
17. Dr. Tonny Ssettumba	CEDAT Makerere	Member
18. Mr. Frank Ssemakula	CEDAT Makerere	Member
19. Mr. Paul Ssejjuko	CEDAT Makerere	Member
20. Dr. Jonathan Serugunda	CEDAT Makerere	Member
21. Eng. Rebecca Mayanja	UCC	Member
22. Winnie Mukholi	UCC	Member
23. Robert Mbassa	UCC	Member

SUB-COMMITTEE OF THE ORGANIZATION COMMITTEE

a) Technical Program Committee

NAME	AFFILIATION
1. Dr. Pradeep Kumar	TPC - Chair
2. Dr. Mayur Kumar Chhipa	TPC – Co Chair
3. Dr. Robert Mindila	Member
4. Dr. Kamami Wanjiru	Member
5. Dr Oyo Benedict	Member
6. Winnie Mukholi	Member
7. Susan Nakanwangi	Member
8. Dr. Peter Mbabazi	Member
9. Dr. Tyagi V.B	Member

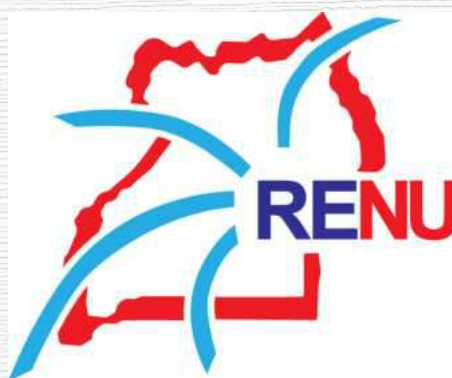
b) Editorial Committee

NAME	AFFILIATION
1. Dr. Pradeep Kumar	Chief Editor
2. Dr. Robert Mindila	Co - Editor
3. Dr. Mayur Kumar Chhipa	Member
4. Dr. Kamami Wanjiru	Member
5. Dr. Peter Mbabazi	Member
6. Dr. Tom Nsubuga	Member
7. Mr. Umesh Kumar	Member

c) Sponsorship Committee

NAME	AFFILIATION
1. Dr. Tom Eve	Chief Coordinator
2. Dr. Kamani Wanjiru	Member
3. Mr. Okello Gilbert	Member
4. Mr. Hareesh Kumar	Member
5. Mr. Fahad Musa	Member
6. Ssemanda Ronald	Member

SPONSORS FOR THE NCC-2025





GULU UNIVERSITY

For Community Transformation

Gulu University is one of the ten Public Universities in Uganda established by Statutory Instrument Number 31 of 2003. The University is situated In Laroo Division, Gulu City.

Currently, the University has six Faculties and two Institutes: Faculty of Medicine, Faculty of Science, Faculty of Agriculture and Environment, Faculty of Education and Humanities, Faculty of Business and Development Studies, Faculty of Law, Institute of Peace and Strategic Studies, and Institute of Research and Graduate Studies. Satellite campuses are located in Kotido District, Hoima City, Kitgum Municipality, and Moroto District.

The University offers six PhD, 27 masters, nine postgraduate, 33 undergraduate, and five certificate programmes, in a range of specializations, and has a student population of about 4,500. It also boasts an Alumni population of 19,529.

Vision

To be the leading Academic Institution for the Promotion of Community Transformation and Industrialization for Sustainable Development.

Mission

To provide access to Quality Higher Education, Training, Research, and Innovations for the Delivery of Appropriate Services towards Community Transformation and Sustainable Development.

Core Values

Professionalism | Integrity | Effectiveness and Efficiency | Accountability and Transparency | Teamwork | Gender Responsiveness | Inclusiveness

CURVATURE-AWARE UAV PATH OPTIMISATION

1. Mugenyi Charles

Department of Electrical

2. Arnold Asimwe

Electronics Engineering

Kyambogo

ABSTRACT

Unmanned Aerial Vehicles (UAVs) are vital in applications like surveillance, logistics, and disaster response, where safe and efficient navigation is crucial. Traditional path planning methods often overlook curvature constraints, leading to inefficient or unrealistic routes.

This research introduces a path optimization model using Convolutional Neural Networks (CNNs) and the Adam optimizer to generate smooth UAV trajectories. The CNN processes aerial imagery to identify safe zones, enabling curvature-aware path generation.

Compared to traditional optimizers like SGD and RMSProp, the combination of the Adam optimizer and a machine learning based model achieves smoother, more efficient paths with faster convergence. The approach demonstrates strong potential for real-world UAV navigation in changing environments.

KEYWORDS:

Central Bank Digital Currencies (CBDCs), Social adaptation, financial education

WHO GETS TO PARTICIPATE IN AFRICA'S AI FUTURE? GENDER, EDUCATION, AND POLICY READINESS IN THE GLOBAL SOUTH

Okello Andrew Peters
Makerere University

ABSTRACT

The Global South, particularly sub-Saharan Africa, faces a delicate role of preparing human capital for work, learning, and public service through the development of Artificial Intelligence (AI) talent. AI has the potential to drive development within the region, but key questions remain: Is the region prepared? Does it have the innovative human talent required to drive the change, and are the appropriate policy frameworks in place?

This paper discusses two interconnected challenges that need to be addressed to develop a well-trained and inclusive AI-ready human capital in low-resource settings: women's underrepresentation in AI-related education and the lack of national AI policies, and where such policies do exist, they often fail to incorporate gender inclusion. This study employed a mixed-methods approach combining micro-level and macro-level analyses.

At the micro level, graduation data from Makerere University (2016–2025) was manually extracted from published graduation booklets to examine gender representation in AI-related education. At the macro level, a desk review was conducted across 49 Sub-Saharan African countries to assess the presence and gender inclusiveness of national AI strategies, drawing from government documents, institutional reports, and publicly available AI policy documents.

The findings of this study point out 2 critical issues. The first one is female underrepresentation at higher levels of learning where AI specialization takes place, which mirrors broader regional patterns, with women making up less than 30% of STEM researchers in sub-Saharan Africa, according to literature. The second finding shows that very few countries in sub-Saharan Africa have published national AI policies, and even fewer directly address gender inclusion.

Based on these findings, the study recommends widening access to postgraduate and specialized AI education for all, including women, gender equality must be mainstreamed into AI policy frameworks, not as an afterthought but as a principle of design structure, and countries that have not yet developed national AI strategies must accelerate these efforts through an inclusive and participatory way.

KEYWORDS:

Artificial Intelligence (AI), Global South, Human Capital, Women, AI talent, Sub-Saharan Africa (SSA).

DEEP LEARNING APPROACH TO DETECTING DERMATOLOGY INFECTIONS

Katende Chris Marvin

[0000-0008-1333-6829]

*College of Computing and Information
Sciences, Makerere University*

Abubakhari Sserwadda

[0000-0001-9150-5298]

*School of Engineering and
Technology, Soroti University*

ABSTRACT

Skin health is often overlooked, particularly in developing nations such as Uganda, where conditions like Athlete's foot, commonly resulting from walking barefoot, are prevalent. If left untreated, these infections can significantly impact an individual's social life and well-being.

In this study, we propose a deep learning-based approach for the classification of various skin infections, including Athlete's foot, nail fungus, shingles, ringworm, cutaneous larva migrans, cellulitis, impetigo, and chickenpox.

Traditionally, dermatological diagnosis relies on methods such as culturing skin samples to detect bacterial, fungal, or viral pathogens, conducting patch tests to assess allergic reactions, and using Wood's lamp (ultraviolet light) examinations to identify pigmentation changes. While effective, these diagnostic techniques are time-consuming and may lack precision.

Recent advancements in computer vision offer promising alternatives to these conventional approaches. In this paper, we leverage deep convolutional neural networks (CNNs) to classify a dataset of images representing the eight aforementioned skin infections. The CNN model achieved an impressive 100% accuracy on the training set, demonstrating its potential for

KEYWORDS:

dermatologists · wood light test · computer Vision· Convolutional neural networks · ultraviolet · black light examination · transfer learning

HOW THE NEW SUCCESSION LAW CAN HELP REDUCE LAND AND PROPERTY WRANGLE IN ACHOLI SUB-REGION

Magere David

*Multimedia Journalist & Media Scholar
New Vision Printing and Publishing Company
Limited(Vision Group) / Makerere University*

ABSTRACT

The Paper examine show understanding the Succession Laws of Uganda can be a key contributing factor in reducing the persistent land and property conflicts among locals (communities) of Acholi Sub-region in northern Uganda.

In the Acholi Sub-region, lack of understandings of the succession laws has fostered conflicts among communities as seen in conflicts over land that results in physical assaults, arrests and possible prosecution in the courts of law, or communal dispute resolutions through mediations by local authorities, primarily clan chiefs.

Other than that, the paper also spells out the need for the community to embrace peaceful resolutions on land conflicts by seeking various laws/acts that talks about land and Property ownership in Uganda.

KEYWORDS:

Succession Laws, Uganda, local authorities, land conflicts, Property ownership

EXPLORING THE POTENTIAL OF CENTRAL BANK DIGITAL CURRENCIES (CBDCs) WITH FOCUS ON SOCIAL ADAPTATION AND FINANCIAL EDUCATION

1. Martin Bakundana

*Lecturer, Department of Accounting & Finance,
School of Business, CoBAMS, Makerere University*

2. Martha Kayegi

*Student, Master of Arts in Financial Services,
Uganda Institute of Banking & Financial Services*

ABSTRACT

This study explores the potential of Central Bank Digital Currency (CBDC) with a specific focus on social adaptation and financial education. Using qualitative data gathered through expert interviews with central bank officials, fintech leaders, digital transformation consultants, legal experts, and blockchain developers, the research captures a wide spectrum of perspectives from the financial ecosystem.

Supplemented by insights from relevant conferences and stakeholder forums, the study investigates both the opportunities and risks associated with CBDC implementation. Key findings highlight the critical role of strategic public education, stakeholder collaboration, and regulatory clarity in fostering trust and acceptance.

Emphasis is placed on the need for inclusive design, privacy safeguards, and a phased rollout strategy informed by real-world market demands. The research concludes that successful CBDC adoption hinges on a balanced approach—integrating technological innovation, legal preparedness, and broad-based financial literacy initiatives.

KEYWORDS:

Central Bank Digital Currencies (CBDCs), Social adaptation, financial education

SIGNIFICANCE OF MACHINE LEARNING ALGORITHMS & MODELS IN DETECTING FRAUD IN FINTECH PLATFORMS IN UGANDA FINTECH INDUSTRY.

Aloke David Druku

Researcher of MScIT Year-2

2.Dr. Pradeep Kumar

*Associate Professor
ISBAT University*

ABSTRACT

This study explores the applicability of machine learning (ML) algorithms in detecting fraud in fintech platforms, focusing on Uganda's mobile money ecosystem.

With financial fraud evolving in complexity, traditional rule-based systems struggle to keep up. The research evaluates supervised, unsupervised, and hybrid ML approaches using publicly available datasets—Credit Card Fraud Detection and PaySim—and Python-based implementations.

The results demonstrate the superior performance of ensemble methods (Random Forests) and deep learning models (Neural Networks) in detecting fraudulent activity, especially when enhanced by techniques such as SMOTE (Synthetic Minority Over-sampling Technique) and AutoEncoders.

The study reveals the need for Uganda's fintech firms to adopt context-sensitive, data-driven fraud detection systems and proposes strategic recommendations for data sharing, regulatory reform, and AI (Artificial Intelligence) adoption.

KEYWORDS:

ML, AI, SMOTE, Neural Networks, Deep learning, Accuracy, Precision, F1-score (Full Meaning & Importance Measure), ROC-AUC (Receiver Operating Characteristic – Area Under the Curve), Ensemble models.

VOICE RECOGNITION APP FOR VISUALLY IMPAIRED USERS

Sophie Nasuna Kitayimbwa
ISBAT University

ABSTRACT

This paper presents the design and development of a voice-activated offline mobile assistant tailored for the visually impaired in Uganda. The goal of the project is to enable essential phone functionalities including making and receiving calls, sending and reading SMS messages through voice commands and shake gestures, all without requiring an internet connection.

This paper introduces the project by outlining the background, problem statement, proposed solution, objectives, scope, and the significance to various stakeholders. It also lists the tools, platforms, and technologies used in building the application.

This paper provides a literature review of related assistive technologies and mobile applications developed to support the visually impaired. It examines existing solutions, identifies their limitations, and justifies the need for the proposed system.

This paper discusses the methodology employed during the project, including requirement gathering techniques such as interviews and observations, system analysis, user interface design, data modeling, and the implementation approach. It also outlines the tools used for development, testing, and validation.

In conclusion, this project contributes to the field of assistive technology by offering a low-cost, offline, and user-friendly solution that enhances digital accessibility and independence for blind and visually impaired individuals.

The development process also provided valuable insights into user-centered design and mobile system integration.

KEYWORDS:

Voice Assistant, Mobile APP, blind and visually impaired, digital accessibility, low-cost technology

AGRIKBOT - AI-POWERED SMART AGRICULTURAL ROVER FOR DISEASE DETECTION, SOIL MONITORING & PRECISION FARMING (INCLUDING DRONE VARIANT FOR AERIAL SCANNING AND EXTENDED MONITORING)

OCHENG Jerom, ATIM Eunice, OKULLO Daniel
Gulu University

ABSTRACT

Agri-KBOT is an autonomous agricultural rover designed to empower Uganda's farmers through precision agriculture and digital innovation. Integrating advanced robotics, Artificial Intelligence (AI), and smart Sensor technologies, Agri-KBOT automates critical on-farm tasks such as crop monitoring, early disease and pest detection and real-time environmental data collection.

By leveraging AI-powered image analysis and IoT-enabled sensors, the rover provides actionable insights that help farmers optimize irrigation, improve soil health, and make data-driven decisions to increase yields and reduce losses.

Agri-KBOT's autonomous navigation system enables it to operate in diverse Ugandan farming environments, promoting accessibility even among smallholder farmers. Its modular and adaptable design supports various crops and farming scales, making it a flexible solution tailored to local needs.

Aligned with Uganda's development goals and the Sustainable Development Goals, Agri-KBOT contributes to food security, economic empowerment, and climate resilience. It reduces manual labor, minimizes the use of chemicals through targeted interventions, and supports sustainable land management practices.

By bridging the gap between traditional farming and advanced digital technologies, Agri-KBOT exemplifies how locally developed innovations can transform agriculture and strengthen rural livelihoods. The project showcases the potential of home-grown solutions to drive Uganda's digital transformation and empower communities through smart, sustainable farming practices.

KEYWORDS:

Agri-KBOT, precision agriculture, digital innovation, integrating advanced robotics, Artificial Intelligence (AI), smart Sensor technologies.

ANALYSIS OF INI IN 5G NR MODULATION SCHEMES USING WINDOWING AND PULSE SHAPING

AGABA COLLIN, Member, IEEE
Uganda Communications Commission

ABSTRACT

Next generation wireless communication systems, such as 5G and future wireless networks, demand very good throughput, bandwidth and latency. Use of waveforms with multiple numerologies can be used to service these requirements. Subcarriers with narrow spacing have wider symbol duration and are suitable for use cases requiring high data rates and bandwidth, such as: eMBB (Enhanced Mobile Broadband): Transfer giga bytes in a second, augmented reality and online video gaming.

On the other hand, subcarriers with wider spacing generally have much shorter symbol durations and consequently, many slots per subframe thus enabling faster work scheduling in the time domain. This translates to low latency making this numerology good for ultra reliable low latency communication (URLLC) such as mission critical applications, sensor networks and real time control. Wider subcarriers also exhibit lower phase noise and better signal to noise ratio.

While use of mixed numerologies may enable realization of desired throughputs, bandwidth and latency, the process comes with an added cost of induced interference known as inter numerology interference (INI) which affects overall system performance.

In this study an in-depth analysis into a 5G pulse shaping windowing technique is taken to address INI in multi numerology transmission with generally less complexity and reduced peak-to-average power ratio (PAPR).

Further analysis is done to evaluate the effects of INI on the four modulation schemes implemented in 5G NR which include QPSK, 16QAM, 64QAM and 256QAM using a fundamental metric known as Error Vector Magnitude (EVM).

It should be noted that if windowed OFDM is properly designed, good INI performance can be achieved while maintaining a relatively low complexity compared to other candidate waveforms like f-OFDM, FBMC, UFMC and GFDM.

KEYWORDS:

Keywords: Next generation, wireless communication systems, 5G, Enhanced Mobile Broadband, OFDM, inter numerology interference, URLLC

DEVELOPMENT AND DEPLOYMENT OF HEALTHFINDER: A WEB-BASED HOSPITAL LOCATING AND APPOINTMENT BOOKING SYSTEM FOR KAMPALA

MUJUNI DEUS

*Bachelor of Science in Computer Engineering
ISBAT University*

ABSTRACT

The growing demand for health services in Kampala has exposed a critical gap in the accessibility and awareness of appropriate healthcare facilities. Many individuals struggle to locate the right health centers, especially during emergencies, often resulting in delayed care or misdiagnosis due to lack of specialized services.

This research project aimed to address this challenge by developing a system named HealthFinder, designed to connect users with nearby health facilities based on their service needs. The system allows health centers to provide real-time information about their location, available services, and capacity, enabling users to make informed decisions and early bookings, particularly when specialist attention is required.

By improving access to relevant health information, HealthFinder seeks to bridge the gap between healthcare providers and the community, ultimately reducing preventable health complications caused by misinformation or delayed access to proper care.

KEYWORDS:

HealthFinder, specialized healthcare, modern Information and Communication Technology, web-based system, HTML, CSS, JavaScript, Python, MySQL, and Google Maps API

SHAPING UGANDA'S E-COMMERCE REVOLUTION: THE VITAL ROLE OF WEB DEVELOPMENT IN BUSINESS GROWTH

1.Andrew Kyeyune (011240109)

*Researcher of Master's Degree in
Information Technology, ISBAT University*

2.Dr. Pradeep Kumar

*Associate Professor
ISBAT University*

ABSTRACT

This study explores the critical role of web development in advancing e-commerce in Uganda, focusing on its influence on business growth and digital transformation. Amid rising internet penetration and smartphone use, web development strategies such as SEARCH ENGINE OPTIMIZATION (SEO), USER EXPERIENCE (UX) design, mobile responsiveness, and payment system integration have become fundamental for Ugandan businesses seeking to establish and grow an online presence.

Analyzing recent trends and web development practices, this study highlights the value of robust digital platforms in enhancing customer engagement, market reach, and sales conversions. Insights from this research will inform strategies to optimize web development for competitive success within Uganda's growing digital economy.

KEYWORDS:

Business Growth, Digital Transformation, E-commerce, Uganda, Web Development.

USING DIGITAL HEALTH TECHNOLOGIES TO STRENGTHEN HEALTHCARE SYSTEMS AT THE LOCAL LEVEL IN UGANDA: A CASE STUDY OF KIRUHURA DISTRICT

1. Katongore Abel

*PhD Scholar, Faculty of Information
Communication Technology (ICT)
ISBAT University, Uganda*

2. Ojiambo Samuel

*Researcher, Faculty of Science and
Technology Victoria University*

ABSTRACT

Digital health technologies have become essential tools for strengthening local healthcare systems in Uganda, particularly in light of ongoing challenges, including a high disease burden and inadequate service delivery. This paper presents the integration of mobile health solutions within Uganda's healthcare framework, highlighting their capacity to improve access to vital health services.

Despite notable progress, obstacles such as weak governance structures, inadequate funding, and low digital literacy persist, hindering the effective implementation of these technologies. The paper assesses digital health policies, highlighting the need for improved infrastructure and enhanced training for healthcare workers to improve digital health literacy.

It also emphasises addressing socio-cultural factors that affect technology adoption. By capitalising on the rapid rise in mobile phone and internet usage, Uganda can utilise mobile health platforms to deliver tailored health information and support, ultimately leading to better health outcomes.

The results suggest that overcoming existing challenges will require coordinated efforts from the government, healthcare providers, and communities to establish a sustainable digital health ecosystem that can adapt to the evolving needs of the population. This paper contributes to understanding how digital health technologies can effectively strengthen local healthcare systems in Uganda, laying the groundwork for future research and policy development in this vital area.

KEYWORDS:

Digital health, mobile health, Healthcare systems, Technology adoption, Policy and infrastructure

ADVERTISING AND YOUTH PURCHASING POWER FOR MODERN TECHNOLOGY GADGETS IN UGANDA

Yusuf Wandera
Doctoral Candidate
ISBAT University

ABSTRACT

This study explores the role of advertising on the purchasing power of youth for modern technology gadgets such as smartphones, tablets, headsets and trendy laptops in Uganda. Focusing on the three urban districts that largely dominate the purchase and use of modern gadgets in the country – Kampala Capital City, Wakiso and Mukono – this study assesses how advertising influences youth's decisions to purchase modern technology gadgets such as smartphones/iphones, laptops, ipads/tablets, earbuds and smart watches.

Through a survey of 435 youth, 30 in-depth interviews and 3 focus group discussions, the study highlights the relationship between advertising and youth purchasing power for modern technology gadgets. With the increasing use and influence of digital media erasing traditional advertisement, the role of advertising in significantly shaping the purchasing decisions of youth when it comes to tech gadgets. This has thus, gained significant attention among technology companies globally and specifically in cities and promising urban centers in Uganda.

A youth is defined as an individual who is between the age of 18 – 35 who constitute a very large and increasing market for modern and trendy technology gadgets in Uganda. However, with the global production, sale and use of modern tech gadgets significantly increasing (Chinnasamy et al., 2022), empirical studies in Uganda examining the impact of advertising on youth purchasing power for modern tech gadgets remains limited.

Therefore, the current paper examines the existing relationship between advertising strategies employed by tech companies and business proprietors dealing in tech products and the purchasing power of youth in Uganda, with a particular focus on factors such as their income, engagement with social media platforms, particular tech brand perception and their digital literacy. The study employed a mixed methods research approach to capture both quantitative and qualitative data across youth as consumers of modern technology gadgets in Uganda.

The analysis and findings of the study highlight that much as advertising absolutely significantly influenced the purchasing powers of youth in Uganda, affordability, peer recommendation and social media influence were also crucial in shaping their purchasing behaviors towards modern technology gadgets. Therefore, to sustain effective modern technology gadget business globally, advertising and marketing agencies have to adopt fast attractive and appealing ads to the youth. This advertising may be in form of print, online and social media.

KEYWORDS:

Advertising, youth, purchasing power, modern technology, gadgets

DEMAND FOR A SECURE UNIFIED DATA MODEL

1. Musana Eddie

*PhD Researcher
Faculty of Engineering and
Technology
Busitema University*

2. Angole Richard

*Senior Lecturer, Department
of Computer Engineering,
Busitema University*

3. Matovu Davis

*Senior Lecturer, Department
of Computer Engineering,
Busitema University*

ABSTRACT

The evolution of Unified Data Models (UDM) has fundamentally transformed the landscape of data management shifting the paradigms of storage, processing and transmission from various sources of data to a Unified Data Model approach. As a result, there is need to address the concerns of data security and privacy safe guards. This current research focuses to ascertain the demand of Unified Data Models (UDM) and addresses the gaps of data security to achieve a secure Unified Data Model for Cyber Physical Systems End-Users with the goal of securing both data at REST and data in transit.

The existing data security framework so far focuses on amalgamated diverse security protocols, access control, data segmentation and real time surveillance that effectively mitigates latent security threats. However, this research considers the need to achieve data security for Unified Data both when data is at a state of REST and in data TRANSIT for Unified Data Models.

Unified models offer a single, consistent view of data, regardless of its origin, allowing for more efficient querying, analysis, and decision-making thus making easy to understand customers' experience.

There is need to simplify data management, enhance data analysis capabilities, and facilitate interoperability across different systems and platforms.

There is much needed push for a holistic approach to data security instead of the current bespoke approaches. Data protection has been a critical concern even before the advent of the internet. Thus, realization of the importance of securing data leads to the development of the science of cryptography and secure storage.

The age of the internet and increased connectivity eases sharing data with or without authorization hence creating new challenges for data security. Privacy and data security has been a serious concern in the field of information technology as well as in the field of Cyber Physical Systems. Therefore, this aim of this research is to identify the research gaps towards achieving a secure unified data model.

To achieve a contribution of enhanced data encryption algorithms and better data protection mechanism to secure data both at REST and data on TRANSIT for a Secure Unified Data Model.

KEYWORDS:

Unified Data Models, Encryption, Decryption

HARNESSING ICT-DRIVEN DATA GOVERNANCE TO STRENGTHEN CIVIC TECH AND SUSTAINABLE LOCAL SOLUTIONS FOR UGANDA'S DEVELOPMENT GOALS

Flavia Kyeyago Ouma
Uganda Bureau of Statistics

ABSTRACT

Drawing on qualitative insights from key stakeholders at the Uganda Bureau of Statistics (UBOS), the National Information Technology Authority-Uganda (NITA-U), and civic tech organizations such as Pollicy, the study explores the intricate relationship between structured data governance, ICT integration, and the effectiveness of civic tech. This paper examines how an ICT-driven data governance framework can serve as a catalyst for advancing civic technology (civic tech) platforms and enhancing public transparency in Uganda, ultimately contributing to localized digital innovations that align with the country's development goals.

Tools designed to promote accountability. Findings highlight that robust data governance, underpinned by secure, interoperable ICT systems, is fundamental for sustaining platforms like budget dashboards and legislative monitoring tools that foster citizen engagement and institutional responsiveness. However, challenges persist, including fragmented data stewardship across ministries, limited technical infrastructure, and inconsistent enforcement of data protection standards, all of which constrain the potential of civic tech initiatives.

The paper recommends adopting enforceable national data governance protocols, prioritizing investments in resilient digital infrastructure, and strengthening digital literacy programs for both public officials and local communities. These strategies are essential not only for improving the credibility and functionality of civic tech platforms but also for empowering grassroots actors to leverage data in addressing local priorities.

By embedding ICT-driven data governance within Uganda's public administration, the country can build a strong foundation for transparent, citizen-centered governance while driving sustainable local solutions that advance the Vision 2040 and the Sustainable Development Goals (SDGs), particularly targets related to inclusive institutions and participatory decision-making.

KEYWORDS: ICT-driven data governance, Civic technology (civic tech), Transparency and accountability, Digital innovation, Citizen engagement, Uganda Vision 2040

LEVERAGING DIGITAL HR INNOVATIONS TO STRENGTHEN WORKFORCE EFFICIENCY AND DRIVE SUSTAINABLE LOCAL SOLUTIONS IN UGANDA'S PUBLIC SERVICE SECTOR:

Matovu William

ISBAT University

ABSTRACT

Digital transformation in human resource management (HRM) presents substantial opportunities to improve workforce efficiency, transparency, and institutional sustainability within Uganda's public sector. This study investigates how the Uganda Bureau of Statistics (UBOS) is leveraging digital HR innovations to overcome operational challenges and enhance employee engagement.

Employing a qualitative case study design, supported by document reviews and key informant interviews, the research examines the integration of digital HR systems such as e-recruitment platforms, automated payroll processing, online performance management and appraisal tools, and digital leave management systems. Findings indicate that these digital initiatives have streamlined HR processes, reduced manual workloads, improved turnaround times, and strengthened data-driven decision-making, thereby fostering greater accountability and operational clarity.

However, the study also identifies persistent challenges, including infrastructural limitations, inconsistent internet connectivity, and gaps in digital literacy among staff, which hamper the full realization of these systems' benefits. Additionally, resistance to change and the need for stronger leadership support emerged as notable constraints.

The study underscores the importance of comprehensive capacity-building initiatives, targeted digital literacy programs, continuous training for management and line managers, and the establishment of a robust policy and regulatory framework to guide and sustain digital HR practices. By addressing these areas, Uganda's public institutions can better harness digital transformation to drive efficiency and support long-term human capital development. The study concludes by recommending that future research explore the longitudinal impacts of digital HR systems on employee satisfaction, retention, and overall organizational performance, providing further insights into sustainable digital HRM strategies in similar contexts.

KEYWORDS:

Digital HRM, workforce efficiency, sustainable local solutions, public sector, electronic Human Resource Management.

STRATEGIC MANAGEMENT AND LEADERSHIP IN THE ERA OF DISRUPTIVE TECHNOLOGY: TRANSFORMING THE BUSINESS LANDSCAPE IN UGANDA AND AFRICA

Veronica Fiona Kristomodo
ISBAT University

ABSTRACT

Uganda's journey toward sustainable development increasingly depends on inclusive, localized, and technology-driven solutions. This paper examines the transformative role of digital innovation in advancing Uganda's national development goals, with a focus on sectors such as agriculture, health, education, and financial inclusion.

Using a mixed-method approach including policy analysis, stakeholder interviews, and case studies the study highlights the impact of technologies like mobile platforms, GIS mapping, data analytics, and e-governance in improving service delivery, empowering rural communities, and enhancing local resilience.

Despite these advances, persistent challenges such as digital literacy gaps, inadequate infrastructure and fragmented policy frameworks continue to hinder widespread adoption.

In parallel, the paper explores the pivotal role of strategic management and leadership in navigating the broader African business environment amid rapid technological disruption. Innovations such as fintech, artificial intelligence, digital agriculture, and renewable energy are reshaping industries across the continent.

Effective leadership characterized by visionary thinking, proactive risk management, policy advocacy, and organizational agility is essential for harnessing these technologies. The study identifies emerging opportunities, including tech hubs, cross-sector partnerships, and expanded financial inclusion, while calling for stronger public-private collaboration and inclusive digital policies

Ultimately, the integration of digital innovation with strategic leadership can serve as a catalyst for scalable, sustainable, and inclusive development across Uganda and Africa at large.

KEYWORDS:

Digital Innovation, Disruptive Technology, Strategic Leadership, Sustainable Development, Africa, Uganda, Local Solutions, ICT4D, Digital Transformation, Business Strategy, Development Goals, Financial Inclusion.

FUTURE SKILLS AND DIGITAL LITERACY FOR THE SDGs: PREPARING THE WORKFORCE FOR A SUSTAINABLE FUTURE – WORK FOR FUTURE

Kanyua Nduthu
University of Nairobi

ABSTRACT

This paper explores the intersection between digital transformation and the achievement of the United Nations Sustainable Development Goals (SDGs). With less than five years to 2030, the need for inclusive and future-ready digital skills has never been more urgent.

Each of the 17 SDGs—from poverty reduction and climate resilience to good governance and gender equality—depends on digital competencies to scale solutions, reach marginalized populations, and accelerate innovation. However, access to digital tools and skills remains deeply unequal, risking a future where the benefits of technology are unequally shared.

The paper maps digital skill domains—such as data literacy, civic tech, design thinking, and cybersecurity—to each SDG, identifying barriers and emerging ethical concerns, including AI bias, tech-driven exclusion, and data sovereignty. It highlights the risks of digital divides and the promises of open innovation, inclusive design, and global partnerships.

To foster a just and sustainable digital transition, the paper offers strategic recommendations across education policy, infrastructure investment, public-private collaboration, and equity-centered design. The conclusion is clear: empowering individuals with ethical digital skills isn't a luxury—it's a prerequisite for building a sustainable future.

KEYWORDS:

SDGs, policy, infrastructure investment, public-private collaboration, equity-centered design.

LEVERAGING TECHNOLOGY FOR YOUTH EMPOWERMENT IN NORTHERN UGANDA CLEAN ENERGY SECTOR

Aciro Gladys
Gulu University

ABSTRACT

This paper explores the role of digital innovation specifically Augmented Reality (AR) in creating employment opportunities for youth through the production and marketing of green charcoal in Northern Uganda.

In districts like Gulu and Amuru, where youth unemployment and environmental degradation from traditional charcoal use are significant challenges, green charcoal offers a sustainable and eco-friendly alternative made from agricultural waste. However, limited public awareness and ineffective marketing have hindered its widespread adoption.

This study highlights how AR-based mobile applications can enhance product visibility, consumer education, and market access, while also empowering youth with digital skills in content creation, mobile commerce, and technology support. The findings suggest that Northern Uganda's youth are digitally ready, with high smartphone penetration and willingness to adopt digital solutions.

By combining clean energy solutions with accessible technology, AR provides a low-cost, scalable platform that not only promotes sustainable livelihoods but also contributes to broader climate action and development goals. The study concludes with recommendations for scaling up digital innovation and training programs to support youth-led green enterprises.

KEYWORDS:

Digital innovation, Augmented Reality (AR), green charcoal, clean energy solutions, green enterprises.

TEACHERS' E-LEARNING PORTAL: AN ONLINE PLATFORM FOR LIFE-LONG LEARNING FOR IN-SERVICE SECONDARY SCHOOL TEACHERS IN UGANDA

Benedict Oyo

Gulu University

ABSTRACT

For over a decade, computers and internet have penetrated secondary schools in Uganda but with greater attention to students' computer literacy than teachers. During Covid-19 pandemic, digital illiteracy of teachers was one of the major reasons for total closure of schools in Uganda.

These realities point to the need to investigate and implement effective and sustainable initiatives for improving digital literacy and online life-long learning for in-service teachers in Uganda. This paper therefore presents an online platform known as TEP (Teachers' E-learning Portal) for digital literacy and online life-long learning for in-service teachers in Uganda.

TEP is built for environments with inadequate access to computers, internet and technical assistance. As such, TEP is accessible online or offline; managed by accredited local universities in collaboration with beneficiary secondary schools; and runs on existing resources in schools (technical personnel, computers and internet). The previous version of TEP was successfully tested at Gulu University and four secondary schools in 2016.

The current extended version optimizes content creation by teachers to aid implementation of the new competency based curriculum. As TEP is adopted by universities and schools, more teachers will become proficient in using various software for teaching different subjects, thereby impacting on e-learning policy development for secondary education in Uganda.

KEYWORDS:

Digital literacy, e-learning, in-service teachers, life-long learning, Uganda

ENHANCING UGANDA'S ACADEMIC RESEARCH AND COLLABORATION THROUGH METRO EDUROAM USING SOLAR-POWERED ROUTERS

1.Rodgers Mutegeki

*Network Engineer, Network
Operations, RENU*

2.Arthur Tumwesigye

*Network Engineer, Network
Operations, RENU*

ABSTRACT

Access to secure and reliable Internet connectivity is essential for academic research and collaboration. In Uganda, however, access to affordable and dependable Internet remains a significant challenge for students and researchers, particularly outside university campuses, where eduroam is typically limited to institutional networks.

Metro eduroam, a national Wi-Fi initiative implemented by the Research and Education Network for Uganda (RENU), extends eduroam connectivity into public spaces such as hostels, libraries, and transport terminals. This article provides an overview of metro eduroam's system architecture, deployment model, and federated authentication framework.

It assesses the initiative's impact on research accessibility, institutional participation, bandwidth demand, and user experience, while also highlighting challenges related to infrastructure, capacity, and sustainability. The findings show that metro eduroam has significantly improved digital access for Uganda's academic community and offers a scalable model for inclusive connectivity in low-resource settings.

KEYWORDS:

Metro, eduroam, Solar-powered, Connectivity, Research

A MACHINE LEARNING-BASED OPTIMAL DEPLOYMENT APPROACH FOR UAV-ASSISTED HETNETS

1.Arthur Tumwesigye

*Senior Network Engineer, Technical Department,
Research and Education Network for Uganda
(RENU).*

2.Edwin Mugume

*Senior Lecturer, Electrical and Computer
Department, Makerere University.*

ABSTRACT

The integration of Unmanned Aerial Vehicles (UAVs) into terrestrial Heterogeneous Networks (HetNets) offers a promising solution for enhancing mobile network connectivity and coverage. This paper proposes a dynamic UAV deployment strategy that adapts to network traffic conditions using machine learning (ML) for traffic forecasting.

By considering both traffic demand and network topology, UAV Base Stations (UAV-BSs) are strategically positioned to enhance network capacity, reduce interference, and improve network energy efficiency. The goal is to obtain simulation results that demonstrate a significant improvement in network capacity and energy efficiency while reducing interference between the UAV-BSs and terrestrial Macro Base Stations (MBSs) and Pico Base Stations (PBSs).

The ML approach employed a comparison of three forecasting models: Long Short-Term Memory (LSTM), Seasonal Autoregressive Integrated Moving Average (SARIMA), and Exponential Smoothing. Among these, LSTM demonstrated superior performance. Forecasted traffic data is then linked to sum rate metrics obtained from system-level simulations.

To optimize UAV-BS locations, the paper employs Particle Swarm Optimization (PSO), chosen for its simplicity and population-based design. Simulation results show PSO significantly outperforms random deployment. This approach demonstrates substantial improvements in throughput, latency, and energy efficiency, providing a robust framework for future UAV-assisted HetNet deployments.

KEYWORDS:

Machine Learning, UAVs, Sum Rate, HetNets, Efficiency, PSO

HARNESSING THE POWER OF ADVANCED DEEP LEARNING TECHNIQUES FOR EARLY DETECTION AND CLASSIFICATION OF MAIZE LEAF DISEASES IN UGANDA

1.Shongo On'osala Aaron

*Artificial Intelligence and Machine Learning
Department, Isbat University*

2.Abubakhari Sserwadda

*School of Engineering and Technology,
Soroti University*

ABSTRACT

Maize is a vital staple food in Uganda, eaten in various forms. However, it is often attacked by different pests and diseases that require immediate attention when detected to minimise agricultural losses. Recently, deep learning has proven to be very efficient, especially in computer vision.

However, the basic model frameworks cannot efficiently capture complex image patterns. This study leverages YOLOv8 (You Only Look Once, Version 8), an advanced deep-learning model, to detect and classify maize leaf diseases using spectral maize leaf data from Uganda.

The dataset comprises 37,217 maize leaf images with healthy samples and four disease classes, including Fall Army Worm (FAW), Maize Leaf Blight (MLB), Maize Lethal Necrosis (MLN), and Maize Streak Virus (MSV). Data augmentation techniques were adopted to enhance the model's robustness, including random cropping, flipping, adjustments, RGB shifts, and colour jittering.

Thanks to these augmentation techniques, the model's accuracy improved from 94% to 99.7%; this underscores the effectiveness of data augmentation in boosting the model's generalization ability and robustness. The model's high accuracy highlights its potential to significantly assist in early disease detection, ultimately increasing agricultural output.

KEYWORDS:

Artificial Intelligence(AI), Agriculture, Deep learning, YOLOv8, data augmentation, maize leaf diseases

AUTOMATED FEATURE ENGINEERING AND OPTIMAL FEATURE SELECTION FOR REGRESSION MODELS: A CASE STUDY USING OPENFE

1. Shongo On'osala Aaron

Artificial Intelligence and Machine Learning Department, Isbat University

2. Umesh Kumar

Faculty of Information Communication and Technology, Isbat University

ABSTRACT

Artificial Intelligence (AI) is transforming how data is analyzed, with machine learning (ML) playing a critical role in predictive modeling. Feature engineering and feature selection are crucial steps in ML that improves model performance. Feature engineering consists of generating additional features from original data, which may reveal undisclosed patterns.

In contrast, feature selection enhances these features by identifying the most important ones to enhance accuracy and efficiency. This study investigates the efficacy of automated feature engineering and selection in enhancing regression model performance using OpenFE for predicting ground-level nitrogen dioxide(NO₂) concentrations using the GeoAI Ground-level NO₂ Estimation dataset.

This dataset integrates air quality monitoring station data with satellitederived information on NO₂, precipitation, and temperature. We evaluated multiple selection techniques, including correlation analysis, mutual information, boruta and recursive feature elimination with OpenFE emerging as the optimal solution. We generated 300 features from 13 initial features, and used targeted feature selection methods to identify the 10 most impactful features.

Our final model achieved a RMSE of 3.178, this results show that a carefully selected subset of features maintains and improves, the model's forecasting power while reducing overfitting and processing time. This research provides practical insights for researchers and data scientists seeking to optimize regression models by leveraging automated feature engineering and selection algorithm.

Our approach illustrates the balance between feature quantity and quality, emphasizing the need for judicious feature curation to build robust predictive models.

KEYWORDS: Machine Learning(ML), OpenFE, Regression Analysis, Automated Feature Engineering, Feature Selection

LEVERAGING ICT AND BIG DATA ANALYTICS FOR TRANSFORMATIVE BUSINESS SOLUTIONS IN UGANDA

Flavia Kyeyago Ouma
ISBAT University.

ABSTRACT

The Fourth Industrial Revolution has brought Information and Communication Technology (ICT) and Big Data Analytics to the forefront of business transformation globally. In Uganda, the growing adoption of ICT presents both opportunities and challenges for improving decision-making, efficiency, and innovation.

However, issues such as inadequate infrastructure, limited digital literacy, and high implementation costs—especially for small and medium-sized enterprises (SMEs)—remain major hurdles.

This paper examines how ICT and Big Data are shaping Uganda's business environment, using case studies from AgriNet Uganda and Jumia Uganda. AgriNet leverages data to improve agricultural value chains, linking farmers to wider markets and boosting productivity.

Jumia uses analytics to personalize services and enhance logistics, resulting in greater efficiency and customer satisfaction. These examples highlight the real-world benefits of adopting digital technologies and demonstrate how different sectors can harness ICT and data to drive growth.

The paper also stresses the need for improved digital literacy, infrastructure, and policy support to build a strong data-driven economy. Strategic recommendations include investing in training programs, encouraging public-private partnerships, and ensuring equitable access to digital tools, particularly in rural areas. These measures are essential for fostering inclusive growth and unlocking the full potential of ICT and Big Data Analytics in Uganda's development journey.

KEYWORDS:

Digital Innovation, Big Data Analytics, ICT for Development, Sustainable Solutions, Inclusive Business Growth and Local Digital Transformation

STEPS TOWARDS LEVERAGING ARTIFICIAL INTELLIGENCE TO ENHANCE SERVICE DELIVERY AT UGANDA BUREAU OF STATISTICS: CURRENT INITIATIVES AND FUTURE OPPORTUNITIES

Flavia Kyeyago Ouma
ISBAT University.

ABSTRACT

This study explores how artificial intelligence (AI) can enhance service delivery at the Uganda Bureau of Statistics (UBOS) by leveraging digital innovation to support Uganda's development goals. AI technologies offer transformative potential to improve the efficiency, accuracy, and responsiveness of statistical operations—spanning data collection, processing, analysis, storage, and dissemination.

Using a qualitative approach based on secondary data, the research examines how AI integration can streamline statistical workflows and foster data-driven decision-making. Findings indicate that AI can reduce manual errors through automated surveys, enhance data accuracy via real-time cleaning tools, and improve insight generation through machine learning algorithms. These capabilities directly support sustainable and localized solutions by enabling evidence-based planning and targeted policy interventions.

AI also enhances accessibility and stakeholder engagement through intelligent dissemination tools such as chatbots and personalized data services, making official statistics more usable for government, development partners, and the public. However, the study identifies key barriers to AI adoption at UBOS, including gaps in technical skills, infrastructure limitations, and data privacy concerns. To harness AI effectively, Uganda must invest in digital infrastructure, develop technical capacity, and establish strong data governance frameworks.

Addressing these challenges will empower UBOS to fully leverage digital innovation for sustainable local development. The research concludes that AI is not only a tool for improving statistical service delivery but also a strategic asset for achieving Uganda's broader development goals through smarter, faster, and more inclusive data systems.

KEYWORDS:

Artificial Intelligence (AI), Digital Innovation, Service Delivery, Data Governance, Sustainable Development and Uganda Bureau of Statistics (UBOS)

TRANSFORMING LEARNING: THE IMPACT OF ARTIFICIAL INTELLIGENCE ON UGANDA'S EDUCATION SECTOR

1. Dr. Pradeep Kumar

Associate Professor

ISBAT University

2. Kayima Brian

Researcher of Master's Degree in

IT, ISBAT University.

ABSTRACT

The integration of Artificial Intelligence (AI) in education has the potential to revolutionize learning and teaching methodologies worldwide. However, the extent of AI adoption in developing nations, particularly in Uganda, remains underexplored.

This research seeks to examine the impact of AI on Uganda's education sector by analyzing the current level of adoption of AI tool, assessing institutional readiness, and identifying key challenges hindering implementation especially in rural areas.

The study reveals that while urban institutions show gradual AI integration, rural schools and universities face significant barriers, including inadequate technological infrastructure, limited digital literacy, and insufficient policy support.

By evaluating these gaps, this paper provides insights into strategies for enhancing AI adoption, ensuring equitable access, and improving educational outcomes across Uganda. The findings contribute to ongoing discourse on AI in African education and offer recommendations for policymakers, educators, and stakeholders to foster sustainable AI integration.

KEYWORDS:

Artificial Intelligence, AI Adoption, Digital Divide, Education Sector, Institutional Readiness, Rural Schools.

A COLLABORATIVE DIGITAL PLATFORM FOR GREEN CHARCOAL PRODUCTION DATA MANAGEMENT

1. Kevin Aber

*Assistant Lecturer,
Department of Computer Science
Gulu University, Uganda*

2. Daniel Ogenrwot

*Assistant Lecturer,
Department of Computer Science,
Gulu University*

3. Benedict Oyo

*Assoc. Professor
Department of Computer Science
Gulu University, Uganda*

4. Geoffrey Olok Tabo

*Senior Lecturer,
Department of Computer Science
Gulu University, Uganda*

5. Lone Dirckinck-Holmfeld

*Professor, Department of Communication and
Psychology, Aalborg University, Copenhagen, Denmark*

ABSTRACT

Green charcoal offers a sustainable alternative to traditional biomass fuels in Uganda, yet its production value chain remains fragmented, inefficient, and largely undigitized. This study presents the design and development of a collaborative, modular digital platform aimed at enhancing coordination, traceability, and data-driven decision-making across the green charcoal value chain.

The system requirements were shaped by stakeholder input gathered through Future Workshops and focus group discussions. These requirements were then translated into a microservices-based system, designed with role-based access controls and built using lightweight, open-source technologies suitable for low-resource settings.

The system demonstrates potential to model production efficiency, support compliance monitoring, and guide training and policy interventions. A phased pilot rollout is planned to validate usability, data accuracy, and system adoption, supported by targeted capacity-building initiatives. The platform serves as a scalable and adaptable model for advancing sustainability and innovation in Uganda's green charcoal sector.

It offers a practical framework for driving digital transformation in low-resource value chains. With its modular design, the system is well-suited for future integration with IoT sensors, mobile payment systems, and predictive analytics, enhancing its long-term relevance and impact.

KEYWORDS:

Keywords: Green Charcoal, Digital System, Microservice Architecture, Participatory Design

STRATEGIC MANAGEMENT AND LEADERSHIP: DRIVING ORGANIZATIONAL SUCCESS THROUGH INTEGRATED APPROACHES

Matovu William
ISBAT University

ABSTRACT

This paper examines the relationship between strategic management and leadership and how their integration drives organizational performance and success. Strategic management involves setting goals, analyzing internal and external environments, and implementing actions to achieve organizational objectives.

Leadership, on the other hand, focuses on inspiring, motivating, and guiding individuals towards achieving these objectives. The paper discusses the interconnectedness of strategic management and leadership, highlighting their complementary roles in fostering innovation, adaptability, and resilience within organizations.

By integrating strategic management and leadership, organizations can create a clear vision, build high-performing teams, and establish a culture of continuous improvement. The paper also explores the importance of strategic planning, effective communication, and decision-making in ensuring alignment with organizational goals.

Additionally, it emphasizes the role of leadership in managing change, overcoming resistance, and driving organizational transformation. The findings of this study are based on a comprehensive review of literature and case studies providing a holistic understanding of how strategic management and leadership contribute to organizational success.

Effective integration of these components is crucial for achieving a competitive advantage in today's dynamic and rapidly evolving business environment. The paper concludes by providing recommendations for best practices in integrating strategic management and leadership to enhance organizational performance and sustainability.

KEYWORDS:

Strategic management, leadership, organizational objectives, strategic planning, effective communication

CHANNEL MODELING, PREDICTION, DETECTION, AND EMERGING 6G DIRECTIONS

Faruku Dodwa

*MSc Student, Department of Electronics and
Communication Engineering, Egypt-Japan University
of Science and Technology (E-JUST), Egypt*

ABSTRACT

The integration of Unmanned Aerial Vehicles (UAVs), Low Earth Orbit (LEO) satellite communications, and Reconfigurable Intelligent Surfaces (RISs) is transforming the landscape of next-generation wireless networks by enabling high-capacity, low-latency, and globally scalable communication architectures.

This review presents a detailed synthesis of advancements in channel prediction, iterative detection, beamforming, optimization, and system design in UAV-Satellite-RIS-assisted communication networks. It explores hybrid near-/far-field channel prediction models based on Signal-Informed Networks (SIN), advanced Minimum Mean Square Error (MMSE)-based iterative detection frameworks, and the architectural implications of Non-Geostationary Satellite Orbit (NGSO) constellations.

Further, the study discusses on-board satellite computing trends, standardization for satellite-enabled Internet of Things (IoT), and future-oriented frameworks leveraging Software Defined Networking (SDN) and Network Function Virtualization (NFV).

Key challenges such as mobility-induced fading, hardware impairments, resource-sensitive beamforming, and AI-driven distributed control are critically analyzed. This work serves as a consolidated foundation for researchers aiming to design resilient, intelligent, and scalable communication systems for the 6G era.

KEYWORDS:

UAV Communications, RIS, LEO Satellites, MMSE Detection, Passive Beam-forming, NGSO Systems, Satellite IoT, SDN, NFV, Channel Prediction, IRS, 6G Networks.

DESIGN OF A MULTIBAND RECONFIGURABLE COMPACT ANTENNA FOR WIRELESS SYSTEMS

1. Mpagi Yunusu

2. Baluku Philly

*Department of Electrical and Electronics
Engineering Kyambogo University*

ABSTRACT

The growing demand for agile and compact wireless systems has driven the need for reconfigurable antennas capable of dynamic frequency adaptation. This project presents a compact multiband reconfigurable antenna utilizing a single PIN diode to switch between ultra-wideband (UWB) and multiband modes.

The proposed antenna features a CPW-fed circular patch with a tunable slot and stub, optimized to achieve efficient impedance matching. Electromagnetic simulations confirm strong resonance, stable radiation patterns, and low return loss.

With a simplified architecture and minimal active components, the antenna demonstrates competitive gain and reduced design complexity, making it suitable for IoT, 5G, and cognitive radio applications.

KEYWORDS:

reconfigurable antennas, ultra-wideband, IoT, 5G, CPW- fed circular patch topology

AN ACUS-BASED FRAMEWORK FOR PERSONALIZED AI APPLICATIONS IN ADVANCING SUSTAINABLE DEVELOPMENT

James Boogere

*Department of Computer Science,
Faculty of Science
Gulu University*

ABSTRACT

This conceptual paper introduces a human-centered framework—ACUS (Awareness, Comprehension, Use, and Skill)—to guide the ethical and inclusive personalization of artificial intelligence (AI) for sustainable development.

It addresses critical disparities in AI access, understanding, and engagement, particularly in low- and middle-income countries where digital inequalities threaten to widen existing development gaps.

By structuring the journey from basic awareness to empowered skill, the ACUS model fosters responsible, contextualized AI adoption that supports Sustainable Development Goals (SDGs) 1 (No Poverty), 2 (Zero Hunger), 3 (Good Health and Well-being), and 4 (Quality Education).

The framework is designed to empower individuals and communities to actively participate in shaping AI's impact on their learning, livelihoods, and well-being, thereby advancing personalization not as a technological luxury but as a strategic pathway for inclusive and sustainable transformation.

KEYWORDS:

Artificial Intelligence, Sustainable Development, Personalization, Education, Wealth, Nutrition, Health, IoT, Blockchain, Machine Learning, SDGs

DIGITAL INNOVATION FOR SOCIAL IMPACT: TRANSFORMING COMMUNITIES THROUGH TECHNOLOGY

William
ISBAT University

ABSTRACT

The rapid advancement of digital technologies has created unprecedented opportunities to address complex social challenges, foster inclusive growth, and improve quality of life.

This paper explores how digital innovation—encompassing artificial intelligence, data analytics, mobile solutions, and blockchain—can be strategically applied to create sustainable social impact. It examines case studies from diverse sectors, including healthcare, education, agriculture, and civic engagement, demonstrating how technology-driven interventions have enhanced accessibility, transparency, and efficiency in service delivery.

The discussion also highlights the role of community participation, digital literacy, and policy frameworks in ensuring equitable access and long-term adoption. By integrating human-centered design with emerging technologies, digital innovation can bridge socio-economic gaps, empower marginalized populations, and contribute directly to achieving the Sustainable Development Goals (SDGs).

The paper concludes with recommendations for fostering cross-sector collaboration, ethical governance, and scalable solutions that harness the transformative potential of technology to build resilient, inclusive, and empowered societies.

KEYWORDS:

digital innovation, digital technologies, Sustainable Development Goals, socio-economic gaps, digital literacy

SERGET DECENTRALIZED AI POWER NETWORK

1. **Twesigye Keith** *Developer, I.T Department, Najod intelligent Systems*
2. **Trevor Dante** *Developer, I.T Department, Najod intelligent Systems*

ABSTRACT

We present Serget Decentralized AI Power Network, a fully decentralized platform that enables scalable, peer-to-peer (P2P) AI inference and federated learning. Serget leverages a blockchain-based smart contract layer for trustless task coordination and payments, and IPFS content-addressable storage for sharing large models and datasets.

In this network, Bootstrap, Worker, Owner, and User nodes collaborate: Bootstrap nodes facilitate discovery, Workers provide compute (e.g. GPUs), Owners contribute models/data, and Users submit inference tasks. Inference workloads are executed via a vLLM/Ray-powered cluster that parallelizes models across distributed GPUs.

A mobile-first Progressive Web App (PWA) interface allows lightweight access. Resources are allocated dynamically (using Ray's scheduling), and governance is handled via on-chain consensus. A token-based incentive model (using Ethereum ERC-20 tokens) ensures fair payment for services.

We detail Serget's architecture, provide mathematical models for parallelism and resource allocation, describe integration workflows, and illustrate use cases. Tables summarize node roles, pricing schemes, and performance tiers. Serget offers a new federated AI coordination paradigm that combines existing technologies (P2P, blockchain, IPFS, vLLM, Ray, PWA) into a coherent platform.

KEYWORDS:

Decentralized Inference, Federated Learning, Peer-to-Peer, Blockchain, IPFS, Token Economy

FUTURE SKILLS AND DIGITAL LITERACY FOR SDGS

Godfrey Drani *Baraka Relief And Development Organization West Nile Arua Uganda*

ABSTRACT

During the survey taken in various schools in Arua District has shown that many youth who join secondary school end up dropping from school before finishing their secondary school due to various reasons e.g others due to lack of school fees, early pregnancy for girls and there after they are left to suffer without any support they are living a defeated life which forces some to enter in to the practice of prostitution and drug abuse , theft. And so we search funds to support them by offering for them job opportunity , training to the youth who want them.

This project will assist women and girls in West Nile region of Uganda through provision of these services and activities:

- 1) training, community dialogue, talk-shows and messages on sexual and reproductive health, gender based violence, human rights and sensitization on corona virus and protective measures;
- 2) provision of food items and nutritional supplements to the most needy women and girls; and
- 3) provision of revolving funds to women and girls to boost their businesses. The goal of the project is to improve the living conditions of women and girls and their communities through improved livelihood and productivity.

Sustainable Development Goals (SDG) request among others equality and empowerment of all women and girls, food security and nutrition, promotion of peaceful and inclusive societies and promotion of sustainable economic growth.

The project plans to address these and more of the SDGs by conducting trainings, community dialogue, radio talk-shows and messages, provision of food items and nutritional supplements and provision of revolving funds to women and girls to boost their businesses.

The project will impact women, girls and their communities by making women and girls to become economically independent, reduce cases of sexual and gender based violence, move hygiene practices, increase enrolment and retention of girls in schools and improved living conditions within the communities.

Keywords: future skills, digital literacy, Sustainable Development Goals (SDG), economically independent, sustainable economic growth

KEYWORDS:

Future skills, digital literacy, Sustainable Development Goals (SDG), economically independent, sustainable economic growth

IMAGE CLASSIFICATION AI AS AN INSTRUMENT OF MASS CONTROL

Ogenrwot Daniel

*Department of Mechanical Engineering, Ulsan National Institute of Science
and Technology*

50 UNIST-gil, Ulsan 44919, Republic of Korea

ABSTRACT

This article examines how state-of-the-art AI image classification systems, originally developed for tasks such as facial recognition and object identification, are increasingly repurposed as tools for mass surveillance. We argue that the technical precision inherent in these systems, a strength in industrial and civilian applications, is precisely the quality that also makes them susceptible to rapid conversion into pervasive monitoring infrastructures.

By analyzing real-world cases including Oakland's Domain Awareness Center (DAC), (Policy, 6/2/2015), (Bartlett, 2019) Clearview AI's scraping operations (Shepherd, 2024), and state led surveillance initiatives in Xinjiang (Arvind Narayanan, 2025), this report illustrates the ethical, societal, and political implications of widespread deployment.

In doing so, it highlights the inherent algorithmic biases; Systematic errors in AI outputs result from skewed training data or flawed system design, often leading to disproportionately negative outcomes for marginalized or minority groups. (Arvind Narayanan, 2025), potential for civil rights violations, and risks of disproportionate targeting of marginalized communities. Based on an earlier reading from Unmasking AI by MIT researcher Joy Buolamwini, (Buolamwini, 2023).

It was concluded that without robust oversight, transparent governance, and rigorous ethical frameworks, image classification AI technologies risk transforming from mere tools of convenience into powerful instruments of social control.

In the (Arvind Narayanan, 2025), the article on Painting AI with a single Brush clearly gives greater examples of how predictive AI; AI systems that use past data to forecast future behavior, conditions, or classifications image classification falls under this broader category, on which Image classification falls under is error prone mostly to the minority group. (Arvind Narayanan, 2025)

KEYWORDS: Image classification, AI, Surveillance.

IMAGE CLASSIFICATION AI AS AN INSTRUMENT OF MASS CONTROL

Maarij Shamim

Graduate Researcher, Department of Electrical Engineering, NUST

ABSTRACT

The rising challenges of water scarcity, environmental degradation, inefficient agricultural practices, and rising food waste generation demand smart, innovative, technology-driven solutions.

This paper presents the design, implementation, and evaluation of three integrated sustainability projects: a Smart Irrigation System, an AI-powered Food Waste Management System for Material Recovery Facilities (MRFs), and the Clean Shield Project for detecting Black Carbon and safe water access to local communities. Using a combination of Internet of Things (IoT), artificial intelligence (AI), embedded hardware, and renewable energy integration, these systems address critical environmental concerns in resource-constrained contexts.

Integrating these solutions into a unified framework enhances cross-sector impact, enabling simultaneous progress on water, waste, and climate resilience goals. Results from pilot deployments indicate water savings of up to 32%, food waste classification accuracy of 87%, and measurable improvements in water safety, aligning with the United Nations Sustainable Development Goals (SDGs) 6, 11, and 12.

KEYWORDS:

Smart irrigation, food waste management, IoT, AI, sustainability, clean water.

EMBRACING DIGITAL FINANCIAL TOOLS FOR SMES GROWTH AND SUSTAINABILITY IN UGANDA

1.Urbans Mujuni

IT Officer, Department of Information Technology, UNITE Unyama Campus

2.Lot Pario

*Acting Dean & Lecturer, Department of Education Management
UNITE Unyama Campus*

ABSTRACT

Small and medium-sized enterprises (SMEs) play a critical role in Uganda's economic development, accounting for over 90% of the private sector and contributing significantly to employment and income generation.

However, many SMEs face persistent challenges related to poor financial management, limited access to credit, and informal operations.

The rise of digital financial tools such as mobile money platforms (MTN MoMo), digital bookkeeping systems (QuickBooks), and SMEs-focused platforms (TradiPulse) offers a unique opportunity to transform how these enterprises manage resources, make decisions, and scale operations in both urban and rural contexts.

KEYWORDS:

Small and medium-sized enterprises (SMEs), digital financial tools, mobile money, financial inclusion, digital accounting software, business performance, Uganda, adoption barriers, rural and urban enterprises, financial management, digital transformation, economic growth, TradiPulse, QuickBooks, MTN MoMo.

SMART AGRICULTURE APP FOR ENHANCING INFORMATION ACCESS CASE STUDY OF NORTH DIVISION, FORT PORTAL CITY, UGANDA

1.Kwagala Moris OwenLot

*Bachelor's Graduate Student, Computer Science
Mountains of the Moon University*

2.Tugume Andrew

*Lecturer, Department of Computer Science
Mountains of the Moon University*

ABSTRACT

This study aimed to address critical challenges faced by smallholder farmers in North Division, Fort Portal City, Uganda, who struggle with limited access to timely and accurate agricultural information.

These challenges include inadequate weather forecasts, fluctuating market prices, pest and disease outbreaks, and poor crop management practices, all of which hinder productivity and food security.

A Smart Agriculture App was developed to bridge these gaps by providing real-time access to weather forecasts, market price trends, pest and disease alerts, and farming tips. The application was built using Flutter, React JS and Firebase, and its development followed a user-centered and participatory design approach involving local farmers.

Evaluation results revealed improved planning, efficiency, and productivity among the farmers. The app demonstrates the potential of digital technologies in enhancing agricultural practices and decision-making for rural communities.

KEYWORDS:

Smart Agriculture, Mobile App, Rural Farmers, Uganda, Information Access

BRIDGING THE GAP: EFFECTIVE COMMUNICATION STRATEGIES FOR COMMUNITY ENGAGEMENT IN TRADITIONAL MEDICINE RESEARCH, A GULU UNIVERSITY EXPERIENCE

Lamwaka Alice Veronica
GULU University

ABSTRACT

Traditional medicine plays a significant role in African healthcare systems, including Northern Uganda, and effective communication is crucial for promoting awareness, understanding, and collaboration.

This presentation will discuss the importance of community engagement in traditional medicine research and highlight effective communication strategies for bridging the gap between researchers, traditional medicine practitioners, and local communities.

We will share insights from the Africa Traditional Medicine Awareness Week, a recent event held at Gulu University, which brought together stakeholders to promote awareness and understanding of traditional African medicine. Our discussion will focus on the role of communication in fostering collaboration, addressing misconceptions, and promoting the safe and effective use of traditional medicine.

This presentation aims to contribute to the ongoing conversation on effective communication strategies in traditional medicine research and community engagement.

KEYWORDS:

Traditional medicine Community engagement Effective communication Research collaboration Cultural sensitivity

A USSD-BASED IOT SOLUTION FOR AUTOMATED WATER PAYMENT AND DISPENSING

PUTSHU LUNGHE SAMUEL

Samuel

La Marquee Translate Company Limited

ABSTRACT

This short paper presents MajiQuick, a smart water dispensing system that leverages IoT technology and USSD-based transactions to enable secure, efficient, and cashless water purchases.

The prototype was developed and tested using the Wokwi simulator, where GSM functionality was not simulated due to module limitations. In the proposed physical implementation, a 4G LTE GSM module will be used for real-time data transmission between the dispenser and the backend.

The system integrates a keypad module for code entry and an LCD for displaying transaction details. On the backend, the Africa's Talking USSD API facilitates water purchase requests, while the Africa's Talking SMS API, and EmailJS API send instant notifications to users upon successful transactions.

The USSD application was tested using Africa's Talking Sandbox, which provides a cost-free environment for simulation since real USSD code deployment is expensive. Additionally, a ReactJS-based web application complements the hardware by enabling remote purchases and management.

This solution enhances transparency, convenience, and accessibility in water vending while reducing physical cash handling and improving operational efficiency.

KEYWORDS:

IoT, MQTT, ReactJS, web application, Keypad input, LCD display, water payment system, NodeJS.

CIVIC TECHNOLOGY AND DIGITAL GOVERNANCE FOR UGANDA'S SUSTAINABLE DEVELOPMENT: UNLOCKING LOCAL INNOVATION THROUGH DIGITAL SOLUTIONS

Jonathan Cula

La Marquee Translate Company Limited

ABSTRACT

This comprehensive study explores the transformative potential of civic technology and digital governance in advancing Uganda's sustainable development agenda, aligned with the United Nations Sustainable Development Goals (SDGs). Recognizing Uganda's unique socio-political fabric marked by a predominantly youthful demographic, rapid mobile technology adoption, and rich linguistic diversity—this research underscores both opportunities and inherent challenges in implementing inclusive digital solutions.

The study evaluates how civic technologies such as SMS-based feedback platforms, mobile applications, crowdsourcing tools, and multilingual e-participation portals function within this context. While these platforms have demonstrated capacity to promote transparency, accountability, and citizen engagement, their effectiveness is often constrained by linguistic and cultural barriers particularly among rural and marginalized populations.

Drawing on case studies including UNICEF's U-Report, the Ministry of Health's mTrac, and the Electoral Commission's multilingual voter education campaigns—this paper demonstrates that culturally responsive and multilingual design significantly increases adoption, data accuracy, and public trust. The research employs a Digital Inclusion and Participatory Governance Framework with five interrelated pillars: access, digital literacy, cultural and linguistic accessibility, participation, and trust.

Findings emphasize that linguistic inclusivity is not optional but essential for equitable digital governance. Policy recommendations include mandating multilingual support, fostering strategic public-private partnerships, creating open-source language resources, and adopting culturally sensitive design standards. Future research directions include AI-driven language translation and quantitative assessments of participation disparities across linguistic and socio-economic groups.

KEYWORDS:

Civic Technology, Digital Governance, Uganda, Multilingual Platforms, Indigenous Languages, Digital Inclusion, Participatory Governance, Mobile Engagement, ICT4D, Linguistic Diversity, E-Government, Youth Engagement, Voice-Based Reporting, Electoral Participation, SDGs, Digital Literacy, Cultural Relevance, Trust in Institutions, Open-Source Language Tools, AI-Powered Translation

TOWARDS AGRICULTURE 4.0 : DEVELOPMENT OF A UAV-ACQUIRED DATASET FOR MACHINE LEARNING-BASED INTRUSION DETECTION IN FARMS.

1. Lukwago Hussein
2. Mutesi Winnie
3. Namiiro Esther
4. Nyanzi Muniir
5. Hirya Richard
6. Stanley Mugisha

Department of Electronics and Computer Engineering, School of Engineering and Technology, Soroti University, Arapai, Uganda

ABSTRACT

This article presents the development of a comprehensive dataset to train machine learning-based models in farm intrusion detection systems specifically applicable to farms, focusing much on data acquisition using Unmanned Aerial Vehicles (UAVs).

The dataset addresses a serious problem: human or stray animal intrusions whose effect to farmers is often economic loss. Collected mainly through aerial footage from UAVs supplemented with mobile phone ground captures, the dataset comprises 2,067 rescaled images spread across three classes: animals (907 images), people (588 images), and empty spaces (572 images).

UAVs provided essential bird's-eye views, which made it possible to monitor wide areas of the farm under different lighting and angles, conditions that are very useful in real-world deployments for intrusion detection.

The paper describes the data collection process, preprocessing, and analysis of distributions with visual representations. This constitutes the foundation for automated surveillance systems in Agriculture 4.0, which integrates advanced technologies like IoT, Big Data, AI, and robotics into farming practices leveraging UAVs to detect illegal activity, thus enhancing farm security.

The dataset is publicly available for further research at:

https://drive.google.com/file/d/1CQwy8Sn-t0ntyLnYTJv7V_Mg6u3zSyOB/view?usp=drivesdk

KEYWORDS:

Unmanned Aerial Vehicles (UAVs), farm intrusion detection, machine learning, dataset creation, livestock security, image processing, Agricultural IoT, Agriculture 4.0.

HARNESSING DIGITAL COMMUNICATIONS FOR CLIMATE-RESILIENT DEVELOPMENT IN UGANDA

Alex Lew

ABSTRACT

Uganda faces pressing challenges in infrastructure, healthcare, education, agriculture, and governance—sectors increasingly reliant on robust communications technologies. This paper examines how digital communications innovations such as mobile connectivity, Internet of Things (IoT) applications, and data-driven platforms can accelerate inclusive and sustainable development in Uganda.

Drawing on case studies of mobile money systems, digital health platforms, and precision agriculture pilots, the research highlights the transformative role of communications technology in addressing rural connectivity gaps, strengthening health service delivery, improving smallholder productivity, and enhancing climate resilience.

The paper employs a mixed-methods approach, combining policy analysis with interviews from local stakeholders and secondary data from regional ICT initiatives. Findings suggest that scalable communication technologies not only enhance efficiency and transparency but also empower marginalized groups, including women, youth, and rural farmers.

However, challenges remain in digital literacy, infrastructure investment, data governance, and ensuring affordability for underserved populations. We propose a framework for integrating cutting-edge communications technologies with Uganda's national development priorities, focusing on three pillars: (1) expanding equitable digital infrastructure, (2) enabling community-driven innovation ecosystems, and (3) strengthening governance for secure, ethical, and inclusive communications.

By bridging the gap between technological innovation and socio-economic realities, this study underscores the potential of Uganda's communications sector to serve as a catalyst for climate-smart, resilient, and inclusive development.

KEYWORDS:

Digital Communications, Internet of Things (IoT) applications, ICT, Uganda

EXPLORING ETHICAL CONSIDERATIONS IN BIG DATA MANAGEMENT AND USAGE IN KAMPALA

Victor Mawerere
ISBAT UNIVERSITY

ABSTRACT

In the dynamic digital landscape of Kampala, Uganda, the rapid growth of big data presents both immense opportunities and significant ethical challenges. As healthcare services increasingly rely on data-driven technologies, concerns arise regarding the privacy of sensitive patient information, the potential for algorithmic bias in decision-making systems, and the adequacy of existing regulatory frameworks like the Data Protection and Privacy Act of 2019.

This study delves into these critical issues, investigating the ethical implications of big data usage within Kampala's healthcare sector. Using a mixed-methods approach, encompassing literature reviews, stakeholder interviews, and data analysis, the study aims to assess the impact of big data on individual privacy, evaluate the risks of algorithmic bias, and analyze the strengths and weaknesses of the current regulatory framework.

By examining these facets, the study seeks to contribute to the development of robust ethical frameworks for big data management in the Ugandan context, fostering responsible data governance that safeguards individual rights and promotes equitable healthcare outcomes.

KEYWORDS:

Big data, healthcare services, data-driven technologies, data governance, Uganda

DETECTING THE INVISIBLE: AN AI-POWERED DEEPPFAKE DETECTION SYSTEM

Krishi Tejas Patel

Undergraduate Student, Master's In Information Technology, ISBAT University

ABSTRACT

Deepfake technology, powered by artificial intelligence (AI), has rapidly evolved, making it increasingly difficult to distinguish between real and manipulated media.

This paper presents an AI-powered deepfake detection system using a hybrid approach that integrates convolutional neural networks (CNNs) for spatial analysis and recurrent neural networks (RNNs) for capturing temporal inconsistencies.

The study utilizes an extensive dataset of real and deepfake videos to train and evaluate the model. Results demonstrate that the proposed system achieves an 89% accuracy rate, outperforming traditional forensic techniques.

This research highlights the urgent need for advanced AI-driven security measures to combat misinformation and digital fraud.

KEYWORDS:

Digital Communications, Internet of Things (IoT) applications, ICT, Uganda

CLICKTOASSIST: AN AI-DRIVEN PLATFORM FOR TRANSFORMING UGANDA'S INFORMAL SERVICE ECONOMY THROUGH CONTEXTUAL ALGORITHMIC MATCHING

Nakisisa George

Student Alumni, ICT, Uganda Institute of Information Technology

ABSTRACT

Uganda's informal service sector—employing 70% of working Ugandans—suffers from severe market fragmentation characterized by trust deficits and information asymmetry. We developed ClickToAssist, an AI-powered platform engineered specifically for Uganda's context.

Through field testing across Kampala with 250 verified service providers and 1,200 customers, we implemented community-based verification and culturally intelligent matching algorithms incorporating neighborhood reputation networks, language compatibility, and local context.

Results demonstrated an 87% reduction in service search time (from 3.2 days to 4.7 hours), 76% higher customer satisfaction, and a 63% decrease in income variance for service providers. Our AI matching achieved 92% accuracy by addressing contextual factors global platforms overlook.

This research demonstrates that contextually intelligent technology can effectively transform fragmented service markets in the Global South.

KEYWORDS:

Algorithmic matching, informal service sector, digital platform economy, trust mechanisms, service verification, AI-driven solutions

AN ADAPTIVE CONGESTION CONTROL MECHANISM FOR NANONETWORKS WITH NODE MOBILITY

1. Robert Mbassa

Student, Department of Networks, CoCIS, Makerere University

2. Bernard Muwonge

Lecturer, Department of Networks, CoCIS, Makerere University

ABSTRACT

Mobile nanonetworks, composed of mobile nanonodes, pose significant challenges for reliable communication due to frequent topology changes, limited computational resources, and severe energy constraints, all of which contribute to congestion.

There is a need to create congestion control mechanisms that are tailored to these specific constraints, especially for the mobile nanonetworks as the traditional reactive congestion control mechanisms are often inadequate in such dynamic environments for nanonetworks.

This research proposes a lightweight, and predictive and adaptive congestion control mechanism for high mobility nanonetworks. The model integrates predictive mobility modelling for nanonodes, and velocity-weighted density mapping to anticipate future congestion hotspots, enabling proactive routing decisions through a modification of the Stateless Linear Routing (SLR) protocol.

An evaluation of the proposed model through simulations highlighted a suitable mobility model for the mobile nanonetwork, which feeds into the proposed congestion control mechanism. The model demonstrated substantial improvements in dynamic congestion suppression, packet drop rate reduction, and buffer stability, validating the efficacy of the model in highly dynamic nanoscale environments.

KEYWORDS:

Kalman filter, nanonetworks, Ornstein-Uhlenbeck, Stateless Linear-path Routing, velocity-weighting

MATERIAL OF FOOD CALORIE PREDICTION USING DEEP LEARNING MOBILE NET

Methily Johri, Aditri Ashish
Galgotias University,
Gautam Buddh Nagar, Uttar Pradesh , India

ABSTRACT

Food is the Major need of Any Human Body, without food a human body cannot exist or survive. In the current scenario the lifestyle of modern life is changing day by day and with these changes the Composition of Human Body need also changes which include several consumptions or readymade foods.

With the excess of foods there is one issue which rises in our daily life are Obesity, Fat and these issues are generated due to over access of calorie to Human Body. In this Paper we aimed to prepare a solution of this problem.

Our Work is to first determine the Category of food and after predicting the category of Food (Fruit or Vegetable) Our System determining the Category of that Image (Either the Image is in the Category of Food or Vegetable) After Determining these Things We are predicting the Calorie of that Food as well.

In This Paper. Our Work is totally based on the Algorithm named as Mobile Net. Mobile Net is the Conjunction or the Deep learning and Transfer Learning that is used to recognize the image and based on the image it will Identify the Category. Our System Comprises with several segmentation and image parameters as well.

KEYWORDS:

MobileNet, Deep Learning, Transfer Learning, Streamlit, CNN

RESOURCE ALLOCATION AND SCHEDULING IN CLOUD COMPUTING

Methily Johri, Aditri Ashish
Galgotias University,
Gautam Buddh Nagar, Uttar Pradesh, India

ABSTRACT

Cloud computing technology virtualizes and offers several services across the network. It principally aims at scalability, availability, throughput, and resource utilization. Rising techniques specialize in scalability and availability.

However, cloud computing should be advanced to specialize in resource utilization and resource management. The cloud atmosphere, embedded with the nimbus and cumulus services can contribute a lot of in creating the responsibility of resource utilization in Cloud Computing.

Keeping in mind the processing time, memory usage, resource utilization based on CPU usage and throughput, the cloud atmosphere with the service node to manage all clients request, may give most service to all or any clients. Resource Scheduling and scheduling tasks separately involves more waiting time and response time.

A scheduling algorithm called as Linear Scheduling for Tasks and Resources (LSTR) is laid out, which performs scheduling of tasks and resources respectively. Here, the mixture of Nimbus and Cumulus services are imported to a server node to ascertain the IaaS cloud environment and KVM/Xen virtualization besides LSTR scheduling is employed to allot resources that maximize the system throughput and utilization of resources.

KEYWORDS:

Cloud Computing, Virtualization , KVM, Resource Allocation, Resource Utilization

ANPRS: AN AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM

1. Dr.Mayur Kumar Chhipa

Head of Engineering and Head of ODeL, ISBAT University , Uganda

2. Dr.Prashant Johri

Professor, Galgotias University, Gautam Buddh Nagar, Uttar Pradesh, India

ABSTRACT

India's developing wealth of urban sector has made vehicles the basic need. This has brought about a surprising public hassle - visitors manage and automobile identification. Parking areas at the moment are tight due to the increase in traffic congestion these days.

Automatic Number Plate Recognition system allows the user to identify the vehicle using number plates of the vehicle using an image processing technology. The ANPRS shows a vital work in indicating those problems, because application levels get right from entry of vehicles to parking lots to monitoring city traffic and monitoring vehicle theft.

There are many ANPRS packages to be had nowadays primarily based on distinct techniques. This paper, cross check many techniques and their mechanisms related to ANPRS. The ANPRS turned into applied the usage of fit templates and its accuracy become discovered at 82.7% on Indian quantity plates.

ANPRS is therefore a basic technology used to obtain a car registration code variety and, in turn, presents these facts inside the next segment of computer processing wherein facts may be translated, stored or matched to create an ANPRS-based software.

KEYWORDS:

Educational Institution, Automatic Number Plate Recognition System, Layout Comparison, Artificial Networks

EDUCATIONAL INSTITUTION, AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM, LAYOUT COMPARISON, ARTIFICIAL NETWORKS

Janati Nakimera

Hult International Business School, USA

ABSTRACT

This paper investigates the relationship between renewable energy adoption, GDP per capita, and carbon dioxide emissions within an ESG (Environmental, Social, and Governance) framework.

Addressing climate change requires a transition to sustainable energy solutions and a concerted effort to reduce global emissions. Using data from 2000 to 2020, we employ machine learning models (linear regression, decision tree, random forest, k-nearest neighbors, XGBoost) and time series forecasting (ARIMA) to analyze trends and predict future trajectories.

The results indicate a negative correlation between the share of renewables in energy consumption and CO₂ emissions per capita. We also discuss ethical considerations around Diversity, Equity, Inclusion, and Belonging (DEIB) and provide actionable insights for policymakers.

KEYWORDS:

renewable energy adoption, GDP, ESG (Environmental, Social, and Governance) framework, machine learning models.

BLOCKCHAIN TECHNOLOGY FOR SMART MATERIAL IN HEALTHCARE SYSTEM: A REVIEW

Deependra Rastogi

*Associate Professor, School of Computer Science and Engineering,
IILM University, Greater Noida, India*

ABSTRACT

The monetary area, store network the executives, food industry, energy area, web of things, and medical services are altogether utilizing blockchain as a safe and trustworthy stage for information sharing.

We assess the current examination and utilizations for blockchain innovation in the medical services area in this review. Besides, this exploration gives elective work processes to the medical services area that utilization blockchain innovation to further develop information the executives.

Utilizing the Ethereum blockchain stage, numerous clinical work processes including complex clinical tasks, for example, medical procedure and clinical preliminaries have been conceived and executed. Getting to and dealing with an immense volume of clinical information is likewise important for the set of working responsibilities.

The connected expense for the clinical savvy contract framework for medical care the board has been surveyed as far as an attainability study, which has been broadly revealed in this article, as a feature of the execution of the work processes of this framework. Numerous gatherings partaking in the clinical framework would profit from this work, which would empower them to give better medical care administrations at lower costs.

KEYWORDS:

Blockchain utilization; attainability; Ethereum; lower cost; develop information; innovation; healthcare; medical services; clinical framework

DATA SECURITY IN CLOUD COMPUTING USING CRYPTOGRAPHY ALGORITHMS

SHREYTA RAJ

*Institute of Technology and Science,
Mohan Nagar, Ghaziabad, Uttar Pradesh, India*

ABSTRACT

Cloud computing is the fastest growing technology nowadays. It provides services to the user over internet. Cloud is the group of data centers and servers that are located at different places. The main reason for using the cloud is that the user can store and access data in the cloud from anywhere anytime.

And the main advantage is that cloud services are cost efficient. This technology has changed the face of traditional computing technology. But concerns have been raised regarding the safety of the cloud environment.

Despite the hype surrounding cloud computing, customers remain reluctant to deploy their commercial enterprise into the cloud. Nevertheless, protection is the only major concern that hinders increased use of cloud computing. That's why a strong user authentication is the main requirement for cloud computing that reduces unauthorized user access of data on cloud.

This paper focused on the various cryptography algorithms that are mainly used to secure the data exchanged between the user in cloud computing.

KEYWORDS:

Cloud computing, data security, cryptography algorithms, unauthorized user access

FAREFLOW: AN IOT AND CLOUD-BASED SMART BUS FARE COLLECTION SYSTEM FOR SUSTAINABLE URBAN TRANSPORT

1. PUTSHU LUNGHE Samuel

*Student, Department of Electronics and Communication Engineering,
ISBAT University*

2. Dr. Mayur Kumar Chhipa

*Head of Department, Department of Electronics and Communication Engineering,
ISBAT University*

ABSTRACT

Public transportation in developing countries, including Uganda, continues to rely heavily on manual cash-based fare collection methods. These systems are prone to inefficiencies such as delays during boarding, revenue leakage, lack of transparency, and hygiene risks from physical cash handling.

This study proposes FareFlow, a smart RFID-based bus fare payment system that leverages Internet of Things (IoT) devices and cloud computing to address these challenges while contributing to the United Nations Sustainable Development Goals (SDG 9: Industry, Innovation & Infrastructure, and SDG 11: Sustainable Cities & Communities).

The system integrates an RC522 RFID reader with a NodeMCU ESP8266 microcontroller to enable contactless passenger identification and fare deduction. A GPS module provides real-time bus tracking, while cloud services based on Firebase Firestore and an Express.js backend manage user accounts, balances, and transaction logs.

FareFlow also features web-based applications for three stakeholder groups: passengers, bus operators, and administrators. Passengers can view balances, monitor transaction history, and receive SMS/email alerts. Operators gain real-time visibility of fare activities on their routes, while administrators access centralized dashboards for system oversight, card registration, and revenue analysis.

Prototype implementation and functional testing confirmed the system's reliability, with transactions processed in under 1.4 seconds and real-time updates synchronized across the cloud. Results demonstrate improvements in efficiency, accountability, and user convenience.

By enhancing operational transparency, reducing cash dependency, and enabling digital infrastructure for public transport, FareFlow illustrates how IoT and cloud technologies can support sustainable, inclusive, and resilient urban mobility in Uganda and similar contexts.

KEYWORDS:

RFID, IoT, Smart Transportation, Cloud Computing, Bus Fare System, Uganda, SDGs

HOW STUDENTS USE WHATSAPP TO ACCESS NEWS CASE STUDY: UNIVERSITY OF RWANDA - SCHOOL OF LAW, HUYE CAMPUS

Emmanuel HABİYAKARE

School of Journalism and Communication University of Rwanda

ABSTRACT

This study discussed that WhatsApp is a popular tool among university students and that students use it for accessing news. The following; this study found that students access news by WhatsApp where they access news by chatting; in this method the researcher found that students can text, record, and each other.

Besides, students access news by using another method of viewing WhatsApp status; in this method the research found that, someone can post a status and becomes easy for another one to view it when the number of each other is saved. Furthermore, the participants access news from WhatsApp groups; this method is how students can join many groups on WhatsApp.

In addition, this research was limited, the research is recommending other researchers for the studies that examine the effect of the use of WhatsApp or social media on students' learning performance, besides there is a need for empirical studies to explore how WhatsApp can help students in secondary school in Rwanda.

KEYWORDS:

WhatsApp, social media, students' learning performance, Rwanda

CHALLENGES AND OPPORTUNITIES IN INCORPORATING PROBLEM AND PROJECT-BASED LEARNING IN HIGHER EDUCATION

Deepak L. Waikar, Ph.D. and Saroj D. Waikar, M.B.B.S., M.D.
*Freelance Educators and Practitioners
The Republic of Singapore*

ABSTRACT

Student-centric approaches such as Problem-Based Learning (PBL) and Project-Based Learning (PjBL) can foster real-world problem-solving skills through critical thinking, to prepare students for the rapid technological advances and evolving demands of the 21st-century workforce.

Both PBL and PjBL promote self-directedness in students to acquire deeper conceptual understanding, as well as development of transferable skills such as communication and teamwork. For improving interactions, enhancing engagement, connecting with community, and involvement in real-world problems that can be implemented as projects, PBL and PjBL can provide pragmatic avenues.

Effectiveness of these approaches were observed in the review articles of Neroni & coauthors [1] and Rahman et al [2]. A small to moderate encouraging effect was reported by Wijnia et al [3]. They also observed interesting changes in beliefs, task value perceptions, and attitudes toward learning, particularly in STEM and healthcare disciplines [4]. Practitioners are adapting the educational philosophy of problem and project-based learning pedagogies [5].

In conclusion, integrating PBL and PjBL into higher education curricula offers a promising pathway to cultivate lifelong learners who are globally competent. However, increased faculty workload to design curricula and holistic assessment frameworks, and even-handed access to resources, are foreseeable challenges that can pave the way for future research on implementation of scalable models and longitudinal impact assessments, to systematically evaluate and sustain these pedagogies across diverse disciplines.

This presentation highlights how these challenges can be addressed and transformed into opportunities for enhancing student learning in line with the sustainable development goal 4 on enhancing quality education. The authors will also share their experiences as practitioners of PBL and PjBL as well as perspectives of the participants of the faculty development programmes they have conducted for the educational institutions of higher learning.

KEYWORDS:

Problem-Based Learning, Project-Based Learning, problem-solving skills, critical thinking, sustainable development goal 4, quality education

HARNESSING YOLO-BASED DIGITAL INNOVATION FOR SUSTAINABLE TOMATO DISEASE DETECTION IN UGANDA

Tekirya Brighton, Student, Bsc. Artificial Intelligence And Machine Learning,
ISBAT University, Kampala, Uganda, East Africa
Umesh Kumar, Lecturer, Faculty of Information and Communication
ISBAT University, Kampala, Uganda, East Africa

ABSTRACT

Agriculture remains the backbone of Uganda's economy, yet crop diseases continue to threaten sustainable productivity and food security. Tomatoes, one of the most economically valuable crops, are highly vulnerable to leaf diseases such as early blight, leaf miner, and leaf rust, which significantly reduce yields and farmer incomes.

Traditional disease detection methods rely on manual inspection, which is often delayed, inaccurate, and inaccessible to smallholder farmers. With advances in Artificial Intelligence (AI) and Deep Learning, new opportunities have emerged for real-time plant disease detection and improved decision-making in farming.

This study explores the use of the You Only Look Once (YOLO) object detection framework for leaf disease detection in tomato crops. Unlike conventional Convolutional Neural Networks (CNNs), which mainly focus on classification, YOLO integrates both classification and localization in a single step, offering superior accuracy and speed.

A curated dataset of tomato leaf images was used to train and evaluate the model, with performance measured in terms of precision, recall, accuracy, and mean Average Precision (mAP). Experimental results demonstrate YOLO's effectiveness in real-time object detection, outperforming standard CNN approaches and making it suitable for deployment in precision agriculture systems.

By enabling low-cost, scalable, and accessible disease detection tools, this innovation supports smart agriculture, enhances food security, reduces crop losses, and contributes directly to Uganda's agricultural transformation and the Sustainable Development Goals (SDGs).

KEYWORDS:

Leaf Disease Detection, Object Detection, Plant Disease Detection, Deep Learning, Precision Agriculture, YOLO, Smart Agriculture

CAMPUSBITE: A ROLE-BASED AI-POWERED FOOD DELIVERY PLATFORM FOR UNIVERSITY CAMPUSES IN UGANDA

1. Mukwaya Mark
2. Mbekeka Dianah

*Student, Department of Computer Science,
UICT, Kampala, Uganda*

ABSTRACT

Food delivery services are increasingly popular in urban areas, yet existing platforms in Uganda fail to address the unique needs of university students. Issues such as affordability, accessibility, and campus-specific restrictions remain unresolved.

This paper presents CampusBite, an AI-powered, role-based food delivery application designed for university campuses in Uganda. CampusBite integrates a role-based login system with distinct dashboards for administrators, vendors, riders, customer support, and students.

Built using Flutter and Dart with Supabase for backend and authentication, the platform employs Row-Level Security (RLS) for secure access control.

Features such as AI-driven food recommendations, geofencing, campus maps, and mobile money integration provide an affordable, accessible, and scalable solution. Pilot testing demonstrated reduced delivery times, improved affordability, and high adoption rates, suggesting that CampusBite can significantly enhance student welfare and operational efficiency in campus environments.

KEYWORDS:

Food Delivery, Role-Based Access Control, Supabase, Flutter, Uganda, AI Recommendations, Geofencing

DEVELOPMENT OF A SMART VEHICLE ANTI-THEFT SYSTEM SUPPORTING SUSTAINABLE CITIES AND CRIME PREVENTION IN UGANDA

1. Zacharie Masimango Mwakambaya
2. Dr. Mayur Chhipa Kumar

*Department of ECE,
ISBAT University, Uganda*

ABSTRACT

Vehicle theft remains a persistent challenge in Uganda, undermining personal security, disrupting trade, and threatening economic stability.

This paper proposes a digital vehicle security system designed to minimize theft and protect livelihoods. The system integrates embedded hardware with a mobile application to provide real-time monitoring of door status, engine activity, battery presence, vehicle location, and an innovative Engine Lock feature that restricts ignition to authorized personnel only.

By aligning with Uganda's development goals and the United Nations Sustainable Development Goals (SDGs), this digital solution demonstrates how locally engineered innovations can enhance safety, sustain livelihoods, and strengthen trust in digital infrastructure.

KEYWORDS:

Digital Solutions, Vehicle Security, Sustainable Development, Uganda, Internet of Things (IoT)

ADVANCED SMART ELECTRICITY METER WITH REMOTE MONITORING AND RECHARGE SYSTEM: AN IOT-BASED SOLUTION FOR MULTI-TENANT

1.Namurinda Alex

*Student, Department of Electronics and Communication Engineering,
Faculty of Information and Communication Technology, ISBAT University*

2.William Ahaisibwe

*Student, Department of Electronics and Communication Engineering,
Faculty of Information and Communication Technologies, ISBAT University*

3.Dr. Mayur Kumar Chhipa

*Head, Department of Electronics and Communication Engineering, Faculty
of Information and Communication Technologies, ISBAT University*

ABSTRACT

This research presents an innovative IoT-based Advanced Smart Electricity Meter with Remote Monitoring and Recharge System designed to address critical challenges in multi-tenant residential electricity management.

Traditional electricity distribution systems in apartments and shared accommodations suffer from lack of individual consumption monitoring, manual recharge processes, and frequent billing disputes among tenants.

The proposed system combines ESP32 S3 microcontroller technology, PZEM energy measurement modules, and solid-core Current Transformers to create a centralized smart meter capable of monitoring individual room consumption without expensive sub-metering installations.

The system utilizes a cloud-based database with a web-based interface to provide real-time consumption monitoring, remote balance recharging, automated billing, and comprehensive reporting capabilities. Implementation results demonstrate significant improvements in billing accuracy, user satisfaction, and energy management efficiency.

The system successfully eliminates billing disputes by ensuring transparent measurement of individual electricity consumption while providing convenient remote access capabilities for both tenants and property managers.

KEYWORDS:

Smart Electricity Meter, IoT-Based Energy Monitoring, Multi-Tenant Electricity Management, Remote Recharge System, Current Transformer Technology

PROTECTING HEALTHCARE AND MINIMISING SPREAD OF COVID-19

1.Ashish Sharma

*Department Of Technology, JIET, Jodhpur, Rajasthan,
India-342008*

2.Sujeet Kumar

Greater Noida Institute Of Technology, Greater Noida, UP, India-201308

ABSTRACT

Our ability to think and develop the technology is tremendously growing due to the major outbreak of the world. This paper is an overview of Artificial Intelligence and its importance in healthcare, the concepts behind this approach and its use cases in different fields.

Its impacts on our daily lives along with the future aspects and some new applications which has supported the patients of COVID-19 to recover. It aims at inspiring advanced research in the constantly evolving technology of AI. As we know that our ability to think regarding the technology is expanding, we came across the approach of ARTIFICIAL INTELLIGENCE (AI) in COVID-19.

Brief explanation about the concepts behind tackling the major epidemic situation of the world (COVID-19). The major topic of discussion will be about protecting the healthcare using smart AI applications. Starting from basic of AI, its history and all the technical concepts about fighting the pandemic situation.

Some brief read of the major articles of the major organizations working on AI and developments which has been suggested.

KEYWORDS:

COVID19, Pandemic, Corona Virus, Smart-AI, Artificial Intelligence

ETHICAL CHALLENGES IN NATURAL LANGUAGE PROCESSING: A COMPARATIVE STUDY OF SOLUTIONS ACROSS MULTIPLE DOMAINS

Khushi Singh, Sheetal Singh, Sujeet Kumar

Department of Computer Application

Echelon Institute of Technology, Faridabad, India, 121101

ABSTRACT

This comparative analysis explores the ethical dimensions of Natural Language Processing (NLP) by examining ten foundational publications in the field. Concerns about bias, privacy, fairness, and transparency have grown in significance as NLP applications spread across industries.

This paper examines different approaches researchers have taken in addressing these problems through a systematic review. The analysis highlights varying viewpoints on privacy in NLP systems while identifying common strategies for transparency and bias mitigation.

The study also considers broader societal implications of making ethical decisions in NLP research and development. This paper seeks to expand our knowledge of the ethical landscape in NLP and lay the foundation for further research and application by combining various points of view.

KEYWORDS:

Ethical considerations, Natural Language Processing(NLP), NLP ethics, Bias, Privacy, Fairness, Transparency, ChatGPT.

WINGS OF CARE: CLEAN COOKSTOVE INNOVATION FOR CLIMATE ACTION, PUBLIC HEALTH, AND GENDER INCLUSION IN KENYA

Valencia Owino

Founder, Wings of Care

Department of Computer Application

Echelon Institute of Technology, Faridabad, India, 121101

ABSTRACT

Household air pollution remains one of the most urgent yet overlooked contributors to poor health outcomes, environmental degradation, and climate change in Africa. In Kenya, over 80% of households still rely on charcoal or firewood for cooking, leading to high exposure to toxic smoke, deforestation, and carbon emissions.

This paper presents Wings of Care, a social innovation that addresses these interconnected challenges through the design, production, and distribution of affordable clean cookstoves made from recycled metal. The stoves are designed to reduce fuel consumption by up to 50% and lower smoke emissions significantly, thereby mitigating respiratory health risks while reducing carbon footprints.

Our research examines both the environmental and socio-economic impacts of the innovation. Data collected from over 800 households shows an estimated annual reduction of 1,200 tons of CO₂ emissions and the preservation of approximately 2,000 mature trees. In addition, families report annual savings of up to KES 15,000 on fuel costs and fewer cases of respiratory illness.

A unique feature of the model is the integration of women micro-entrepreneurs as last-mile distributors, which creates green jobs, enhances gender inclusion, and strengthens community-based climate resilience. The findings demonstrate that grassroots-led clean cooking solutions can simultaneously mitigate climate change, protect public health, and empower marginalized communities.

Scaling such innovations across Africa could accelerate progress toward SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 5 (Gender Equality).

KEYWORDS:

: Household air pollution, environmental degradation, climate change, affordable clean cookstoves, Kenya

AI IN AGRICULTURE: TRANSFORMING FARMING PRACTICES FOR SUSTAINABLE FOOD PRODUCTION

1.Wacal Gideon

*Student, Bachelors in Artificial Intelligence & Machine Learning,
ISBAT University, Kampala Uganda, East Africa*

1.Umesh Kumar

*Lecturer, Faculty of Information and Communication Technology
ISBAT University, Kampala Uganda, East Africa*

ABSTRACT

Smarter, data-driven, and more sustainable farming methods are made possible by artificial intelligence (AI), which is completely changing the agricultural industry. Agriculture is facing previously unheard-of difficulties due to the growing world population and rising food demand, such as labor shortages, climate change, and depletion of natural resources.

From precision farming and supply chain optimization to crop monitoring and disease detection, artificial intelligence (AI) technologies like machine learning, computer vision, robotics, and predictive analytics are being used at many points in the agricultural value chain. This essay examines how artificial intelligence (AI) is revolutionizing agriculture, emphasizing how it can boost output, lessen environmental effects, and encourage sustainable food production.

It also looks at the obstacles to adopting AI, such as infrastructure deficiencies, data privacy issues, and the digital divide in developing nations. The real-world uses of AI and its consequences for future food systems are demonstrated through case studies from both developed and developing nations.

The results imply that although AI has enormous promise, inclusive access to technology, cooperative stakeholder groups, and supportive legislation are necessary for its success. This study comes to the conclusion that AI is a catalyst for reconsidering global agricultural practices in order to achieve food security and sustainability, rather than just a tool for automation.

KEYWORDS:

Robotic Surgery, medical robotics, surgery, surgical robots.

A REVOLUTION FOR ROBOSURGERY: RESEARCH CHALLENGES

1. Himanshu Dubay 2. Rooma Singh 4. Saru Bajwa

Greater Noida Group of Institute Greater Noida, U.P, INDIA-201308,

3.Sujeet Singh

Greater Noida Institute of Technology Greater Noida, U.P, INDIA-201308

ABSTRACT

For far more than two decades, surgical robots were the topic of research. While this research has been going on, only a few companies have been able to reap the benefits of it and undertake clinical trials on human beings.

Even though more research is being done, there have been much fewer causality testing than expected. In this study, many of the problems stem from the medical and business environments in which they are working, rather than from technology itself. Some suggestions are made in an attempt to boost the amount of medical systems already in use.

More patients will benefit as the number of manufacturing systems grows in the future. The use of medical robots is producing a paradigm change in the treatment of patients. Da Vinci, Intuitive Surgical most popular surgical robot, has been mentioned in over 4,000 peer-reviewed publications, has been cleared by the FDA for various areas of operations, and was used in 80 percent of radical tumor shrinkage performed in the United States in 2008, just 9 years after the system went on the market.

Surgeon and patient compliance of laparoscopic operations and robotic aid are fueling the fast expansion of medical robotics. As with any technology-driven revolution, new applications for medical robots are always being developed. Assistive robots may make life better for elderly and chronically ill patients in their own homes or in health care facilities.

KEYWORDS:

Robotic Surgery, medical robotics, surgery, surgical robots.

DATA TO DIAGNOSIS: A SYSTEMATIC REVIEW OF AI/ML IN HEALTHCARE

Sheetal Singh, Khushi Singh, Sujeet Kumar

Department of Computer Application

Echelon Institute of Technology

Faridabad, India, 121101

ABSTRACT

Artificial Intelligence (AI) and Machine Learning (ML) are fast revolutionizing the diagnosis of healthcare by augmenting accuracy, speed, and efficiency. AI/ML technologies facilitate earlier and more accurate disease identification with advanced algorithms for image processing, predictive modelling, and pattern recognition, frequently outperforming conventional diagnostic techniques.

This review delves into the key contribution of AI/ML in contemporary healthcare, such as its use in clinical data analysis, imaging reports, and patient histories to enable more timely and informed diagnoses. Emphasis is given to real-time diagnostic functions based on AI/ML, whose potential to streamline processes, eliminate diagnostic errors, and maximize resource allocation is stressed.

Data security, ethical considerations, algorithm openness, and regulatory compliance are some of the obstacles that must be properly addressed despite their revolutionary potential. This paper gives an extensive overview of contemporary AI/ML deployments in medical diagnostics, advantages they bring, and challenges that need to be overcome to realize safe, efficient, and large-scale implementation.

KEYWORDS:

Artificial Intelligence (AI), Machine Learning (ML), healthcare diagnostics, real-time diagnosis, predictive modeling, image processing, clinical data analysis, medical imaging, pattern recognition, diagnostic accuracy, early disease detection, electronic health records (EHR), algorithm transparency, ethical considerations in AI, data security in healthcare, regulatory compliance, AI in medical decision-making, diagnostic automation, resource optimization, AI-based healthcare systems

AN ARTIFICIAL INTELLIGENCE (AI) POWERED TOOL FOR PROVIDING TREATMENT OPTIONS AND DIAGNOSIS TO HYPERTENSIVE PATIENTS.

1. Nakatudde Harriet

Electrical and Electronics Engineering, Uganda Institute of Information and Communications Technology (UICT)

2. Sserunjogi Derrick

Electrical and Electronics Engineering, Nakawa Vocational Training College (NVTC)

3. Sserunjogi Derrick

Information Technology, Uganda Technology and Management University (UTAMU)

ABSTRACT

Hypertension affected over 1.2 billion adults worldwide, with many lacking timely diagnosis and personalized treatment. This project aimed to develop an AI-driven tool integrated with a wearable telemedical bracelet to improve hypertension management.

We employed machine learning algorithms to analyze patient demographics, medical history, lifestyle factors, and real-time blood pressure data. The system was prototyped using an ESP 32 microcontroller, Max30102 pulse oximeter sensor, GSM module, and accompanying mobile application (Pulse pal). A pilot test involving ten users demonstrated improved monitoring accuracy and patient adherence.

The results showed a 20% improvement in early detection and a 30% increase in treatment compliance. We concluded that the AI-powered system significantly enhanced hypertension management, reduced healthcare costs, and increased access for remote populations. Recommendations included scaling to larger trials and integrating additional health metrics.

KEYWORDS:

Electronics, hypertension, blood pressure alert bracelet.

AI-POWERED AUTO NAVIGATION WHEELCHAIR

Opolot Justine

*Lecturer, Faculty of ICT
ISBAT University*

ABSTRACT

Mobility impairments significantly impact the independence and quality of life of millions worldwide, necessitating innovative solutions to assist affected individuals. This paper presents the design, implementation, and evaluation of an AI-powered auto-navigation wheelchair, an intelligent assistive device aimed at providing enhanced autonomous mobility and safety for users with physical disabilities.

Unlike conventional powered wheelchairs that require manual operation, the proposed system integrates state-of-the-art artificial intelligence algorithms with multi-sensor fusion, enabling real-time environmental perception, dynamic path planning, and autonomous navigation in complex and unstructured indoor and outdoor environments.

The system architecture leverages the Robot Operating System (ROS) framework to coordinate inputs from LiDAR sensors, ultrasonic rangefinders, and GPS modules, facilitating accurate mapping and continuous obstacle detection. Advanced AI techniques, including convolutional neural networks for object recognition and reinforcement learning for adaptive route optimization, are employed to ensure robust navigation even in dynamic settings.

User interaction is facilitated via multiple accessible interfaces such as voice commands, gesture recognition, and a mobile application, designed to accommodate users with varying degrees of physical capabilities.

Experimental results from prototype testing demonstrate that the wheelchair can successfully navigate cluttered indoor spaces and outdoor pathways while avoiding obstacles, maintaining safety, and minimizing user intervention.

This research contributes to the field of assistive robotics by providing a scalable, adaptable solution that not only reduces user fatigue and caregiver dependency but also enhances autonomy and safety for wheelchair users. Future directions include the integration of health monitoring sensors and AI-driven predictive maintenance to further improve user experience and system reliability.

KEYWORDS:

Autonomous Wheelchair, Assistive Robotics, Artificial Intelligence, Multi-Sensor Fusion, Path Planning, Human-Machine Interface

ETHICAL CHALLENGES IN NATURAL LANGUAGE PROCESSING: A COMPARATIVE STUDY OF SOLUTIONS ACROSS MULTIPLE DOMAINS

Khushi Singh, Sheetal Singh, Sujeet Kumar

Department of Computer Application

Echelon Institute of Technology, Faridabad, India, 121101

ABSTRACT

This comparative analysis explores the ethical dimensions of Natural Language Processing (NLP) by examining ten foundational publications in the field. Concerns about bias, privacy, fairness, and transparency have grown in significance as NLP applications spread across industries.

This paper examines different approaches researchers have taken in addressing these problems through a systematic review. The analysis highlights varying viewpoints on privacy in NLP systems while identifying common strategies for transparency and bias mitigation.

The study also considers broader societal implications of making ethical decisions in NLP research and development. This paper seeks to expand our knowledge of the ethical landscape in NLP and lay the foundation for further research and application by combining various points of view.

KEYWORDS:

Ethical considerations, Natural Language Processing(NLP), NLP ethics, Bias, Privacy, Fairness, Transparency, ChatGPT.

EFFICIENT SPECTRUM UTILIZATION USING OCCUPANCY PREDICTION

AGABA COLLIN

Member, IEEE

Uganda Communications Commission

ABSTRACT

Given the finite nature of the radio frequency spectrum and the explosive growth of wireless communications, efficient spectrum utilization is more critical than ever. Traditional static regulatory tools are limited by unflexible spectrum planning rules in determining spectrum usage.

Furthermore, spectrum band occupancy detection gets complicated in an environment with varying noise levels, making adaptive solutions essential. This research leverages adaptive threshold techniques to dynamically respond to shifts in the radio environment and signal characteristics, ensuring more accurate and robust spectrum sensing.

Regulators often assign spectrum to operators with the expectation of efficient utilization. However, some assignees do not deploy the spectrum as agreed, leading to underutilization and breach of licensing conditions. To address this challenge, this paper proposes a novel approach using Kriging interpolation, a statistical technique to enable prediction of spectrum occupancy in areas where physical visits are not feasible.

KEYWORDS:

Spectrum sensing, ITU-R SM.1809, Spectrum occupancy, Kriging interpolation model, Static threshold, Spectrum occupancy prediction.

HYBRIDITY AS AN ENABLER OF CBC IN HIGHER EDUCATION

1. Tabo Olok Geoffrey

Department of Computer Science, Gulu University

2. Okot David Pakono

Directorate of ICT Services, Gulu University

ABSTRACT

The need to redesign delivery of education to address society challenges is long overdue. We tackle this through introduction of PBL Hybrid in selected masters' programmes at Gulu University.

In this article we explore hybrid models for integrating 21st century skills to the learners in addition to challenges and opportunities with these models. We draw on expansive learning theory to explicate the learning cycles. Based on social constructivist paradigm, qualitative approach with workshops and focused groups as data collection methods.

Participants were purposively selected based on interest and roles as required in the project. Data analysis followed a six phased reflexive thematic analysis. Results indicates that change in delivery in higher education is slow and that teachers are enthusiastic to learn new ways of teaching.

Information Technology Infrastructure and physical infrastructure are important in shaping the new practice in higher education. In conclusion, we noted that competency based curriculum is not new in higher education because there has been attempts from medical and engineering sciences to train artisans. PBL Hybrid presents an opportunity and is preferred by teachers following the COVID-19 experiences.

KEYWORDS:

PBL-Hybrid, expansive learning, Competency Based Curriculum, Higher Education

DIGITAL MARKETING, RENEWABLE ENERGY AND ADOPTION OF CLEAN COOKING PRACTICES IN NORTHERN UGANDA

Awacorach Judith
Gulu University

ABSTRACT

Access to affordable, available, and reliable energy remains a persistent challenge in rural Northern Uganda. The vast majority of households in this region depend on biomass fuels like firewood and charcoal for their daily energy needs.

Renewable energy technologies (RETs), particularly solar home systems, mini-grids, and improved cook stoves, offer pathways to sustainable energy access, improved health outcomes, and environmental protection. However, adoption rates are low due to affordability barriers, limited awareness, cultural perceptions, and infrastructural constraints.

This study reflects on the role of digital marketing as a catalyst for renewable energy adoption among rural households in Northern Uganda, exploring how digital marketing can change the landscape of adoption of renewable energy. Drawing on the Sustainable Livelihoods Framework (SLF): The paper examines how mobile platforms, social media, and community-driven digital campaigns are reshaping household perceptions of renewable energy by highlighting how energy choices intersect with assets (natural, financial, human, physical, and social capital).

Evidence highlights that mobile money-enabled pay-as-you-go systems, SMS-based sensitization campaigns, and localized social media storytelling can increase awareness, reduce mistrust, and improve affordability of RETs. Nevertheless, challenges persist regarding digital literacy, rural connectivity, and the cultural alignment of messages.

The paper concludes that, when integrated with community influencers and livelihood-sensitive financing mechanisms, digital marketing offers a transformative approach to accelerating renewable energy transitions in resource-constrained rural settings. This informs policy debates on inclusive energy transitions and highlights the significance of strategies that are culturally grounded and digitally enabled in Uganda.

KEYWORDS:

Renewable energy technologies, Sustainable Livelihoods Framework, Renewable Energy, Clean Cooking Practices, Northern Uganda

AN IOT SYSTEM TO CURB VANDALISM ON TRANSMISSION NETWORKS: A CASE OF UETCL

1. Benjamin Patrick Makanga

*School of Engineering, Department of Electrical and Computer Engineering,
Makerere University*

2. Florence Konga Simon

*School of Engineering, Department of Electrical and Computer Engineering,
Makerere University*

ABSTRACT

The Uganda Electricity Transmission Company Limited (UETCL) faces a major problem of vandalism of high-voltage transmission infrastructure, posing a critical threat to Uganda's electricity grid. Vandalism causes equipment losses, service disruptions, and escalating maintenance costs.

This research presents an Internet of Things (IoT)-based monitoring system designed to provide real-time detection and intelligent classification of vandalism attempts on transmission towers. The system uses a set of sensors, integrating motion sensors, accelerometers for tamper detection, and piezoelectric vibration sensors to detect structural disturbances.

A key innovation is the use of a lightweight machine learning (ML) model deployed on a Raspberry Pi, which distinguishes between human intruders and animals with high accuracy, significantly reducing false alarms. Sensor data and classified images are transferred securely via MQTT protocol over cellular networks to a Flask-based web dashboard.

Laboratory testing demonstrated alert generation times of 2-6 seconds, with the ML module achieving 95% accuracy in human-animal classification. The conventional monitoring system showed 32% false alarm rates, which reduces greatly with IoT integration, representing a promising improvement in detection reliability.

KEYWORDS:

Electricity transmission networks, vandalism detection, Internet of Things (IoT), Machine Learning (ML), Uganda Electricity Transmission Company Limited (UETCL), Message Queuing Telemetry Transport(MQTT).

ENERGY-EFFICIENT COGNITIVE RADIO SENSOR NETWORKS FOR SMART HEALTHCARE: AN AI APPROACH

Amrit Mukherjee

Department of Computer Science, University of South Bohemia, Ceske Budejovice, Czech Republic

ABSTRACT

Smart healthcare demands continuous, reliable, and secure patient monitoring while operating under stringent energy constraints on wearable and ambient sensors. Cognitive Radio Sensor Networks (CRSNs) offer dynamic spectrum access to alleviate congestion and interference in crowded medical environments; however, realizing energy efficiency without compromising latency, reliability, and privacy remains challenging.

This paper proposes an AI-driven framework for energy-efficient CRSNs tailored to smart healthcare, unifying cross-layer power management, spectrum sensing, and adaptive communication through data-driven decision policies. First, the work formulate patient-centric quality-of-service objectives that jointly consider delay-sensitive biosignals, reliability thresholds for clinical safety, and regulatory coexistence constraints with primary users.

Second, proposed work develop a lightweight deep reinforcement learning (DRL) policy that coordinates spectrum sensing dutycycling, channel selection, and transmit power control, while a complementary tinyML module predicts traffic bursts from physiological dynamics to preemptively allocate resources. Third, the proposed framework introduce an uncertainty-aware sensing scheme that combines cooperative observations with noise-robust feature learning to sustain high detection probability at ultra-low sampling budgets.

To ensure real-time applications, the proposed model uses compression (quantization and pruning) with on-node scheduling and a wake-up radio trigger and therefore minimizing the computation and radio on-time. Simulations were performed on random hospital-home scenarios and hardware-in-the-loop experiments with commercial sensor motes demonstrate up to 45–60% reduction in energy consumption as compared with the static CRSN baselines, while meeting primary-user protection and achieving sub-150ms end-to-end latency for high-priority streams.

Finally, the work discusses privacy-by-design measures by including on-device inference and differential-noise masking for feature telemetry, and provide an open, reproducible toolkit with reference implementations. The results indicate that Alguided CRSNs can deliver relevant reliability and responsiveness energy-efficiently by preparing a scalable direction for continuous, at-home and in-hospital smart healthcare monitoring.

KEYWORDS:

Cognitive Radio Sensor Networks, Energy Efficiency, Machine Learning, Random Forest, Neural Networks

AI FOR FLEXIBLE PAYMENT SYSTEMS IN AFRICA: REDUCING FINANCIAL STRESS FOR INFORMAL WORKERS IN AFRICAN CITIES

Hareesh Kumar

PhD Candidate

ISBAT University, Kampala, Uganda

ABSTRACT

In African cities, the rigid requirement to pay large expenses such as rent on a monthly basis or school fees in termly lump sums clashes catastrophically with the irregular daily incomes of the vast informal workforce. This fundamental mismatch is a primary driver of housing insecurity, educational disruption, constant anxiety and preventable evictions or school dropouts for low-income families.

This research project confronts a pressing question: Can artificial intelligence help design fair flexible payment plans that stabilize access to housing, education and essential services for tenants and families while also guaranteeing reliable income for landlords, schools and service providers? Our overarching purpose is to move beyond hype and generate rigorous, actionable evidence on the real opportunities and risks of using AI for social good in the livelihoods sector. We specifically aim to ensure these technologies reduce rather than worsen existing inequalities.

The project will work intimately with tenants, landlords, parents, schools, utility providers and community organizations. We will gather detailed stories and financial data to understand the reality of their economic lives. Using this information, we will employ AI as a sophisticated simulation tool to safely test thousands of potential payment model such as small daily deductions or payments based on a percentage of daily earnings without any real-world risk. Crucially, our analysis will explicitly focus on uncovering the differential impacts of these models on women, youth and persons with disabilities.

The expected outcomes are designed for direct use by decision-makers. Outputs will include a robust dataset on income volatility; clear metrics on the potential to reduce evictions, school dropouts and service disruptions; an inclusive analysis of benefits and risks for marginalized groups; a policy brief with ethical guidelines for governments; and practical toolkits for landlords, schools and community organizations.

The ultimate outcome of this research is to provide the foundational evidence needed to transform policy and practice leveraging technology to build economic resilience and dignity for Africa's informal workers and their families.

KEYWORDS:

practice leveraging technology, AI, flexible payment systems, Africa

DESIGN, DEVELOP AND IMPLEMENTATION OF FINGERPRINT IGNITION SYSTEM WITH GPS TRACKING AND GEOFENCING (TWO FACTOR AUTHENTICATION USING BOTH A KEY AND FINGERPRINT)

TUMUHIMBISE KARINKIZA
St. Lawrence University (SLAU)

ABSTRACT

Revolutionizing Vehicle Security through Integrated GPS Tracking and Fingerprint Ignition. This project endeavors to pioneer a transformative solution for enhancing vehicle security and monitoring capabilities by integrating a GPS Tracking System with a Fingerprint Ignition System.

The amalgamation of Arduino Nano, GSM module (SIM800C), GPS module, and capacitive fingerprint sensor forms the foundation of this comprehensive approach. The GPS tracking component provides real-time and historical location data, offering precision and accuracy in vehicle monitoring.

Concurrently, the Fingerprint Ignition System adds a robust layer of security, allowing only authorized users to start the vehicle. The systematic implementation, involving meticulous coding, testing, and security protocols, ensures the reliability and efficiency of the integrated system.

User-friendly mobile applications and a web dashboard empower users with remote control and real-time insights. This project not only addresses the existing challenges in vehicle security but sets a new standard for innovation, usability, and security in the dynamic landscape of automotive technology.

KEYWORDS:

GPS Tracking, Fingerprint Ignition, Arduino Nano, GSM module, mobile applications

SAFEANGLE: LEVERAGING IOT AND SMS TECHNOLOGY FOR REAL-TIME GENDER-BASED VIOLENCE RESPONSE IN UGANDA'S UNDERSERVED COMMUNITIES

Saul Kabali, Messach Luminsa Samuel, Janet Nabaloga, Katende Richard,
Kamya Ambrose

SafeBangle Technologies, Uganda

ABSTRACT

Gender-based violence (GBV) remains a significant barrier to achieving SDG 5 (Gender Equality) in Uganda, where 34.1% of women report experiencing GBV, rising to over 50% among adolescents aged 15–19 (Makerere University School of Public Health, 2024).

Beyond immediate physical harm, GBV in Kampala's informal settlements has been linked to poor mental health outcomes: 37% of women screened positive for depression and 30% for anxiety, with emotional violence significantly increasing risk for both.

SafeBangle Technologies has developed a culturally appropriate wearable device that addresses critical gaps in GBV reporting and response. Designed to resemble traditional beadwork jewelry for discretion and cultural acceptability, the bracelet enables women to send location-based emergency alerts to trusted contacts via SMS at the press of a button. Critically, it functions without internet connectivity, addressing Uganda's infrastructure limitations.

Through the PEER research project, 72 women in Kampala's informal settlements received SafeBangles. Twenty-two real emergency activations were recorded, with response times reduced by 63% (from 47 to 17 minutes). User feedback highlighted the bracelet's acceptability: "When I press my SafeBangle, I know someone is coming for me."

The bracelet looks like traditional jewelry, so nobody knows it's actually a safety device." Iterative development with Makerere University's Resilient Africa Network (RAN) Lab incorporated user feedback from both urban Kampala and rural Karamoja. Recently recognized with the 2024 World Summit Award, SafeBangle demonstrates how locally developed technologies can bridge cultural context, public health evidence, and digital innovation to strengthen community safety systems and advance gender equality in resource-constrained settings.

KEYWORDS:

SafeBangle Technologies, Gender-based violence, IoT and SMS technology, Resilient Africa Network

ICT CLUB COMPETITION

Central Region



Eastern Region



Northern Region



Western Region





FutureGateway is the registered tradename of the ERP systems developed by FTL. FutureGateway ERP system is a base ready fully featured Web Based ERP system with user-friendly interface designed for Small, Medium and Large-scale industries. FutureGateway ERP is featured with various detailed analytical reports for each module along with Graphical Dashboards to empower members of the top management and middle management to take appropriate strategic business decisions. FutureGateway ERP system supports multiple business units and multiple branches in the same application interface and is designed to support concurrent users with defined access rights. The system has enhanced features like managing transactions in each module, instant Email & SMS integration with scheduled email facility for required reports and messaging, making it truly versatile and intelligent.

With a detailed training and implementation plan along with local expertise on support and maintenance, the company has successfully implemented FutureGateway ERP systems at small, medium and large organizations, having more than 30 installations across East Africa. FutureGateway has a Modular System Architecture giving clients flexibility to choose modules as per requirements and has a scalability of integrating 3rd party applications apart from adding any customised modules as per business requirements.

Future Technologies can be your one stop Business Solutions and Analytics partner for Business Process Reengineering, Solution Architecture, Analytic tools, Training & support, customization for changing needs, and system scalability for business growth.

Software Systems are fully engineered and developed in Uganda, supporting the BUBU policy of the Government of Uganda



One network, endless possibilities
Affordable. Reliable. Limitless.

- ♡ Voice Calls
- ♡ More Data
- ♡ Lyca Money*