ASSOCIATION OF NIGERIAN SCHOLARS IN HONG KONG

ANSHK

ASSOCIATION OF NIGERIAN SCHOLARS IN HONG KONG

ANNUAL RESEARCH FORUM

ADVANCES IN GENERATIVE AI AND MACHINE LEARNING: EXPLORING CROSS-DISCIPLINARY IMPACTS AND OPPORTUNITIES

RESEARCH FORUM PROCEEDINGS

Saturday, August 9th, 2025

Prepared by the 2025 Research Forum Committee:

Dr. Sopuruchi Aboh ‖ Ms. Linda Mgbechidinma ‖ Mr. Basit Adigun ‖ Mr. Ajibola Ogunsola ‖ Mr. Utibe Akpan

Acknowledgments

The 2025 ANSHK Research Forum Committee sincerely appreciates the 2024/2025 ANSHK Executive Board for the opportunity to serve the Association in this capacity. Our gratitude goes to every member of the association (current and alumni) and other scholars across the globe who, through their presentations, contributed to the success of the Forum this year. Specifically, we acknowledge the contributions and commitment of the following individuals:

Patron

1. Professor Lawal M. Marafa   -   Chinese University of Hong Kong

Keynote Speaker

1. Dr. Adesola Ademiloye   -   Swansea University

Guest Speakers

1. Dr. Juliet Ezulike   -   Hong Kong Polytechnic University
2. Dr. Abd'gafar Tunde   -   Chinese University of Hong Kong

Session Chairs

1. Dr. Kayode Oyesina   -   City University of Hong Kong
2. Dr. Sopuruchi C. Aboh   -   The Hong Kong Polytechnic University
3. Mr. Ajibola Ogunsola   -   The University of Hong Kong
4. Ms. Chiamaka Mgbechidinma   -   Chinese University of Hong Kong
5. Mr. Basit Adigun   -   The Education University of Hong Kong
6. Mr. Utibe Akpan   -   Hong Kong University of Science and Technology

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Foreword

Dear Esteemed Readers,

With great pleasure, I present the foreword for the 2025 Proceedings of the Association of Nigerian Scholars in Hong Kong (ANSHK) Research Forum. Scheduled for August 9th, 2025, this annual event serves as a reliable medium for intellectual discourse among scholars. Within its congenial and less-formal ambiance, participants share their research, sparking dialogues that ignite novel ideas and foster interdisciplinary collaborations.

In our dynamic world grappling with artificial intelligence, the 2025 Research Forum is themed "Advances in Generative AI and Machine Learning: Exploring Cross-disciplinary Impacts and Opportunities". This theme is justified because it allows us to address the multifaceted impacts and opportunities of integrating AI and machine learning in various fields.

We express our gratitude that this year's forum garnered a substantial number of abstract submissions. This is a testament to the keen interest this discourse ignited among our members and the wider public. Drawing from a total of 31 presentations (including 28 confirmed abstracts, 1 keynote speaker, and 2 guest speakers) hailing from Hong Kong, the UK, and Nigeria, the forum is structured into three plenary sessions. These sessions spotlight cutting-edge research across Science & Technology, Engineering & Mathematics, and Social Sciences & Humanities. Moreover, we are thrilled to announce the ANSHK Top Presenters' Award for the fourth consecutive year. Recognizing outstanding efforts, this award encourages presentation excellence in customized certificates.

Anticipate an informative and engaging 2025 Research Forum, where curiosity thrives as we learn, connect, and explore together. On behalf of the 2024/2025 Executive Board and the 2025 Research Committee, I extend heartfelt thanks to all reviewers, speakers, and participants. Welcome to the Forum, and may your experience be delightful.

Dr. Sopuruchi ABOH
Chair, 2025 ANSHK Research Committee

Introductory remarks

My Esteemed Colleagues, Distinguished Guests, and Honoured Participants,

It is with immense pride and a deep sense of honour that I officially welcome you to the 11th Annual Research Forum of the Association of Nigerian Scholars in Hong Kong (ANSHK). This gathering represents not just another meeting but a testament to our unwavering commitment to academic excellence, intellectual collaboration, and the relentless pursuit of knowledge that transcends borders.

This forum has grown into a vibrant platform—uniting brilliant minds to tackle pressing global challenges. Here, we exchange ideas, challenge norms, and build partnerships to create a better world.

To every participant here today, whether a longstanding member or a first-time attendee, your presence speaks volumes about your dedication to research and innovation. You are the driving force in our society, and your passion truly inspires us. To our distinguished keynote and guest speakers, we extend our deepest gratitude for gracing us with your wisdom. Your insights will undoubtedly ignite new ideas, spark transformative discussions, and propel us toward greater heights of achievement.

For the sixth year, we meet virtually, transcending distance to connect with scholars worldwide. This digital space expands our potential, and we embrace its opportunities.

On behalf of the ANSHK, I must acknowledge the extraordinary efforts of our Organising Committee, led by the tireless Dr. Sopuruchi Aboh, alongside Mr. Ajibola Ogunsola, Mr. Utibe Akpan, Mr. Basit Adigun, and Mrs. Linda Mgbechidinma. Their tireless dedication has been the backbone of this event, and we owe today's success to their unwavering commitment.

To all participants, I urge you to seize this opportunity: engage deeply, network widely, and let the knowledge exchanged here today fuel your aspirations. May this 11th Annual Research Forum not only meet but surpass your expectations, lighting the way toward a future brimming with possibility and progress.

Welcome once again. Together, let us embark on this journey of discovery, innovation, and collective growth.

Thank you. Long live ANSHK! Long live knowledge!

Davies Iyinoluwa Esegbuyotaroghene Emmanuel
ANSHK President (2024/2025 Session)

Programme and presentation schedule

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NATIONAL ANTHEM			
Time (HKT)	Event		
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3 mins 14:11 – 14: 14	Dr. Sopuruchi Aboh *Chair, 2025 Research Forum Committee*	Introductory Remarks	The Hong Kong Polytechnic University, Hong Kong SAR
10 mins 14:14 – 14:24	Prof. Lawal M. Marafa *Patron*	Patron's Address	Chinese University of Hong Kong, Hong Kong SAR
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CHAIR			
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15:31 – 15:41	Israel Taiwo Olanipekun and Gabriel Olukayode Ajayi;	Amuofu Eniyoke, V. E. Okereke, Abubakar Garba	Abdulwasiu Abdulhafeez; Enhancing cloud resource

	Antioxidant activity and *in silico* analysis of vaco polyherbal extract: a potential antidiabetic polyherbal formulation	Comparative analysis of the use of supervisory strategies of school administrators in public and private primary schools in Bauchi State, Nigeria: Implications for data-driven decision-making in education	allocation with Deep Q-Learning and Ant Colony Optimizer
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15:53 – 16:03	Onyeberechi Chiagozie; Generative artificial intelligence & machine learning in ophthalmic imaging and eye care: Clinical applications for enhanced diagnosis, equity, and patient care	Ngozi Okonkwo; Edith Anyanwu; Veronica Ubi Interdisciplinary collaboration as a pathway to increased awareness and use of generative AI among Nigerian university lecturers	Waliu, A. Abdulrasheed; Abass, O. Alade; Ibrahim, O. Tijani; Abdulganiy, O. Yusuf; Mujeeb, O. Olarinde; Fahidah, O. Oladimeji; Kayode, P. Ilori; Mustapha, A. Saminu; and Tinuade, J. Afolabi Adsorption of Methylene Blue from simulated wastewater using Tithonia Diversifolia xylem-based cellulose: Kinetic and agitation studies
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16:15 – 16:25	Amodu Godwin; Oni Mary; Friday Achenyo Peace; Ojo Dorcas Bisola; Jonathan Achika Ilemona; Sunday Ene-ojo Atawodi Leveraging Generative AI in drug discovery: Unlocking the therapeutic potential of African medicinal plants	Olua Sylvanus; Timothy Jonah Influence of AutoCAD on students' motivation and achievement in technical drawing in Plateau State, Nigeria	Sofekun, M.A; Adeyemi, I.T; and Awojobi, F.O; Can generative AI preserve statistical properties? A study on distributional consistency in synthetic data

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SECTION 1:

SCIENCE AND TECHNOLOGY

ANTIOXIDANT ACTIVITY AND IN SILICO ANALYSIS OF VACO POLYHERBAL EXTRACT: A POTENTIAL ANTIDIABETIC POLYHERBAL FORMULATION

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Diabetes is a global health concern, and traditional medicine offers alternative remedies, but their efficacy and phytochemical profiles are often unknown. This study investigated the phytochemical composition, antioxidant potential, and molecular docking of a polyherbal extract containing Vernonia amygdalina (V), Azadirachta indica (A), Citrus aurantifolia (C), and Ocimum gratissimum (O) (VACO).

Phytochemical analysis was carried out by GC-MS analysis; in-vitro antioxidant activity was determined using 2,2-diphenyl 1-picrylhydrazy (DPPH) and Ferric Reducing Antioxidant Power (FRAP) assays, and molecular docking analysis of some compounds revealed by GC-MS was also carried out. The GC-MS analysis revealed dimethyl sulfoxide (44%), n-hexadecanoic acid (12.4%), phytol (8.5%), and ethyl 6,9,12-hexadecatrienoate (6.6%) as the major phytocompounds present in the VACO extract. In vitro antioxidant assays demonstrated an increased value in antioxidant activity as the concentration of VACO extract increased, while 6-methoxybenzofuroxan and glycerol 1-palmitate had the highest docking score of -7 against human β-glucosidase. The results showed that the VACO polyherbal formulation contains phytochemical compounds and possesses antioxidant activity.

The molecular docking showed that there was high interaction of some VACO compounds with β-glucosidase, an antidiabetic enzyme. These findings suggest that VACO polyherbal formulation may have antidiabetic potential, which may be due to the presence of identified phytocompounds and its antioxidant activity.

Keywords: Diabetes, polyherbal extract, VACO, antioxidant activity, molecular docking.

BARRIERS TO GENERATIVE AI ADOPTION IN NIGERIAN SMES: A TOE FRAMEWORK PERSPECTIVE

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Considering the revolutionary nature of Generative Artificial Intelligence (GenAI), this research gathers that its adoption by Small and Medium Enterprises (SMEs) in Africa, particularly Nigeria, remains limited and underexplored. To address this gap, this current research explores the crucial TOE (technological, organizational, and environmental) constraints of using GenAI among SMEs in Kano State, the nation's commercial center, in open consideration of firms with social innovation and inclusive innovation aims. Using the Technology–Organization–Environment model, this present research describes how infrastructural constraints, organizational readiness, and uncertainty regarding the environment of regulation decide the adoption options. However, GenAI adoption was used as a unidimensional variable. The study population comprises 1,794,358 registered SME owners in Kano State, of which Taro Yamane's (1967) formula for sample size determination was used to arrive at a sample size of 400. Data was collected using a questionnaire and analyzed using Structural Equation Modelling (SEM) through SMART-PLS. The analysis shows that the technological factor significantly and positively affects generative AI adoption (β = 0.203, t = 3.847, p = 0.000). Similarly, organizational factors demonstrate a statistically significant positive effect on generative AI adoption (β = 0.132, t = 2.138, p = 0.033). Furthermore, environmental factors show the strongest positive effect on generative AI adoption among the three dimensions (β = 0.592, t = 10.373, p = 0.000). However, this research also aligns with the previous work of Kalle and Duran (2025) and Malaysia and Visnu (2024). The present study adds to the existing literature by furthering the TOE framework in the new GenAI environment. It offers practical advice to the policymakers, the digital innovation hubs, and the social entrepreneurs. Since this current study used GenAI adoption as a unidimensional variable, future research should investigate the multidimensional aspects of Generative AI adoption and extend the analysis beyond Kano State, Nigeria, to include comparative insights from other regions and emerging economies.

Keywords: Generative AI, SMEs, Technological Factor, Environmental Factors, TOE Framework.

EMPOWERING ROBOTS TO LEARN: GENERATIVE ARTIFICIAL INTELLIGENCE FOR ADAPTIVE HUMAN-ROBOT INTERACTION

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The future of robotics lies in its ability to adapt. Adaptive Human-Robot Interaction (HRI) captures this by enabling robots to modify their responses based on human input and situational context. Unlike traditional systems that follow rigid and predefined scripts, the integration of AI generative models marks a shift towards greater flexibility and intuitive engagement. This proposal focuses on improving HRI by integrating GPT-4V (a vision-capable large language model) with a TurtleBot 4 running on ROS 2 Humble. The system will include an RGB-D camera and microphone to receive real-time multimodal input such as speech and gestures. GPT-4V will be prompted via a custom interface that structures sensor data (e.g., transcribed speech, gesture recognition, emotional cues) into dynamic prompt-ready formats via a decision-tree-based routing mechanism, enabling context-aware orchestration. GPT-4V's responses will then be parsed through a behavior tree system that adjusts the robot's behavior and task execution, ensuring affective HRI. The novelty of this approach lies in its prompt orchestration pipeline, built using LangChain, allowing intent inference and affective response to be co-modulated within a single generative framework—thereby bridging low-level control and high-level reasoning. Expected outcomes include demonstrating that integrating generative AI (GPT-4V) with a multimodal prompt orchestration framework offers a greater affective alignment and scalable HRI system in social robotics than traditional scripted models. While potential benefits include task generalization and increased human trust, challenges such as hallucination, reliability, and ethical considerations must also be critically addressed.

Keywords: Human-Robot interaction, multimodal prompt, generative AI

BRIDGING DATA GAPS WITH AI: CROSS-SECTORAL DEPLOYMENT OF MACHINE LEARNING FOR PUBLIC HEALTH, DEFENSE, AND AGRICULTURE IN NIGERIA

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The promise of artificial intelligence (AI) to solve pressing challenges in developing contexts is often hindered by infrastructural limitations, fragmented data, and the lack of cross-sectoral integration. This study addresses these challenges by showcasing how machine learning (ML) models designed with contextual sensitivity can bridge critical data gaps in Nigeria's public health, defense, and agricultural sectors.

This research investigates the practical deployment of ML models using three real-world implementations: (1) a mobile-optimized convolutional neural network (CNN) for rapid plant disease detection, improving diagnosis efficiency for farmers in low-connectivity regions; (2) a behavioral prediction model trained on national health survey data to uncover key drivers of HPV vaccine hesitancy, such as income levels and misinformation exposure; and (3) defense analytics tools that support predictive resource allocation and mission planning within the Nigerian military. Each model was built and evaluated in low-resource settings, emphasizing explainability, ethical guardrails, and operational utility.

Findings reveal that context-aware AI systems can significantly enhance decision-making in sensitive sectors. For example, the CNN model achieved an 85% accuracy rate on mobile devices, while insights from the vaccine hesitancy model informed strategic public health messaging. In defense, real-time analytics now support logistics planning at the 2nd Division, contributing to operational readiness.

This work not only demonstrates the technical feasibility of AI in under-resourced environments but also highlights the importance of local data sovereignty and ethical AI deployment. Compared to traditional siloed approaches, these integrated models promote scalable and sustainable innovation. Further research is needed to assess the long-term impact of these tools and expand their adoption through public sector partnerships and policy engagement.

Keywords: Machine Learning, Defense Analytics, Public Health AI, Agricultural Technology, Vaccine Hesitancy, CNN, Ethical AI, Data Sovereignty, Low-Resource Environments, Mobile AI

LEVERAGING GENERATIVE AI IN DRUG DISCOVERY: UNLOCKING THE THERAPEUTIC POTENTIAL OF AFRICAN MEDICINAL PLANTS

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Many rural African communities still face major barriers to accessing affordable and effective medicine, even though they possess a rich heritage of medicinal plant use. However, transforming these natural remedies into clinically useful drugs often requires long, expensive development processes. This study explores how generative artificial intelligence (GenAI) can speed up the discovery and optimization of plant-based drug candidates by combining traditional knowledge with advanced computational tools. We focus on two key generative approaches: variational autoencoders (VAEs), which are used to generate structurally diverse analogues of bioactive compounds, and reinforcement learning models, which help refine these candidates for improved therapeutic potential. By training these models on datasets of known phytochemicals and ethnobotanical records, we identify lead compounds that may offer improved safety, efficacy, and ease of production. The workflow is designed to be

resource-conscious and community-focused, using local medicinal plants relevant to rural health needs. Early simulations indicate that this method can significantly reduce research timelines and costs, while honoring and utilizing indigenous plant knowledge. In doing so, the project offers a path toward more inclusive and accessible pharmaceutical innovation. Beyond the immediate application, this approach may be scaled to other regions with similar medicinal resources and healthcare challenges, making GenAI a key player in global health equity.

Keywords: Generative AI, Variational Autoencoders, Reinforcement Learning, Drug Discovery, Medicinal Plants, Ethnopharmacology, Rural Healthcare.

EVALUATION OF THE ANTI-DIABETIC PROPERTY OF METHANOL BARK EXTRACT OF DETARIUM SENEGALESE ON BRAIN CATALASE AND SUPEROXIDE DISMUTASE IN ALLOXAN-INDUCED WISTAR RATS

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Incidence Diabetes mellitus remains a global health burden with increasing interest in plant-derived therapeutic alternatives. Detarium senegalense, a native African tree known for its ethnomedicinal properties, has shown promise as an anti-diabetic agent.

D. senegalense is a priority fruit species exploited but little known and under-valued in West African countries. The activities of superoxide dismutase and catalase were measured in subcellular fractions of homogenates prepared from the brain of diabetic male wistar rats treated with methanol bark extract of D. senegalense. Diabetes was induced by intraperitoneal injection of 60mg of alloxan monohydrate. The blood glucose levels, and body weight also were analyzed as indices of diabetes. After 7 days, alloxan monohydrate increased the blood glucose level ($P<0.05$) of rats indicating hyperglycemia. Also, there was significant increase in body weight of the diabetic rats. However, treatment of the rats with extract at varying dosage of (250 mg/kg, 500mg/kg and 1000 mg/kg) of D. senegalense decreased the blood glucose, body weight levels significantly decreased ($P<0.05$) within 7-21days of treatment. There was also significant decrease in brain antioxidant activities of superoxide dismutase and catalase in diabetic rats. But on administration with extract at varying dosage of (250 mg/kg, 500mg/kg and 1000 mg/kg) of D. senegalense, the antioxidants activity increased. This study concludes that the methanol bark extract of D. senegalense can be used as traditional treatment for diabetes mellitus as claimed by local users.

Keywords: Diabetes mellitus, D. senegalense, Wistar rat, Alloxan, Catalase, Superoxide dismutase

GENERATIVE ARTIFICIAL INTELLIGENCE & MACHINE LEARNING IN OPHTHALMIC IMAGING AND EYE CARE: CLINICAL APPLICATIONS FOR ENHANCED DIAGNOSIS, EQUITY, AND PATIENT CARE

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Background: The convergence of generative artificial intelligence (GenAI) and machine learning (ML) is reshaping ophthalmology and eye-care delivery. Advanced generative models, including Generative Adversarial Networks (GANs), diffusion models, and multimodal vision–language systems are enabling breakthroughs in synthetic image creation, diagnostic support, and patient engagement. **Objective:** This review explores applications of generative AI and ML in ophthalmic imaging and eye care, examining technical innovation, clinical integration, equity-driven data approaches, patient education, and personalized therapies to evaluate their impact on early diagnosis, model generalizability, and accessibility in resource-limited settings. **Methods:** A narrative review study was conducted to identify studies that apply advanced generative models in diagnosis, therapy and patient engagement on different eye conditions. Sixty-four peer-reviewed primary studies (2015 - 2025) were selected, sourced from Google Scholar, MEDLINE, Embase, and Scopus (2015–2025) using keywords such as "GANs in ophthalmology," "diffusion models," "vision-language in eye health," and "synthetic ocular images." Extracted data were assessed using the STARD checklist. Results were synthesized qualitatively across four domains: (1) image enhancement, (2) bias mitigation, (3) vision–language educational tools, and (4) 3D digital twin prototypes. **Results:** The studies identified showed that models like GANs have capacities of Image enhancement and augmentation. Synthetic data reduced class imbalance and improved generalizability across diverse cohorts to mitigate bias. Vision–language tools like EyeGPT achieved expert-level triage accuracy with ≥85% clinician or patient satisfaction. 3D ocular models- a 3D digital twin prototype showed >90% anatomical concordance. **Conclusions:** Generative AI and ML are redefining eye-care by enabling scalable synthetic data generation, reducing diagnostic bias, enhancing patient education, and personalizing therapy. To translate these advances into clinical practice especially in underserved areas, future research must focus on rigorous validation (including randomized trials), standardized evaluation (STARD/TRIPOD/CONSORT-AI), ethical frameworks, and cross-disciplinary collaboration involving data scientists, clinicians, ethicists, and regulators

Keywords: Generative AI, Ophthalmic Imaging, Machine Learning, Patient Education, Personalized Eye Health.

SECTION 2:

SOCIAL SCIENCES AND HUMANITIES

INFLUENCE OF AUTOCAD ON STUDENTS' MOTIVATION AND ACHIEVEMENT IN TECHNICAL DRAWING IN PLATEAU STATE, NIGERIA.

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This study investigated the influence of AutoCAD on students' motivation and achievement in Technical Drawing in Plateau State, Nigeria. This study aimed to fill that gap by exploring awareness levels, types, frequency, and utilization of AutoCAD among teachers and students, and how these factors relate to student motivation and academic achievement in Technical Drawing. The study adopted a descriptive survey design with a sample of 242 respondents, comprising both teachers and students, selected through stratified random sampling to ensure representation across schools. Data were collected using a self-constructed questionnaire titled Students' Perception of AutoCAD Questionnaire (SPAQ). Descriptive and inferential statistical tools were used to analyze the data and test four hypotheses at the 0.05 level of significance. The findings showed that over 75% of teachers and students were aware of AutoCAD and recognized its relevance in enhancing motivation and achievement in Technical Drawing. The study further found that frequent use of AutoCAD correlated positively with increased student motivation and improved academic performance. Various versions and applications of AutoCAD were found to influence engagement, especially when integrated into hands-on teaching and project-based learning. Based on these findings, the study recommends that professional development programs prioritize practical training in AutoCAD for Technical Drawing teachers. Integrating AutoCAD into the curriculum with consistent access to digital resources is also crucial for optimizing student outcomes.

Keywords: AutoCAD, Technical Drawing, student motivation, academic achievement, computer- aided design, teacher training, Plateau State

THE MULTIMODAL MEANING-MAKING IN THE DIGITAL AGE: STICKER COMMUNICATION AMONG UNIVERSITY OF NIGERIA, NSUKKA STUDENTS

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In Digital communication increasingly relies on multimodal resources beyond text. This study conducts a sociolinguistics analysis, grounded in Multimodal Social Semiotic Theory (Kress & van Leeuwen, 2001), examining the pervasive use of stickers in the everyday online interactions of students at the University of Nigeria, Nsukka (UNN) and its influence on the academic performance of the students. Despite their ubiquity, the culturally situated functions and meanings of stickers within specific African academic communities remain underexplored. Utilizing a digital ethnographic approach, data was collected from diverse social media platforms (WhatsApp, Facebook, Instagram, TikTok) central to UNN students' communication. To determine the influence of the use of stickers on the academic performance of the students, questionnaire was used to gather data for analysis. Through detailed qualitative analysis, the study identified three core findings. First, stickers functioned primarily as crucial pragmatic tools for efficient emotional expression, relationship management (e.g., softening requests, showing solidarity), and maintaining conversational flow, often surpassing text in effectiveness for specific communicative goals. Second, sticker usage exhibited significant cultural indexicality, with students adeptly adapting global sticker packs and utilizing locally created stickers featuring Nigerian Pidgin, UNN-specific references, and Nigerian socio-cultural memes to express shared identities and experiences. Third, distinct platform-specific "sticker ecologies" were observed, shaped by the unique affordances and communicative norms of WhatsApp (private, expressive), Instagram (aesthetic, narrative), Facebook (emphatic, public), and TikTok (meme-centric, viral). The study also finds out that the use of stickers negatively affect the academic performance of students. The study concludes that stickers are not merely decorative but constitute sophisticated semiotic resources integral to meaning making, reflecting and reinforcing the unique sociocultural context of the UNN student community. Findings underscore the need for greater attention to localized multimodal practices in digital discourse analysis and suggest implications for digital literacy education and culturally responsive platform design. This research contributes to sociolinguistics, digital communication studies, and our understanding of African youth digital culture

Keywords: stickers, digital discourse, communication, social media, semiotics.

INTERDISCIPLINARY COLLABORATION AS A PATHWAY TO INCREASED AWARENESS AND USE OF GENERATIVE AI AMONG NIGERIA UNIVERSITY LECTURERS

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To increase awareness and use of artificial intelligence (AI), various pragmatic measures have to be deployed. This study examines the place of interdisciplinary collaboration in increasing awareness and use of generative artificial intelligence (GAI) among Nigerian university lecturers. Survey design and multistage method were employed. Interview, observation, library and the internet were relied on for primary and secondary data. The primary data were obtained from 60 lecturers of two universities in Ebonyi State, Nigeria. They are from 6 departments, with 3 each from the 2 universities. In each department, 10 lecturer participants were involved in telephone interviews. The participation was at freewill, with the participants being told to withhold their names but mention their departments, ranks and years of experience. Each of the authors had the task of interviewing 20 lecturers. Statistical and descriptive tools were employed for the data analysis. The results reveal low level of awareness and use of GAI, and interdisciplinary collaboration among Nigerian university lecturers, while confirming that interdisciplinary collaboration can significantly increase awareness and use of GAI among the lecturers. The study concludes that the opportunities of GAI can be harnessed more significantly across Nigerian universities through increased awareness and use of GAI and high-level interdisciplinary collaboration. Meaningful stakeholder engagement, increased AI education and awareness campaigns, and funding of AI resources and training are recommended as the panacea.

Keywords: Interdisciplinary collaboration, Pathway, Awareness, Use, Generative AI, University lecturers.

NEGATION MARKING IN MGBAKWỤ DIALECT OF IGBO AND THE STANDARD IGBO.

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This research examines negation marking in Mgbakwụ dialect of Igbo, spoken in Mgbakwụ in Awka North Local Government Area in Anambra State, Nigeria and the standard Igbo. The objectives of this study are to identify the various negation processes in Mgbakwụ dialect, to find out the similarities between negation marking in Mgbakwụ dialect and standard Igbo as well as to identify their differences. Data for the study were obtained through uninstructed interview and analyzed descriptively using the internal reconstruction theory, which focuses on identifying patterns of irregularity or variation within a single language. This study identifies various negation marking processes in Mgbakwụ dialect with its various markers like - lọ, -belọ, -na, - ne, etc, in words such as 'belọ' - "ọ gabelọ ọrụ" he/she has not gone to worK, "kwune"- e kwune ya" don't say it, "zana" - "a zana ụlọ" don't sweep the house, "galọ" - "Nneka agalọ asa efere" Nneka will not wash the plate, "sana"-"a sana ya" don't wash it. Similarly, both Mgbakwụ dialect and standard Igbo marks negation by means of affixation, suffixation precisely. However, the study also finds out certain differences in negation marking in Mgbakwụ dialect and standard Igbo. Mgbakwụ dialect has more number of negators than the standard Igbo.

Keywords: Dialect, Negation, Mgbakwụ, Igbo, Language, Affixation, Negator.

LEVERAGING EFFECTIVE LANGUAGE USE AND INTERDISCIPLINARY COLLABORATION FOR MORE FEATS IN GENERATIVE AI AND MACHINE LEARNING

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Advancing Generative Artificial Intelligence (GAI) and Machine Learning (ML) beyond what they are currently requires harnessing multiple measures, diverse research, and making more concerted efforts, among others. This study seeks to determine the extent to which effective language use and interdisciplinary collaboration can be leveraged for groundbreaking achievements in contemporary tertiary education. It avers that the sage "Two good heads are better than one" can be made manifest in any meaningful and engaging collaboration among professionals of different fields, as in those in technology, informatics, linguistics, computer science, and applied and social sciences. Correlational descriptive survey embedded mixed-method, interpretive devices, percentage, Likert scaling, analytic description, figures, tables, and content and thematic analyses are employed. Focus group discussion and observation are used to obtain primary data. The discussion involved 60 lecturers of six different departments across 3 tertiary institutions in Ebonyi State, Eastern Nigeria. The results show that effective language use and interdisciplinary collaboration have the potential to increase breakthroughs in GAI and ML and revolutionize teaching and learning at a significant extent. The study submits that effective language use and interdisciplinary collaboration are viable means of advancing GAI and ML further, and they can proffer lasting solutions to pedagogic and technology integration issues. Intellectuals must partner with the media to create and increase awareness about GAI, ML, effective language use and interdisciplinary collaboration to the public across various places.

Keywords: Effective language use, Interdisciplinary collaboration, Feats, Generative AI, Machine Learning

EXAMINE THE INFLUENCE OF GOVERNMENT REMOVAL OF FUEL SUBSIDY ON SECONDARY SCHOOL TEACHERS' PRODUCTION AND UTILIZATION OF INSTRUCTIONAL MATERIAL, IN PLATEAU STATE, NIGERIA.
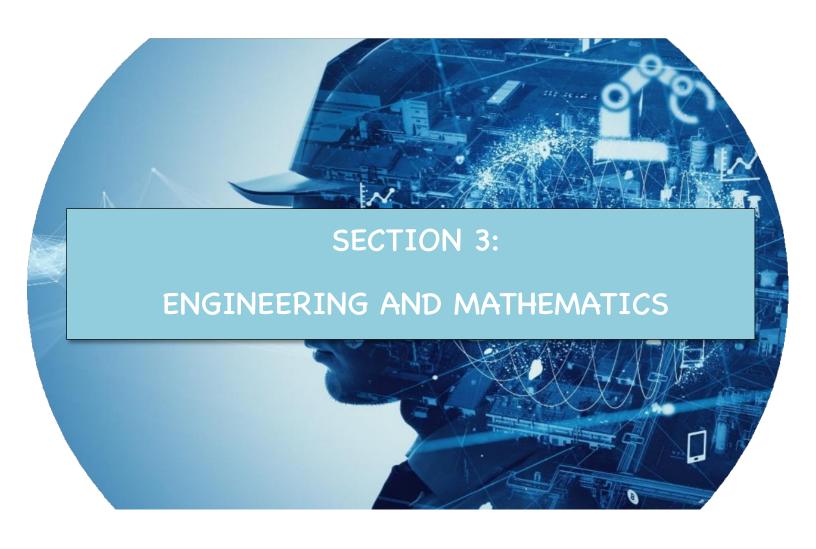
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This study examined the influence of the Nigerian government's removal of fuel subsidy on the production and utilization of instructional materials by Senior Secondary School teachers in Plateau State. The removal of fuel subsidy is hypothesized to negatively impact teachers' instructional practices due to increased fuel costs, which affect transportation, electricity access especially for those dependent on generators because of unstable power supply and high cost of procurement of materials. Specifically, the study assessed the effects on the production and use of visual, audio, audio-visual, improvised, and realia instructional materials. The research employed a descriptive survey design with a sample of 201 teachers, selected through random sampling. All 201 questionnaires were returned after administration. Data was collected using a research-developed instrument titled Teachers' Production and Utilization of Instructional Materials (TPUIM), consisting of 30 close-ended questionnaire items. The reliability and validity of the instrument were confirmed through expert review and pilot testing. Data were analyzed using mean and standard deviation, and hypotheses were tested at the 0.05 level of significance. The findings revealed a negative influence of fuel subsidy removal on teachers' ability to produce and utilize all five categories of instructional materials, particularly due to higher costs of production and reduced accessibility. Based on these findings, it is recommended that the government allocate additional resources to support teachers, provide subsidies or grants for instructional material development, and implement targeted professional development programs to enhance teachers' production skills despite economic challenges.

Keywords: fuel subsidy removal, instructional materials, secondary school teachers, Nigeria, production, utilization, education policy.

SECTION 3:

ENGINEERING AND MATHEMATICS

CAN GENERATIVE AI PRESERVE STATISTICAL PROPERTIES? A STUDY ON DISTRIBUTIONAL CONSISTENCY IN SYNTHETIC DATA

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As the demand for privacy-preserving and scalable data solutions grows, synthetic data generation using generative AI models, particularly Generative Adversarial Networks (GANs),has gained significant attention. Do generative models maintain the statistical properties of the original data, particularly under varied conditions? This study investigates the distributional consistency between real and synthetically generated datasets, using a controlled simulated environment. We generate baseline datasets with known statistical properties, including normal, binomial, and skewed distributions, to test the generative model's ability to replicate them. The study evaluates the consistency through a series of statistical diagnostics, such as mean/variance comparison, Kolmogorov-Smirnov tests, Q-Q plots, and other distributional fit metrics. Findings reveal that generative models maintain statistical fidelity in conditions where the original data is symmetric, of large sample size, and low in noise. Under these circumstances, synthetic data generated by GANs closely mirrors the original statistical properties, including key measures like central tendency, variance, and higher-order moments. These results underscore the conditions under which generative models can be trusted to maintain fidelity to the statistical structure of the original data and highlight critical areas of discrepancy that need careful attention when utilizing synthetic data for statistical modeling. Our findings suggest that while generative models offer promising potential for synthetic data generation, model selection, data preprocessing, and evaluation diagnostics play a crucial role in ensuring statistical consistency, particularly in high-noise or extreme cases.

Keywords: Generative AI, Synthetic Data, Statistical Consistency, Generative Adversarial Networks (GANs), Distributional Fidelity, Statistical Diagnostics, Kolmogorov-Smirnov Test, Q-Q Plots, Data Privacy, Noise Sensitivity, Tails of Distribution.

DESIGN, AUTOMATION, AND EVALUATION OF A REMOTE-CONTROLLED LAWNMOWER

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Conventional lawnmowers, whether manual or gas-powered, are characterized by significant manual labour, noise pollution, high carbon emissions, and recurring maintenance demands. This leads to uneven cutting, requires constant human supervision, and offer limited flexibility. The design and automation of a remote-controlled robotic lawnmower was undertaken to address this environmental and operational limitations associated with conventional lawnmowers. The advent of robotic lawnmowers already addresses many of these drawbacks by offering autonomous operation, with minimal physical labor. However, the true paradigm shift occurs with the incorporation of IoT capabilities. IoT-enabled robotic lawnmowers leverage connectivity through Wi-Fi to provide automation, control, and efficiency. This research explores the impact of integrating Internet of Things (IoT) technology into robotic lawnmowers, aimed to develop a cost-effective, efficient, and user-friendly alternative that minimizes human effort and environmental impact. The robotic lawnmower integrates locally sourced components, including a 6.5 hp petrol engine, a DC motor-driven control system, stainless steel cutting blades, and a battery-recharging alternator system. A WiFi-enabled remote control interface allows users to operate the mower via smartphone, enhancing accessibility for users of all ages. The design prioritizes durability, strength, and maneuverability, supported by material selections such as mild and stainless steel for the frame and blade, respectively. Performance evaluation was conducted on seven test plots with carpet grass (Axonopusaffinis), and the robotic lawnmower achieved an average field efficiency of 81.3%, with a maximum of 86%. Theoretical and effective field capacities were calculated, validating the mower's operational reliability. The lawnmower's dashboard interface includes directional and functional controls, a blade switch, and battery level indicators. The result confirms that the developed robotic lawnmower not only performs effectively but also presents a scalable, eco-friendly solution to grass cutting tasks in residential and agricultural settings.

Keywords: Robotics, Lawnmower, Automation, IoT, Eco-friendly

TRANSFORMING MEDICAL RESEARCH THROUGH ARTIFICIAL INTELLIGENCE: OPPORTUNITIES, CHALLENGES AND FUTURE PATHWAYS.

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This Artificial Intelligence (AI) is rapidly transforming the landscape of medical research, offering unprecedented capabilities in data analysis, predictive modelling, and drug discovery. This presentation explores the cross-disciplinary impact of AI applications within biomedical research, with a focus on how machine learning algorithms are enhancing clinical trials, accelerating diagnostics, and enabling personalized treatment planning.

Drawing from recent advancements in generative AI and deep learning, this study outlines current methodologies, real-world case studies, and ethical considerations in medical AI integration. Special emphasis is placed on AI's role in reducing research timelines, minimizing human error, and uncovering insights in large-scale health datasets that were previously inaccessible. The presentation concludes with a critical discussion of the limitations and risks of over-reliance on AI technologies in healthcare, and proposes future pathways for responsible, collaborative innovation between technologists and medical researchers. This work aims to contribute to the growing body of evidence supporting the ethical and effective use of AI in reshaping the future of medical discovery.

Keywords: Artificial Intelligence, Medical Research, Machine Learning, Deep Learning, Personalized Medicine, Clinical Trials, Biomedical Ethics

GREEN DEMOCRACY: INTEGRATING GENERATIVE AI, BLOCKCHAIN, AND RENEWABLE ENERGY MANAGEMENT FOR SUSTAINABLE ENGINEERING

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Constitutional democracies rely on resilience, including free, fair, and transparent elections. Digital manipulation, opaque data practices, and the increasing energy demands of modern voting systems mostly threaten fairness and transparency. Therefore, there is an advantage to introducing modern technologies into election processes to create a system for successful electioneering. The presentation explores how integrating blockchain and generative Artificial Intelligent (AI), especially Large Language Models (LLMs), can improve voter outreach and policy transparency while recognizing their potential to enable hyper-targeted disinformation.

Additionally, traditional election day operations, which depend on local grids, diesel generators, and centralized data centers, contribute to peak loads and grid instability during election seasons. Blockchain systems and LLMs could enhance transparency but require more computing and storage resources, stressing electrical grids and challenging environmental goals. This presentation also offers a perspective that combines advances in generative AI, blockchain's immutable ledger, and dynamic energy management utilizing renewable infrastructure. It examines current electoral operations, highlighting how polling places draw on municipal power during peak hours, and how vote-counting centers and IT hubs need sustained computing resources. Blockchain's decentralized architecture records ballots, AI-generated content, system logs, and uses energy-efficient consensus protocols, which reduce computational overhead. The analysis considers grid impacts, microgrid deployment, demand-response incentives, and equity considerations in underserved regions. A cross-stakeholder governance model is outlined, incorporating algorithmic fairness metrics, voter literacy programs, and transparent policy frameworks. This multidisciplinary approach aims to stabilize grid operations, lower carbon footprints, and rebuild voter trust, paving the way for scalable,next-generation sustainable democratic processes.

Keywords: Election Transparency, Generative AI, Blockchain voting, Energy Management, Voters' confidence

GREEN ADSORPTION OF METHYLENE BLUE FROM SIMULATED WASTEWATER USING TITHONIA DIVERIFOLIA XYLEM-BASED CELLULOSE: KINETIC AND AGITATION STUDIES

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Dyes are dominant pollutants that pose a potential threat that are carcinogenic to the health of Human beings, ecosystems, and aquatic life. They are widely used in industries such as textiles, rubber, plastics, and cosmetics, to color their products and invariably left as the major waste in these due to their chemical structures and resistance to fading on exposure to light, and water and, therefore are difficult to be decolorized once released into the aquatic environment which are hazardous and affects aquatic life and even the food chain. Hence, this article explored the usage of cellulose obtained from Tithonia Diversifolia Xylem as an adsorbent. The Methylene Blue (MB)was obtained from the BWERG laboratory, LAUTECH, Ogbomoso, and was used as an adsorbate. MB (10 mg) was weighed and dissolved in 1000ml distilled water, which makes a concentration of 10mg/L. The cellulose was used as an adsorbent for the removal of methylene blue from the simulated wastewater under the influence of time and varying agitation from 150 to 250 rpm. An increase in the time of the adsorption leads to an increase in the adsorption capacity of the model gave a good fit for the experimental data with R2 of 0.8442 and qecal of 0.6854 mg/g. Because, compared to zero, first, second, and third order models with adsorption capacity and coefficient of correlation respectively, (0.1855mg/g, 1), (0.2394mg/g, 0.9721), (0.2591 mg/g, 0.8891) and (3.7521 mg/g, 0.772 with rate constant (k3) of -0.1085 $\frac{g^2}{mg^2 min}$), it gave the highest qe with no negative rate constant like others. This innovation is instrumental in treating Industrial wastewater, agricultural wastewater, and other wastewater that can be reused for cleaning, wetting fields, and safe discharge into the environment. This indicates the accessibility and affordability of renewable resources for improving water quality in rural areas.

Keywords: Adsorbent, Adsorption, TDX, Wastewater, Wastewater Treatment

A HYBRID MODEL FOR HIGH -VOLATILITY STOCK MARKET FORECASTING USING SEASONAL-TREND DECOMPOSITION AND EXTREME LEARNING MACHINE

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Accurate stock market prediction remains a critical challenge due to the inherent volatility, noise, and non-linear dynamics of financial time series. Traditional econometric models and standalone machine learning (ML) or deep learning (DL) approaches often struggle to capture multiscale properties and adapt to rapid market fluctuations. This study proposes a novel hybrid model, Seasonal-Trend decomposition using Loess combined with Extreme Learning Machine (STL-ELM), to address these limitations. STL decomposes stock data into trend, seasonal, and residual components, while ELM, known for its rapid training and strong generalization, models each component independently. Empirical evaluations on four major global indices: S&P 500 (USA), FTSE 100 (UK), Hang Seng Index (Hong Kong), and Dow Jones Industrial Average (USA), demonstrate that STL-ELM consistently outperforms state-of-the-art models such as Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), and attention-based architectures. For example, STL-ELM achieved a Root Mean Square Error (RMSE) of 46.53, Mean Absolute Error (MAE) of 35.48, and Mean Absolute Percentage Error (MAPE) of 0.81% on the S&P 500, along with the highest R^2 score (0.9945), indicating superior predictive performance. Moreover, the model's training completes in just 4–5 seconds with memory usage under 2.5 MB, vastly more efficient than LSTM and GRU, which require over 2,000 seconds and 1 GB of memory. These gains underscore STL-ELM's computational advantage over traditional DL models, particularly for real-time or resource-constrained environments. A signal-based trading strategy further validates the model's practicality, yielding a Sharpe ratio of 1.3165 and a maximum drawdown of only -0.2277 on the Hang Seng Index. These results affirm the model's ability to generate stable, risk-adjusted returns in highly volatile markets. This research contributes a lightweight yet powerful forecasting framework that bridges decomposition techniques with efficient ML. Future work will explore integration with ensemble learning and adaptation for cryptocurrency markets, extending its utility across diverse financial forecasting scenarios.

Keywords: Seasonal trend, Loess Extreme Learning Machine, Volatile Market

Closing remarks

Distinguished guests, esteemed speakers, fellow scholars, ladies and gentlemen,

On behalf of the Association of Nigerian Scholars in Hong Kong, I wish to extend my heartfelt appreciation to our Patron, Prof. Lawal Marafa, and to our keynote and guest speakers for honoring our invitation despite your busy schedules. Your willingness to share your expertise on this year's theme has not only enriched our understanding but also sparked fresh ideas on how emerging technologies can transform diverse fields of research.

This year's forum has been truly global in scope. We received 28 initial abstract submissions, with 26 final abstracts after review and resubmission, from scholars affiliated with institutions in Ghana, Hong Kong, Nigeria, and the USA. The breadth of topics presented today confirms that generative AI and machine learning are influencing a wide range of disciplines and that the richest innovations often emerge when ideas cross boundaries.

I want to acknowledge and congratulate all our presenters. Whether or not you take home an award today, your work is significant, and your contributions are invaluable to the academic community. You have each added a piece to the ever-growing puzzle of knowledge and discovery. Special thanks also go to the Research Committee for their dedication and hard work in organizing this event, and to my fellow ANSHK Executives for your steadfast support in bringing this vision to life.

As we close, let us remember that the future of research in every discipline will be shaped by those willing to collaborate across boundaries, think creatively, and explore boldly. May today's exchanges inspire us to keep asking questions, building bridges, and ensuring our work serves the greater good.

Thank you all for making the 2025 ANSHK Research Forum a success. We look forward to connecting with you again in future events. Until then, please stay safe and stay inspired

Ajibola Ogunsola
ANSHK Secretary (2024/2025 Academic Session)