DEPARTMENT OF
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AHMADU BELLO UNIVERSITY,
ZARIA - NIGERIA

PROCEEDINGS

OF THE

2nd International Conference
ON COMPUTING AND ADVANCES IN INFORMATION TECHNOLOGY
ICCAIT 2023

THEME:

ARTIFICIAL INTELLIGENCE AND THE FUTURE OF DEVELOPING NATIONS

November 21 – 23, 2023

EDITORS
Y. A. Sahabi
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ASSEMBLY HALL
& NITDA ICT HUB,
AHMADU BELLO UNIVERSITY,
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ZARIA, NIGERIA

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Editors

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FORWARD

It is with great pleasure that I welcome you to the 2nd International Conference on Computing and Advances in Information Technology (ICCAIT) 2023. This event underscores the transformative potential of computing and information technology, focusing on the theme: *"Artificial Intelligence and the Future of Developing Nations."*

In an era of rapid technological advancement, Artificial Intelligence (AI) offers unprecedented opportunities to address the challenges faced by developing nations. This conference serves as a platform to explore AI's applications across sectors such as healthcare, education, agriculture, and governance, with an emphasis on fostering innovation and sustainable development.

This document features a collection of the papers presented at the conference, showcasing a diverse range of research and insights. These contributions reflect the interdisciplinary nature of AI and its capacity to drive meaningful progress and equitable growth.

We extend our heartfelt gratitude to all participants, the technical program committee, and the reviewers whose efforts have made this conference a success. Your dedication and collaboration are deeply appreciated.

We look forward to seeing you in future editions of ICCAIT.

Dr. Mohammed Abdullahi
Chairman, Conference Organizing Committee.

PROFILE OF THE INVITED SPEAKERS

Dr Aminu Maida

Executive Vice Chairman/ CEO Nigerian Communications Commission

Dr. Aminu Maida is the Executive Vice Chairman and Chief Executive Officer of the Nigerian Communications Commission (NCC), he was appointed into office on the 11th of October 2023 by President Bola Ahmed Tinubu GCFR. Dr. Maida is a highly accomplished technology executive with extensive experience spanning across the telecommunication and payments industries. Throughout his illustrious career, Dr. Maida has consistently demonstrated his expertise in leading cutting-edge innovations, managing cross-functional teams, and driving growth for businesses in competitive markets.

With a solid academic background, Dr. Maida holds a Ph.D. in Electrical & Electronic Engineering from Bath University, UK, a Masters in Engineering in Information Systems Engineering from Imperial College London, as well as Post Graduate Diploma in Entrepreneurship from Cambridge Judge Business School. His educational credentials have played an instrumental role in shaping his ability to tackle complex technical challenges and devise robust, future-proof strategies.

Throughout his career, Dr. Aminu Maida has successfully managed teams of engineers, developers, and researchers, fostering a collaborative and innovative work environment. His expertise in strategic planning, business development, technology transformation, and project management have contributed significantly to the growth and expansion of the companies he has worked with.

Prior to his appointment as the Executive Vice Chairman/ CEO of the NCC, Dr. Maida was the Executive Director, Technology and Operations at the Nigeria Inter-Bank Settlement Systems PLC (NIBSS) where he oversaw the day-to-day activities of the entire operations and IT infrastructure of NIBSS. Prior to this role he was the Chief Technology Officer at ARCA Payments Network, a Nigerian based FinTech, and before then he worked with the British Telecoms as a Lead Consultant as well as with Cisco Systems UK.
Dr. Maida's technical prowess is further evidenced by the numerous patents he holds to his name in the areas of wireless communication and self-organising networks.

He is an active participant in industry conferences and forums, where he shares his insights and experience with fellow professionals. He is committed to the ongoing advancement of technology in the telecommunication and payments sectors, mentoring young professionals, and contributing to research that shapes the future of these industries.

Professor Chenghua Lin

University of Manchester, United Kingdom

Chenghua Lin is Professor of Natural Language Processing in the Computer Science Department, University of Manchester. His research interests are centred around Natural Language Processing and Generation (NLP/NLG), Machine Learning, and the intersection between them. He has pubEshed over 100 publications in the aforementioned areas and has received several awards for his research, including the Test of Time Award in CIKM 2020, the Best Paper Award Runner-up in INLG 2019, and the Best Paper Award in NLDB 2017. He is currently Secretary of the ACL SIGGEN Board and Committee Member of the IEEE Speech and Language Processing Technical Committee. He has served in numerous programs and (senior) area chairing roles for *ACL conferences, including publication co-chair for ACL 2023, workshop co-chair for AACL- IJCNLP 2022, and program co-chair for INLG 2019. He also serves as Associate Editor for Neurocomputing and a standing reviewer for TACL and the Computational Linguistics Journal.

Professor Abiodun Musa Aibinu

Summit University, Nigeria

Abiodun Musa AIBINU (Ph.D.), is a highly motivated career driven achiever with over 24 years working experience in the field of Mechatronics Engineering, Telecommunication Engineering, Teaching and Research. Presently, he is the Vice-Chancellor, Chief Executive and Academic Officer, Summit University, Offa, Kwara state, Nigeria, and a Professor of Mechatronics Engineering at the Federal University of Technology (FUT), Minna, Nigeria. Formerly, he had served as the:

a. Head, Department of Mechatronics Engineering, FUT Minna, Nigeria, 2014 to 2022.
b. Director, Centre of Open Distance and e-Learning, FUT Minna, 2014 to 2022.
c. Coordinator, Advanced Engineering Innovation Research Group, FUT Minna, 2013 to 2015.
d. Chairman, Unmanned Aerial Vehicle Challenge, 2020

However, prior to venturing into academic field, he has worked with: MTN Communication (Nigeria) Limited; GS Telecom (Nigeria) Limited; DCC Satellite and Networks Limited; Oganla Consulting and Investment limited; Communications Associates Limited just to mention but a few.

Prof. Aibinu is an advocate of Spiritual Intelligence, Artificial Intelligence and AcadoPreneurship. AcadoPreneurship simply means turning academic ideas into businesses, and efforts are ongoing in turning some of his research outputs and that of other colleagues into start-up businesses at Federal University of Technology, Minna. Aibinu is also a co-founder at Artificial Intelligence for Clean Energy Nigeria Limited, a startup firm with product development along Industry 4.0 technologies.

Professor Aibinu has participated and won several academics and research awards at various international and national exhibitions. He was nominated for 2012 promising researcher award and best teacher award at IIUM Malaysia. In 2017, Aibinu was one of the recipients of the highly prestigious Nigerian Air Force (NAF) Research and Development award. Also, in 2019, he was honoured with SERVICOM Excellence Award by Federal University of Technology Minna, Nigeria in recognition of his selfless services and contributions to the development of Federal University of Technology Minna, Nigeria and the country at large. In 2021, he was one of the recipients of the Vice-Chancellor Excellence award. Additionally, he has won several research grants in and outside Nigeria.

He has also authored and co-authored several publications in both local and international journals and conferences. Some of his published works are highly cited in the academic field. His research interests include Digital signal and Image processing, Information and Communication Technology, Robotics, Process Automation, Intelligent system development and Clean Energy generation.

He has been actively involved in teaching, supervision, mentoring and research activities at various universities in Nigeria and Malaysia. He is a research-resource person to the Nigerian Air Force (NAF), Nigerian Army (NA), and National Defence Headquarters, and other agencies having memorandum of Understanding with FUT Minna.

He is presently the Mogaji of Aikulola-Aibinuomo Family, Itaabigbo, Oke Mapo, Ibadan, Oyo State.

Professor Francisca Oladipo

Thomas Adewumi University, Nigeria

Francisca Oladipo is a Professor of Computer Science and current Vice-Chancellor of Thomas Adewumi University, Oko, Kwara State Nigeria. She previously served as pioneer Director, Quality Assurance, a member of the Governing Council– the first female elected to the Council, and the first female Head of the Department of Computer Science at the Federal University Lokoja Nigeria. She is a Consultant at the Tilburg School of Humanities and Digital Sciences of Tilburg University, Netherlands, and had served previously at Kampala International University (KIU), Uganda as the Director of Research, Innovations, and International Relations and Lecturer and Researcher, in the Department of Computer Science, Nnamdi Azikiwe University, Awka, Nigeria. Francisca served as the Chief Technical Advisor (Kogi) on the Joint Admissions and Matriculation Board (JAMB), and, Facilitator, Africa Centre of Excellence in Technology and Learning (ACETEL), National Open University of Nigeria. She also served as a visiting Professor at the Pan-African University Institute of Basic Sciences, Technology and Innovation, Jomo Kenyatta University of Agriculture and Technology, Kenya. She was the International Projects Synergy and Support Lead, for the NUFFIC Regional and Ethiopia Projects for KIU, and Dutch Partners. The two-part project is sponsored by the Dutch Ministry of Foreign Affairs and, is facilitated by e-learning and data sharing in the Horn of Africa to develop and implement eLearning Systems to strengthen Security and Rule of Law; Food and Nutrition, specifically in Somalia, Sudan, and South Sudan, and Northern Ethiopia under the Dutch Orange Knowledge Programme (OKP) Initiative. She currently serves as PhD advisor at the Network for Globalization, Accessibility, Innovation and Care (GAIC) promoting the partnership between the Africa University Network (AUN) for FAIR Open Science and European Universities.

As the Executive Coordinator of the Virus Outbreak Data Africa Network (VODAN Africa), she led the initiative to give Africa a place in the fight against the COVID-19 pandemic through the deployment of the only first and only successful implementation of machine-actionable FAIR Data Points in the context of the COVID-19 pandemic across Ethiopia, Kenya, Nigeria, Tunisia, Uganda, Zimbabwe, and the Netherlands. She also led the expansion of the initiative into Tanzania, Somalia, Liberia, Burkina Faso, Rwanda, China, Indonesia, and Kazakhstan. The initiative that was applauded in the 2021 UNESCO Engineering report achieved the VODANA Minimally Viable Product (MVP) through the installation of the MVP in 88 Health Facilities in 8 African countries and received the Award of the Most Inspiring Initiative at the Leiden Science Week in May 2022.

A two-time recipient of the PyCon USA Grant, and the ACM FAT Fellowship, Francisca is one of the inaugural Fellows of the Pan-Africa Scientific Research Council, and a supporting partner of the Africa Universities Network on FAIR Open Science (AUN), as well as a Grace Hopper Faculty Scholar. She is a fellowship alumna of the Heidelberg Laureate Foundation Germany, United States Department of State Exchange Program (TechWomen), Internet Engineering Task Force, the Women of Colour in Computing, Widening Natural Language Processing, Women in Machine Learning, Black in Artificial Intelligence, the 2019 Diversity and Inclusion Fellowship of the ICML, etc. She was a PostDoctoral Fellow at the Massachusetts Institute of Technology, an alumna of the prestigious Machine Learning Summer School, and has been trained in Machine Learning, Big Data Analytics, and Data Science at the Institute of Analytics and Data Science, University of Essex, UK, Universidad Autónoma de Madrid, Madrid, Spain, and the University of Oxford Continuing Education.

Francisca has won many grants and co-authored several award-winning proposals for donor-founded projects including the Philip's Foundation Grants, Google Rapid COVID-19 Grant, Dutch Ministry of Foreign Affairs Orange Knowledge Program, Carnegie African Diaspora Fellowship, Dutch Development Bank Grant for capacity Strengthening in Africa, Google ExploreCSR Grant, Tensorflow Add on Funding, Deep Learning IndabaX Hosting Grant, etc.

In addition to developing innovative curriculum for multidisciplinary research, Francisca is bridging the gaps between research and practice in the areas of Theoretical Computer Science, and she has published numerous papers detailing her research experiences in both local and international journals and presented research papers in several international conferences. She is also a reviewer and editorial board member of many international scientific publications.

CONFERENCE PROGRAMME

Tuesday, November 21, 2023
Day 1

Time	Activities	Venue
08:00 – 09:30	Registration	Assembly Hall, ABU, Zaria.
10:00 – 10:05	Introduction	
10:10 – 10:15	National Anthem	
10:10 – 10:15	Opening prayer	
10:15 – 10:20	Opening Remark: Prof. J. I. Musa (Dean, Faculty of Physical Sciences, ABU, Zaria.)	
10:20 – 10:30	Goodwill massages	
10:30 – 10:40	Welcome Address: Prof. Kabiru Bala (VC, ABU, Zaria)	
10:40 – 11:10	Guest Speech: Dr Aminu Maida, EVC/CEO, Nigeria Communications Commission (NCC) Title: *Government efforts on the development of Artificial Intelligence: The Nigeria Journey so far.*	
11:10 – 11:40	Group Photograph and Tea Break	Assembly Hall, ABU, Zaria.
11:40 – 12:10	Keynote Speech 1: Prof. Chenghua Lin, University of Manchester, United Kingdom Title: *Improving Metaphor Detection with Frame Embedding Learning and Effective Context Denoising*	Assembly Hall, ABU, Zaria
12:10 – 12:40	Keynote Speech 2: Prof. Abiodun Musa Aibinu, Summit University Offa, Kwara State, Nigeria Title: *Leveraging AI for Sustainable Telecommunications and Small-Scale Business Growth in Nigeria*	
12:40 – 13:10	Keynote Speech 3: Prof. Francisca Onaolapo Oladipo, Thomas Adewunmi University, Oko, Kwara State, Nigeria. Title: *The Advent of Large Language Models and the Expectations from African Researchers*	
13:10 – 13:20	Interactive Session	
13:20 – 13:30	Presentation of Award to Invited Speakers, Sponsors & Collaborators	
13:30 – 13:35	Vote of thanks/Announcements: Dr Mohammed Abdullahi (Chairman, Conference Organizing Committee, ICCAIT'23)	
13:35 – 15:00	Lunch Break and Closing for Day 1	Assembly Hall, ABU, Zaria.

Wednesday, November 22, 2023
Day 2

Time	Activities	Venue
08:00 – 09:00	Registration	
09:00 – 10:30	Parallel Session I: Tracks: ▪ Computing and Intelligent Systems ▪ Emerging Technologies ▪ Information Systems and Applied Computing	LH1, LH2 & LH4, Department of Computer Science, (Phase II), ABU, Zaria
10:30 – 11:00	Tea Break	NITDA IT Hub, ABU, Zaria
11:00 – 13:00	Parallel Session II: Tracks: ▪ Computing and Intelligent Systems ▪ Emerging Technologies ▪ Information Systems and Applied Computing	LH1, LH2 & LH4, Department of Computer Science, (Phase II), ABU, Zaria
13:00 – 14:00	Lunch Break	NITDA IT Hub, ABU, Zaria
14:00 – 16:30	Parallel Session III: Tracks: ▪ Computing and Intelligent Systems ▪ Emerging Technologies ▪ Information Systems and Applied Computing	LH1, LH2 & LH4, Department of Computer Science, (Phase II), ABU, Zaria

Thursday, November 23, 2023
Day 3

Time	Activities	Venue
09:30 – 10:30	Closing Ceremony: ▪ Presentation of Certificates ▪ Vote of Thanks: Dr Muhammad Abdulkarim (Head, Department of Computer Science, ABU, Zaria.)	Main Hall NITDA IT Hub, ABU, Zaria
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