Toluwani Samuel Aremu

AI Researcher | Applied Scientist

KEY COMPETENCIES

- **Skills**: Research, Mathematics, Statistics, Machine Learning, Deep Learning, Data Science, Project Management, Programming, Writing.
- **Tools**:
    - Programming Languages: Python, VB.Net, etc.
    - Deep Learning Libraries: PyTorch, Lightning, TensorFlow, Keras, Jax.
    - Data Science Libraries: Scikit-learn, NumPy, Matplotlib, etc.
    - IDE: Visual Studio, Visual Studio Code, PyCharm, Jupyter, etc.
    - Analysis, Writing, and Presentation: Latex, Office 365, Google [Docs, Sheets, Slides].
- **Research Interests**:
    - High-Level Interests: Cognitive Science, Visual Perception, Neural Networks, Trustworthy AI
    - Low-Level Interests: Robustness, Reliability, Explainability.
    - Other Interests: Privacy, Fairness, Generative AI, Vision-Language Models (VLMs).

EDUCATION

- **Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI), UAE**   AUG 2023 – PRESENT
    - Doctor of Philosophy (PhD) in Machine Learning.
    - Courses: Advanced Probability and Statistical Inference, Representation Learning, Advanced Optimization Techniques, Vision-Language Models, Robustness in Computer Vision, etc.
- **Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI), UAE**   JAN 2021 – DEC 2022
    - Master of Science (MSc) in Machine Learning.
    - Courses: Mathematical Foundations of AI, Neural Networks, Probability and Statistical Inference, AI Applications in Smart Cities, etc.
- **University of Ibadan (UI), Nigeria**   MAY 2018 – MAY 2020
    - Master of Science (MSc) in Computer Science.
    - Courses: Cryptography and Network Security, Data Structures and Algorithms, Human Computer Interaction, Advanced Programming Techniques, etc.
- **Adeleke University, Nigeria**   OCT 2012 – JUL 2016
    - Bachelor of Science (BSc) in Computer Science.
    - Courses: Object-Oriented Programming, Operations Research, Numerical Analysis, Computer Logic, Finite Automata, Digital Systems, Philosophy and Logic, Philosophy of Science, Psychology, etc.

RESEARCH EXPERIENCE

- **Doctoral Student, MBZUAI, UAE**   AUG 2023 – PRESENT
    - Currently working on Adversarial defense in VLMs.
    - Research Areas: Trustworthy AI.
- **Research Assistant, MCR Lab (Metaverse Center, MBZUAI), UAE**   FEB 2023 – AUG 2023
    - Research projects: Video Action Recognition, AI for Optimized Scholarly Search, Responsible LLM for Mental Health and Climate Change.

- **Applied Science Intern, G42 (HealthCare), UAE**   FEB 2023 – APR 2023
  - Streamlined the preprocessing of the US CDC NHANES dataset by building an end-to-end pipeline for downloading, retrieving, analyzing, and modeling.
  - Ensured that the pipeline generates a comprehensive TRIPOD report after use.
- **Graduate Research Assistant, SPriNT-AI Lab (MBZUAI), UAE**   JAN 2021 – DEC 2022
  - Developed PolyKervNets to minimize reliance on ReLU activations and optimize latency in AI models during private inference.

  - Projects: Self-Supervised Racial Bias Mitigation in Face Recognition Systems, Accented Speech Recognition using Vector-Quantized Variational AutoEncoders (VQ-VAE), Gender Bias Mitigation in Word Embeddings.

TEACHING EXPERIENCE
- **Teaching Assistant, Introduction to Object Oriented Programming, UNIBADAN**   2019

VOLUNTEERING EXPERIENCE
- Graduate School Application Mentorship   2021 – PRESENT
- Editor, MBZUAI Blog   2024 – PRESENT
- Peer Reviewer
  - IEEE Access   2023 – PRESENT
  - Open Information Science   2023 – PRESENT

SELECTED PUBLICATIONS
- **Conferences**
  - N. Tastan*, S. Fares*, **T. Aremu***, S. Horvath, and K. Nandakumar, "Redefining Contributions: Shapley-Driven Federated Learning," 33rd International Joint Conference on Artificial Intelligence (IJCAI), Jeju, Korea, 2024.
  - **T. Aremu*** and K. Nandakumar, "PolyKervNets: Activation-free Neural Networks For Efficient Private Inference," *2023 IEEE Conference on Secure and Trustworthy Machine Learning (SaTML)*, Raleigh, NC, USA, 2023, pp. 593-604, doi: 10.1109/SaTML54575.2023.00045.
  - W. Y. Kang*, **T. Aremu***, Y. Balah, M. Nadeem, I. G. Navarette and A. E. Saddik, "ScholarFace: Scanning Faces, Discovering Minds," 2024 IEEE International Conference on Consumer Electronics (ICCE), Las Vegas, NV, USA, 2024, pp. 1-5, doi: 10.1109/ICCE59016.2024.10444350.
- **Preprints**
  - **T. Aremu**, "Regularized PolyKervNets: Optimizing Expressiveness and Efficiency for Private Inference in Deep Neural Networks," ePrint IACR, 2023. https://eprint.iacr.org/2023/1917 (accessed Dec. 15, 2023).
  - **T. Aremu** et al., "On the Reliability of Large Language Models to Misinformed and Demographically-Informed Prompts," Jan. 2024, doi: https://doi.org/10.2139/ssrn.4699451.
- **Blog**
  - **T. Aremu**, "Accented Speech Recognition: The Inclusive Realm of Automatic Speech Recognition Systems," Medium, Jul. 03, 2023. https://shorturl.at/oKLP8 (accessed Apr. 27, 2024).

- **T. Aremu**, "AI Text Detectors: Amazing Sleuths or WHAT?," Medium, Jun. 11, 2023. https://medium.com/towards-artificial-intelligence/ai-text-detectors-amazing-sleuths-or-what-31e4e2ca7803 (accessed Apr. 27, 2024).

TALKS & TUTORIALS

- Ethical Perspectives of Artificial Intelligence, Department of Material Sciences, University of Denver, Virtual. (JUL 2022).

HONORS & AWARDS

- MBZUAI MSc & PhD Fully Funded Fellowship   2021-2027
- UAE Golden Visa for Talented Persons/Specialists in Science   2022
- MBZUAI Award of Appreciation for Iconic Representation and Student Hospitality   2022
- ProjectSet Innovation Challenge for Entrepreneurship (ICE-22)   2022
- Top 100, DeepLearning.AI Data-Centric AI Competition   2021
- NYSC-FRSC Award for the Most Creative Corp Member   2017
- 2015 AUE-NACOSS Award for the Best Programmer   2015

PROFESSIONAL DEVELOPMENT

- Microsoft Azure
- Deep Learning
- Google Cloud
- IBM AI & Data Science
- Machine Learning
- MLOps
- Mind & AI

REFERENCES

- Prof. Abdulmotaleb El Saddik - Enterprise Professor, MBZUAI & UOttawa - a.elsaddik@mbzuai.ac.ae.
- Prof. Kun Zhang - Professor, MBZUAI & Carnegie Mellon University - kun.zhang@mbzuai.ac.ae.
- Dr. Karthik Nandakumar - Associate Professor, MBZUAI - karthik.nandakumar@mbzuai.ac.ae.