

Toufiq Musah

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Summary

A biomedical researcher and engineer with multidisciplinary expertise in technology-driven healthcare solutions and machine learning/deep learning. Experienced in leading impactful research and projects, with a strong commitment to advancing AI-driven healthcare accessibility.

Education

Kwame Nkrumah University of Science and Technology (KNUST) Jan 2021 – Nov 2024
BSc. Biomedical Engineering - First Class Honors

- **Relevant Courses:** Research Methods, Biomechanics, Medical Imaging, Probability and Statistics, Linear Algebra, Calculus, C/C++ , Biomaterials, Bioinstrumentation, Biosignal Processing and Analysis

Professional Experience

Research Assistant, Engineering Research Kumasi, Ghana Oct 2024 – Present
Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR)

- Conducting interdisciplinary research in Digital Health, Artificial Intelligence, and Machine Learning within the Global Health & Infectious Diseases (GHID) Group.
- Developing and deploying generative AI models and Clinical Decision Support Systems to enhance diagnosis, treatment, and management of infectious and chronic diseases.
- Collaborating on systematic reviews and literature analyses on disease management strategies, particularly focusing on gestational diabetes care in Ghana.

Research Assistant, Machine Learning Intern Kumasi, Ghana Oct 2023 – Feb 2024
Responsible Artificial Intelligence Lab (RAIL)

- Conducted extensive research across multiple domains of machine learning/deep learning, including Generative Adversarial Networks (GANs) and Machine Learning Applications in Biomedical Engineering.
- Built Generative Models for CT denoising and upscaling (SRGAN), and CT-MRI translation (CycleGAN).

Engineering Intern Kumasi, Ghana Sept 2021 – Nov 2021
Sesi Technologies Limited

- Built User-Interface components to assist in the digitization of agricultural tools.
- Designed and implemented a custom computer mouse, sourcing components, utilizing CAD & 3D printing.

Biomedical Engineering Intern Accra, Ghana Dec 2022 – Jan 2023
37 Military Hospital

- Assisted in routine maintenance checks on various medical equipment including autoclaves and surgery lightening equipment.
- Supported quality control processes through evaluations, ensuring medical devices met regulatory standards.

Research and Academic Work

Conference Papers

Automated Segmentation of Ischemic Stroke Lesions in Non-Contrast Computed Tomography Images for Enhanced Treatment and Prognosis

Authors: **Toufiq Musah**, Prince Ebenezer Adjei, Kojo Obed Otoo

MICCAI Meets Africa Workshop - Paper, Oral Presentation [[ArXiv](#)] [[Springer](#)]

Poster Presentations, Abstracts, Talks

- **An Explainable Artificial Intelligence Framework for Clinical Decision Support Systems in Stroke Triaging**
Authors: **Toufiq Musah**, Tracy Birago Boamah, Mathew Akakpo, Prince Ebenezer Adjei
Ghana Digital Innovation Week - Poster Presentation
- **Explainable Classification of Ischemic And Hemorrhagic Strokes Using Non-contrast Computed Tomography Scans**

Authors: **Toufiq Musah**, Tracy Birago Boamah, Mathew Akakpo, Adjei Prince Ebenezer

- **Sleep Apnea detection Using machine learning in low-resource compute devices and SpO₂ Sensors**
University of Ghana, School of Engineering Sciences Conference - Abstract, Oral Presentation [[Abstract](#)]
- **Advanced Optimisation Techniques in Machine Learning (Tutorial)**
Ghana Data Science Summit, IndabaX-Ghana 2025, Ashesi University, 2025. [[Tutorial Materials](#)]

Relevant Projects

Surgical Scene Understanding and Panoptic Segmentation with Scene Graphs

Developed of an end-to-end system for automated surgical room scene understanding. Trained an S²-Scaled SwinUNETR for panoptic segmentation of 21 classes (personnel, instruments, and tools) enabling robust identification and localization. Fine-tuned MedGemma using QLoRA for scene graph generation and event significance detection, facilitating downstream reasoning and analytics for surgical workflow analysis.

Brain Tumor Segmentation Using Deep Learning

Developed and implemented advanced algorithms for segmenting brain tumors from multi-modal MRI scans as part of the Sprint AI Training for African Medical Imaging Knowledge Translation programme. The project focused on addressing the unique challenges facing the Sub-Saharan African region including limited data availability.

Super Resolution and Denoising of Computed Tomography Scans

A generative model for producing high resolution head CT scans from low resolution variants, to minimize effective patient radiation dose in CT diagnosis radiology procedures.

Data Augmentation via Deep Convolutional GAN

Implemented a deep convolutional generative adversarial network (DCGAN) to synthetically generate additional medical image data for self-supervised pre-training, enabling effective data augmentation and facilitating robust fine-tuning of computer vision models.

Awards and Acknowledgments

- MICCAI Travel Award, 2024, 2025
- Best Oral Presentation Award - MICCAI Meets Africa Workshop, 2024
- Best Poster Presentation Award - Ghana Data Science Summit, IndabaX, 2024
- Academic Excellence Award – Provost List 2021, 2022, 2023
- MasterCard Healthcare Entrepreneurship Grant

Volunteering

Course Facilitator, Women in Engineering - SheCodes Club Teaching Python programming and introductory machine learning classes for the Women in Engineering Society, creating an inclusive learning environment to help members gain tech skills and build their confidence in STEM.

Student Lead, ARM(E3)NGAGE Club Spearheading the ARM student club focused on microcontroller programming, IoT, and embedded machine learning. Guided teams in developing innovative hands-on projects while organizing outreach workshops.

Volunteer, IndabaX, Ghana Data Science Summit Contributing to the organization of IndabaX GDSS by curating engaging content that raised awareness and sparked interest in the transformative potential of data science.

Blog Posts, Tutorials

Introduction to TorchIO for 3D MRI Processing: - [Preprocessing \(Part 1\)](#) - [Augmentation & Dataloaders \(Part 2\)](#)

How to Make an Image Classification Model: Is it a Pie? - [Blog Post](#)

End-to-End Deep Learning Tutorial for Image Classification: Pneumonia Detection - [Colab Notebook](#)

Skills

Languages: C/C++, Python, LaTeX, MATLAB

Libraries: PyTorch, TensorFlow, Keras, Scikit-Learn, Pandas, LangChain

Software: Solidworks, Fusion 360, ANSYS FEA, Unity Game Engine, KiCAD, Electronics Prototyping