BRIAN K. BOSHO

Phone: (+254) 718-474-885 ◇ Email: bkipkiru@andrew.cmu.edu

Homepage: users.ece.cmu.edu/~name

Google Scholar ◇ Github ◇ LinkedIn

SUMMARY

Research Associate at CMU-Africa (M.S. Engineering AI, 2025) working at the intersection of geometry-aware computer vision and efficient learning. I use diffusion-based visual data mining to curate and learn from low-resource urban traffic scenes in African cities. I proposed **FedProp**, a federated-GNN method that performs spectral feature propagation via power iteration with convergence and approximation guarantees. I have built LLM-guided pipelines that execute symbolic robotic plans and applied 3D vision to cryo-electron tomography for denoising, segmentation, and particle picking.

EDUCATION

Carnegie Mellon University Africa (CMU-Africa)   *May 2025*

M.S. in Engineering Artificial Intelligence

GPA: 3.97/4.0

Selected coursework: Data Inference & Applied ML; Mathematical Foundations of ML; Computer Vision; Deep Learning; Natural Language Processing.

Jomo Kenyatta University of Agriculture and Technology (JKUAT)   *November 2018*

Dual B.Sc. in Electrical & Electronics Engineering; Electronics & Computer Engineering

EXPERIENCE

Research Associate   May 2024 – Present

· Lead research on **diffusion-based visual data mining** for low-resource urban traffic scenes in African cities.

Graduate Research Assistant   May 2024 – Aug 2024

· Developed **FedProp**, a federated-GNN method using spectral feature propagation via power iteration.
· Provided convergence and approximation guarantees; validated on Cora, Citeseer, and PubMed benchmarks.

Graduate Teaching Assistant   Sept 2024 – Present

· Designed recitations, quizzes, and assignments for the Mathematical Foundations of ML course and Applied Computer Vision.
· Provided academic support through office hours and supplementary learning materials.

Jasiri Fellow   Jan 2023 – Jun 2023

· Conceived and launched **Swyng**, a peer-to-peer carpooling platform addressing transportation gaps in Kenya.

Project Manager & Director   Dec 2018 – Dec 2022

· Led 10+ optical fiber deployments, delivering connectivity to 1,000+ households in Nairobi and Kisumu.

RESEARCH & PROJECTS

FedProp – Federated GNNs via Spectral Feature Propagation   May 2024 – Aug 2024

· Built a **federated learning environment** with Ray to coordinate server–client orchestration, model training, and evaluation.

- Implemented **FedProp**, combining **spectral graph theory** with **power iteration** for feature imputation in federated GNNs.
- Validated convergence and approximation guarantees; achieved competitive accuracy with reduced communication on Cora, Citeseer, and PubMed.
- *Status:* Manuscript under review at *Applied Artificial Intelligence* (preprint link, code link).

Capstone – LLM-Guided Robotic Execution with PyCRAM Jan 2024 – May 2024

- Designed **RoboChat** and **RoboCRAM**: an LLM agent interface to the PyCRAM robotic planning framework (PyCRAM link).
- Enabled the agent to call ROS commands, run Lisp scripts, and execute symbolic manipulation plans (move, stack, sort).
- Evaluated on a 30-task kitchen benchmark in BulletWorld, comparing LLM-based planning with the default HTN planner (demo link).

Cryo-ET 3D Vision Aug 2024 – Present

- Applied **3D computer vision** and **U-Net architectures** to tomograms from the Cryo-ET Data Portal (link) for denoising, segmentation, and particle picking.
- Developed end-to-end training pipelines for denoising and 3D particle picking, integrating MONAI, PyTorch, and semi-automatic annotation tools.
- Packaged reproducible workflows (Docker + Conda) to facilitate transfer to new datasets and future publications (code link).

AWARDS & ACHIEVEMENTS

- **Valedictorian**, Carnegie Mellon University Africa — Graduated top of the M.S. Engineering AI class of 2025.

- **Local Chair**, African Computer Vision Summer School (ACVSS) 2025.

- **Smart Africa Scholarship Award** — Prestigious merit scholarship fostering digital transformation and leadership in Africa, with a focus on AI and technology innovation.

- **Jasiri Entrepreneurship Fellowship** — Selective fellowship supporting individuals creating high-impact ventures in Africa through entrepreneurial training and mentorship.

SKILLS & INTERESTS

Programming Languages	Python, C/C++, MATLAB, HTML
Machine Learning Tools	PyTorch, TensorFlow, scikit-learn
Other Tools	Docker, Git, Linux, LaTeX
Hobbies	Hiking and cycling