Nathaniel Asiak

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Education

Academic City University College — Accra, Ghana

B.Sc. in Electrical and Electronics Engineering; ***GPA: 3.94/4.00*** — *Sep 2018 – Aug 2022*

- **Honor's list** [2018-2022]

Research Experience

Fortress Ghana Research Lab — Accra, Ghana

Robotics, Machine Learning Engineer — *Jan 2024 – Present*

- Worked on Extended Kalman Filter state estimator for the motion algorithm of a 6-DOF Underwater autonomous vehicle for crude tank exploration .
- Implemented custom navigation algorithm on Pixhawk flight controller via ROS on onboard Nvidia Jetson Nano
- Modelled and simulated dynamics of underwater vehicle motion in Matlab/simulink
- Deployed YOLOv8 and Faster R-CNN models for underwater object detection.

Locovent Research Lab | ***BBC Interview*** — Accra, Ghana

Undergraduate Researcher, Supervisor: Dr. Fred McBagonluri — *May 2020 – Jun 2021*

- Worked on *control system efficiency* for off-grid emergency medical ventilators.
- Developed mathematical transfer models for optimal motor movement to reduce power consumption.
- Wrote i2c communication protocol for data transfer between multiple sensors and microcontroller.
- Designed the project's control system and software architecture, algorithm flowchart, and state machine diagram.

Undergradute Thesis | ***Thesis*** | ***Code*** — Accra, Ghana

Undergraduate Researcher; Supervisor: Dr. Stephen Armah — *Oct 2021 – Jun 2022*

- Worked on designing and constructing a digital stethoscope using machine learning.
- Reduced the sampling rate of audio input by 4x to speed up the training and inference time of the learning model.
- Ran experiments on the performance of SVM, Random Forests, and AdaBoost to different input feature inputs.
- Built a desktop GUI application for interactive recording, visualizing, and classifications for heart sounds.

Work Experience

Jetstream Africa — Tema, Ghana

Machine Learning / Software Engineer — *June 2022 – Jan 2024*

- Worked on the "JetAssist" project for fine-tuning transformer models for named entity recognition in supply chain documents.
- Developed a generative question-answering system with Retrieval-Augmented Generation techniques
- Wrote optimized SQL queries that reduced system latency by 20%.

Kwame AI — Accra, Ghana (Volunteer)

Machine Learning , ***10hrs/week*** — *Aug 2023 – Present, Volunteer*

- Designed legal dataset benchmark for automated evaluation of legal language models
- Designed experiment pipelines for automated metric evaluation of 10000 legal cases generated from LLMs based on ROUGE
- Created internal wiki on evaluation of best practices on legal responses from Large Language Models.

PROGRAMMING SKILLS

Languages: C/C++, Python, PHP, TypeScript, SQL, MATLAB,

Technologies: Laravel, FastAPI, GraphQL, MySQL, PostgreSQL, Neo4j, Git, Docker, Amazon Web Services

Libraries: Scikit-Learn, PyTorch, NLTK, SpaCy, TensorFlow, NumPy, Pandas, Matplotlib, Langchain, ROS, OpenCV

AWARDS & ACHIEVEMENTS

Best Graduating Student, ECE: Awarded to the top-ranked student in Electrical and Computer Engineering – (Aug 2022)

Academic City Presidential Award: Awarded for excellence in engineering (December 2021)

Emerging Leaders In AI Scholar: Received fellowship to learn about graduate school research (Oct 2023)

Finalist, JPMorgan Hackathon: 1 of 7 finalists at the Deep Learning Indaba Conference. (Sep 2023)

Stanford Exposure to Research and Graduate Education Scholar: 1 of 30 students worldwide to participate in graduate school research exposure (Oct 2021)

President Independence Award: Awarded for Academic Performance(1 of 20 nationwide) (Mar 2016)

PROJECTS

PyramidBERT Implementation | *Code*

- Implemented pyramidBert paper on a custom BERT model architecture
- Implemented Core-set algorithm to reduce tokens of hidden layers from 128 to 19 with just 1% performance degradation

5-DOF Robotic Arm | *Report*

- Built a MATLAB/Simulink project to model, and optimize the trajectory of a 5-DOF robotic arm using Inverse Kinematics.

Fire Alarm System | *GitHub*

- Built a fire detection system with guidance from Dr.Paul Obeng
- Developed low-level firmware using Assembly language on the Keil IDE, enabling robust communication protocols with multiple hardware peripherals
- Designed power system for 8051 microcontrollers using Proteus and EasyEDA circuit builder

Movie Recommender system | *GitHub*

- Developed and deployed a KNN-based movie recommender system on Streamlit.

TEACHING, COMMUNITY, VOLUNTEERING AND LEADERSHIP

Code in Place, Stanford University *Jul 2023*
Taught a group of 15 students the first half of Stanford's flagship Intro to Python course, CS106A.

Chief Judicial Officer, Academic City University *Feb 2021 – Feb 2022*
Led reform of student constitution and served on the university disciplinary board

Teaching Assistant, Academic City University *Aug 2021 – Feb 2022*
Conducted tutorials and lab sessions for EE3246 control systems class

Emerging Leaders in Technology and Education(ELiTE) *Sep 2019*
Tutored 50 high school students in basic programming, Arduino, and electronics