Musa Azeem

(803) 397-3337 • musa.mazeem@gmail.com • musaazeem.com

Education

University of South Carolina Honors College Columbia, SC
Bachelor of Science in Computer Engineering; Overall GPA: 4.000 May 2024
Summa Cum Laude; President's Honor List, All semesters

University of South Carolina Columbia, SC
Masters of Science in Computer Science; Overall GPA: 4.000 May 2025

Experience

University of South Carolina Columbia, SC
Artificial Intelligence Research Assistant *Dec 2021 – Present*

- Researched and implemented cutting-edge deep learning models in PyTorch (LSTM, CNN, AutoEncoders) to achieve high-accuracy predictions in diverse domains including human activity recognition, rodent sleep status prediction, and protein structure prediction.
- Engineered a robust ETL pipeline, efficiently extracting, transforming, and loading EEG data from extensive SQL databases and processing it for data analysis and machine learning.
- Developed a Python library and advanced data analysis and ML techniques to evaluate protein structure predictions in the absence of experimentally determined structures. The library calculates an accuracy metric comparable to the industry standard RMSD, providing robust evaluation capabilities.
- Designed and developed software solutions, including an Android WearOS app for real-time accelerometer data streaming into an edge Artificial Neural Network (ANN) and a Flask-based web application that provides an intuitive user interface and streamlined prediction pipeline for deep learning models.

SIOS Technology Corporation Columbia, SC
AI Solutions Architect & Software Engineering Intern *May 2023 – Present*

- Led the strategic planning and development of an advanced AI Chatbot leveraging RAG methodology, empowering users to efficiently find solutions within product documentation. Implemented a quantized local instance of the Llama-3 7B LLM, fine-tuned for optimal query handling and accurate retrieval from a vector database.
- Created a comprehensive Python library to parse customer log files, extract critical information, identify error patterns, and present results via an interactive web interface.
- Set up and maintained AWS subnets and EC2 instances to install, develop, and test software.

Capgemini Houston, TX
Rise Intern - Technology Consultant Role *Aug 2023*

- Directed a rapid turnaround case study exercise to develop a comprehensive mobile app launch strategy, a functional prototype, and a robust business model.
- Leveraged Capgemini's extensive resources and network, engaging with industry experts and gaining insights into software engineering and global technology consulting processes.

Skills

Programming Languages: Python, C/C++, JavaScript, R, Kotlin, Java, MATLAB, SQL, Bash, SystemVerilog

Tools/Libraries: PyTorch, TensorFlow, Biopython, Pandas, NumPy, Flask, Matplotlib, React, Express, Android SDK

Machine Learning: Reinforcement Learning, Decision Trees, K-Means Clustering, Model Evaluation & Diagnostics

Deep Learning: MLP, CNN, LSTM, Residual Networks, AutoEncoder Architecture, Model Regularization

Data Analysis: Data Cleaning, Data Visualization, Exploratory Data Analysis (EDA), SQL Querying, ETL Pipelining

Other: Git, Linux, AWS, Docker, Embedded Systems, Microcontroller, Circuit Design

Publications

[1] Musa Azeem and Homayoun Valafar, “Dihedral Angle Adherence: Evaluating Protein Structure Predictions in the Absence of Experimental Data,” in *2024 Congress in Computer Science, Computer Engineering, & Applied Computing (CSCE), Las Vegas, NV, USA, 2024.* https://doi.org/10.48550/arXiv.2407.18336

[2] Andrew Smith, Musa Azeem, et. al, "Toward Concurrent Identification of Human Activities with a Single Unifying Neural Network Classification: First Step" *Sensors 24*, no. 14: 4542. https://doi.org/10.3390/s24144542

Awards & Engagement

NASA STEM Outreach Award Aug 2023 – May 2024

Secured funding to conduct research and lead eight outreach events, teaching high school students across South Carolina the basics of web programming. The research involved developing a universal smartwatch application to record sensor data and facilitate the annotation of events.

Outstanding Senior in Computer Engineering Mar 2024

Students who receive the university’s Outstanding Senior award have demonstrated major achievement in the categories of service, leadership, academics and research.

Projects

Deep Learning Eating Detection; github.com/musa-azeem/eating-detection Jul 2023 – *Present*

Researched machine learning techniques to utilize tri-axis accelerometer data to recognize the gesture of a person eating to assist in human activity recognition research. Neural networks were developed in PyTorch and consist of LSTM, CNN, Residual, and Autoencoder networks.

Faculty Dashboard Full Stack App; https://github.com/SCCapstone/K3MS Aug 2023 – May 2024

Developed a full stack faculty dashboard app, which allows Professors and Department Chairs at UofSC to access a consolidated view of student evaluations, research information, and relative performance of themselves and their team members. The website was built with Flask, React, and MySQL. The backend serves as a REST API and processes large CSV files to gather data, input this data into the database, and performed calculations to analyze data. The frontend provides a seamless, multi-page, and in-depth dashboard for faculty members to view all of this information. The app was deployed on a server using Apache.

Delta WearOS App; github.com/smithandrewk/delta Jul 2022 – *Present*

Developed an Android watch app for medicinal research in Kotlin and Android Studio to record, annotate, and process data from the watch’s accelerometer. The data is live fed into an edge neural network to detect smoking and recorded for later research. The app’s UI was built using Jetpack Compose and allows users to record time periods in which they are smoking, affirm or deny detected smoking gestures by the model, and record other research-relevant data.

SleepyRats Web App; github.com/smithandrewk/aurora Jan 2021 – Jan 2022

Designed and implemented a web application for the UofSC School of Medicine using the Flask microframework, Pandas and TensorFlow for data processing, Javascript, html, bootstrap CSS, and an SQL database. The app consists of a concise user interface and data pipeline for users to upload files of rodent EMG/EEG recordings, classify them to different stages of sleep with trained models, download files in the required format, and view past activity on the web app.

Log Analytics Prototype May 2023 – Dec 2023

Developed a python library for the Customer Experience team at SIOS Technology to parse through customer product log files and extract key customer and system information, detect error patterns, sync information with an online database of customer cases, and display results through an interactive web interface. Extensive use of Pandas and Regex were utilized to parse data and detect patterns, and the web interface was developed with Flask.

Portfolio Website; github.com/musa-azeem/portfolio | portfolio.musaazeem.com Jan 2023

Built a full stack MERN website to showcase the projects I have worked on and provide a UI and backend to add new projects to the portfolio. The frontend is built in React and html/CSS, which is hosted on Github pages. The backend is hosted by an AWS lambda function and is built in Express connecting to a Mongo Database.