Tanzil Ahmed

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Education

San Jose State University **Aug 2022 – May 2026**

Bachelor of Science, Data Science *San Jose, CA*

Relevant Coursework: Data Structures and Algorithms, Data Visualization, Linear Algebra, Machine Learning, Processing Big Data, Applied Probability and Statistics — **GPA: 3.56**

Professional Experience

Machine Intelligence and Complex Systems Lab @ SJSU **January 2025 - Present**

Machine Learning Research Assistant *San Jose, CA*

- Developing A**gentic Retrieval-Augmented Generation (RAG)** pipelines under the guidance of Dr. Sengupta, by integrating LLMs with vector databases
- Implementing query expansion techniques to refine user queries before retrieval, increasing relevant document recall by **20%**
- Assisting in **fine-tuning hyperparameters** for retrieval models and embeddings to improve overall system performance and optimize retrieval position.

Projects

BetterLyfe **Flask | Javascript | PostgreSQL**

- Engineered a full-stack social assistance platform with **Flask, JavaScript** and dual AI modes (Coach/Assistant), featuring **voice recognition**, real-time conversation monitoring, and an admin portal for connecting the less fortunate with resources
- Increased AI response accuracy by **40%** by implementing a custom **RAG (Retrieval-Augmented Generation) pipeline using Google Gemini (LLM)**, **Vapi API** and a **geolocated database of 60+ services**, enabling dynamic, context-aware recommendations for housing, food, and healthcare
- Built a **multi-modal AI conversation system** with voice-to-text and text-to-speech capabilities, emotion detection, user context memory, and adaptive prompt engineering to **enhance accessibility, personalization, and user engagement**

EmbrAlert (2nd Place Winner at SJ Hacks) **React | Node.js | Python**

- Led the development of a full-stack application for **wildfire detection and community alerts**, utilizing AI-driven smoke detection and multilingual chatbot support with **React** and **Node.js**, enhancing community safety and awareness in wildfire-prone areas.
- Engineered a **real-time data dashboard** using a lightweight **RNN model** and **Express**, providing users with live weather, air quality updates, and wildfire risk assessments, thereby **improving decision-making capabilities by 30%.**
- Integrated live camera detection and voice/text input capabilities using **React, Node.js, and Python**, optimizing the application for both web and mobile platforms, which increased accessibility and usability for diverse communities by **40%.**

Music Recommendation System **Python | Scikit-learn | TensorFlow**

- Developed and implemented a music genre classification system using ensemble methods (**SVM, Random Forest, XGBoost**), achieving **85%+ accuracy** through hyperparameter optimization and cross-validation techniques.
- Engineered **50+ audio features** using signal processing libraries (librosa), extracting MFCCs, spectral characteristics, and temporal features from **8,000+ audio samples** to improve model performance.
- Designed and trained a **Convolutional Neural Network (CNN)** using **TensorFlow** for spectrogram image analysis, incorporating data augmentation techniques and achieving **84% validation accuracy** across 10 music genres.

Technical Skills

Languages: Python, Java, SQL, HTML5, CSS, JavaScript

Web/Database: Firebase, SQLite, PostgreSQL

Libraries/Frameworks: React, Scikit-learn, Flask, TensorFlow, Pandas, Plotly, Seaborn, OpenCV