Aditya Vikram Singh
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Education

Northeastern University — Boston, MA
Masters in Artificial Intelligence — *Sep. 2023 – May 2025*
GPA: 4.0

Vellore Institute of Technology — Vellore, India
Bachelor of Technology in Electronics and Communication Engineering — *Jul. 2019 - Jun. 2023*
GPA: 9.18/10

Experience

Artificial Intelligence Research Assistant — May 2024 – Present
Cybersecurity & Privacy Institute, Northeastern University — *Boston, MA*
- Developed hierarchical MARL algorithms to defend networks, improving threat detection by 34.5% and efficiency by 30%
- Built a top-ranking AI agent for the CASTLE CAGE Challenge, collaborating with 6 researchers in a competitive setting
- Deployed a LangChain RAG agent with Streamlit to analyze cybersecurity logs, increasing lab productivity by 33%

Data Science Intern — Mar. 2023 – Jul. 2023
Pianalytix — *Hyderabad, India*
- Built and deployed 22 AI/ML projects as Flask web apps and created 20+ comprehensive educational videos, boosting student engagement by 40%
- Achieved over 90% accuracy on multiple real-world datasets by applying advanced ML techniques and fine-tuning pipelines

Machine Learning Research Assistant — Jun. 2022 – Dec. 2022
Vellore Institute of Technology — *Vellore, India*
- Designed a novel neural network architecture in MATLAB that achieved 99%+ accuracy on high-dimensional datasets while using fewer neurons, reducing model size by 60% in some cases
- Developed a hardware-software solution to linearize NTC thermistor output, using RBF networks to cut non-linearity from $\pm 45.57\%$ to $\pm 0.033\%$, achieving 99.93% improvement

Projects

Generation of Synthetic ECG data for augmentation — Sep. 2024 – Apr. 2025
- Improved ECG signal similarity by 42% over classical GANs by designing two custom architectures with tailored loss functions for high-fidelity generation
- Achieved state-of-the-art performance with Transformer-based Latent Diffusion Models, surpassing U-Net LDM across 8 evaluation metrics by up to 95% .
- Increased heart disease classification accuracy by 20% through synthetic data augmentation pipeline using generated signals

Emotion-Driven Audio-Visual Experience System — Jan. 2025 – Apr. 2025
- Built a real-time multimodal AI system integrating emotion recognition, audio and video generation, enhancing emotional resonance and user immersion by 56% and user satisfaction by 67% in initial pilot studies
- Developed RAG-powered LLM modules for emotional state inference and prompt generation, enabling dynamic audiovisual adaptation through a memory-augmented feedback loop

Adaptive Difficulty: Leveraging Reinforcement Learning for Player-Driven Immersion — Sep. 2023 – Dec. 2023
- Developed Deep RL and Adversarial RL algorithm to automatically control and test the level design of games
- Designed a custom game in python using PyGame to setup the learning environment from scratch

Advanced Image Processing Application — Sep. 2023 – Dec. 2023
- Built an advanced image processing tool in Java using the MVC design pattern
- Applied object-oriented design principles to create a modular, maintainable architecture supporting future extensions like filters, transformations, and I/O enhancements

Publications

Hierarchical Multi-agent Reinforcement Learning for Cyber Network Defense — AAMAS 2025
ECG Based Biometric Recognition Using Similarity Measure and Feature Matching — ICEEE 2022

Technical Skills

Languages: Python, MATLAB, Java, C++, HTML/CSS, Embedded C/Arduino
AI/ML: Regression, Predictive AI, Neural Networks, Deep Learning, Clustering, Forecasting, Reinforcement Learning, Computer Vision, Generative AI, NLP, Transformers/LLMs, Retrieval Augmented Generation (RAG), Information Theory, Exploratory Data Analysis (EDA)
Libraries & Tools: Pandas, NumPy, PyTorch, TensorFlow, Keras, LangChain, Scikit-learn, OpenCV, spaCy, NLTK, Hugging Face Transformers, Gymnasium (Gym), Ray/RLLib, Flask, Streamlit, Jupyter, MLFlow, DVC
Certifications: DeepLearning.AI TensorFlow Developer, Generative AI with Large Language Models