Aadhithyan Velan M

+91 63830 91760 | aadhi.email@gmail.com | linkedin.com/in/aadhithyan-velan-m/ | aadhithyan-velan-m.github.io/

Education

Birla Institute of Technology and Science (BITS), Pilani — Hyderabad, India
Bachelor of Engineering in Computer Science — *Aug. 2023 – May 2027*
CGPA: 8.20/10.0

Experience

Undergraduate Student Researcher (Adversarial Deep Learning) — Aug. 2025 – Dec. 2025
BITS Pilani (Advisor: Prof. Aneesh Chivukula) — *Hyderabad, India*

- Reproduced and evaluated a game-theoretic adversarial attack on deep neural networks based on a Stackelberg formulation between a variational adversary and a target CNN.
- Reproduced latent-space adversarial perturbations using Variational Autoencoders (VAEs) to generate subtle, effective attacks under perceptual constraints.
- Benchmarked attack performance on standard vision datasets (MNIST, GTSRB), including safety-critical traffic sign recognition tasks.
- Explored extensions and alternative optimization strategies, including Quantum-behaved Particle Swarm Optimization (QPSO), to study attack effectiveness and stability.

Projects

Knightmare Protocol: Chess Agent | *Python, PyTorch, Docker, Lichess API* — Jul. 2025 – Present

- Used **chess as a controlled testbed** to study **reinforcement learning in large discrete action spaces**, implementing **NFQ, DQN, DDQN, and Dueling DDQN** from scratch, without high-level wrappers.
- Trained a supervised policy on **8M+ expert positions** from the Lichess Elite Database, achieving strong offline performance and deploying the agent live on Lichess.
- Designed **canonical board representations** to remove player-perspective asymmetry, improving **data efficiency and training stability**.
- Conducted systematic experiments transitioning from **offline supervised learning to online RL**, observing **policy collapse and catastrophic forgetting** driven by objective mismatch and **Q-value inflation**.
- Used empirical failure analysis to motivate a shift toward **actor–critic methods** as a more stable alternative for offline-to-online learning, with planned extensions to **planning-augmented agents (e.g., MCTS)**.
- Authored a technical blog documenting architectural decisions, experimental results, and other findings.

E-Commerce Attribute Extraction | *BERT, CRF, Hugging Face* — Aug. 2025 – Dec. 2025

- Built an end-to-end **Attribute–Value Extraction (AVE)** system for unstructured e-commerce product titles, framing the task as **sequence labeling**.
- Implemented a **BERT–CRF architecture** to leverage contextual token representations while enforcing **label consistency and valid attribute–value spans**.

Technical Skills

Machine Learning: PyTorch, NumPy, scikit-learn, OpenAI Gym
Research Areas: Reinforcement Learning (value-based methods, offline-to-online learning), Adversarial ML, Imitation Learning
Languages: Python, C++, Java, GDScript
Tools: Git, Linux/Bash

Honors & Achievements

National Talent Search Exam (NTSE) Scholar: Awarded by Govt. of India to top 2,000 students nationwide.

Interests

Creative Writing: Authored a **50,000+ word** high-fantasy novel draft; designed comprehensive world-building bible.
Game Development: Prototyping a 3D Open-World RPG in **Godot**; focusing on narrative system design.