Pratham Patel

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Education

Gannon University *Erie, PA*
Expected May 2028 B.S. in Computer Science (AI/ML Concentration)
Relevant Coursework: Machine Learning, Reinforcement Learning, NLP, Computer Vision, Data Structures & Algorithms, AI Ethics, Linear Algebra, Probability & Statistics

Research Interests

Reinforcement Learning — NLP (Reasoning & Grounding) — Autonomous Systems — AI Safety & Robustness

Research Experience

AI Research Intern *DA-IICT*
Summer 2025

- Engineered a reproducible RL research pipeline using Docker, reducing model evaluation time by **40%** and boosting accuracy by **20%**.
- Developed robust experiment harnesses for hyperparameter optimization and ablation studies, integrating Weights & Biases for metric visualization and reporting.
- Produced high-quality, reusable code modules and detailed research notes to support ongoing and future studies in a distributed team environment.

Synergistic Self-Correction for LLM Reasoning (NLP + RL) *Independent Research*
2025

- Architected a novel reasoning framework augmenting LLMs with Proximal Policy Optimization (PPO) and RAG-based grounding to ensure factual consistency.
- Demonstrated a **60% relative improvement** on the GSM8K benchmark over baseline models through rigorous, controlled experimentation and systematic error analysis.
- Developed a complete research codebase, including an evaluation harness, prompt instrumentation, and interpretability tools. Manuscript planned for Jan 2026 submission.

Adversarial Robustness in Android Malware Detection *Gannon University*
2025

- Constructed a hybrid malware detection model combining static opcode analysis and dynamic runtime behaviors, achieving **97% accuracy** on a dataset of 100,000+ APKs.
- Validated model robustness against adversarial attacks (e.g., code obfuscation) and utilized SHAP for post-hoc interpretability to identify failure modes.
- **Accepted for presentation** at the Microsoft Future Tech Conference (Nov 2025).

Technical Skills

- **Languages:** Python, C++, Java, SQL, JavaScript/TypeScript
- **AI/ML:** PyTorch, TensorFlow, JAX, Transformers, RL (PPO, DQN), RAG, PEFT, scikit-learn
- **Tools & Systems:** Docker, Git, Linux, Slurm, FastAPI, Flask, Next.js, Weights & Biases
- **Data & Cloud:** PostgreSQL, Redis, MongoDB, AWS, GCP (Foundational)

Selected Projects

- **Space Debris Collision Prediction AI:** Developed a space debris collision prediction system using orbital trajectory simulation and a 3D visualization interface (Flask, Next.js).
- **InboxIQ:** Engineered an intelligent email triaging system with an async backend (FastAPI, Celery, Redis), reducing user response times by **30%** through ML-based classification.
- **SignSpeak (CV + Seq2Seq):** Created a real-time American Sign Language (ASL) translator using PyTorch and a custom Seq2Seq model, achieving **¿90% accuracy** with ¡200ms latency.
- **TessAI:** Built a context-aware conversational AI using LangChain and RAG with persistent vector storage (ChromaDB) for explainable, safe responses.

Leadership & Awards

- **Founder & President, Gannon Codex Programming Club (2024–Pres):** Grew community to 50+ members; organized AI/ML workshops, hackathons, and mentored peers on research methods.
- **1st Place, BSidesROC Capture the Flag (2024):** Led a team of four to win a university-level cybersecurity competition focused on reverse engineering, cryptography, and exploitation.
- **CIS Lab Technician (2024–Pres):** Maintained 95% lab uptime and reduced average IT ticket resolution time by 30%.