Varun Rayamajhi

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EDUCATION

University of Richmond, Richmond, VA *Expected May 2027*

Bachelor of Science Candidate | **Major:** Computer Science, **Minor 1:** Physics, **Minor 2:** Mathematics

The University of Edinburgh, Edinburgh, Scotland *September 2025 - May 2026*

Visiting Student | **Department:** Informatics

Cumulative GPA: 4.0/4.0

Relevant Coursework: ML & AI in Robotics; Data Structure & Algorithms; Software Development; Computer Security; Human-Computer Interaction; Natural Language Processing; Probability; Linear Algebra; Classical Mechanics

Honors: Dean's List (4 semesters), Richmond Scholar (1 of ~25 scholars selected from ~11,000 applicants), Robins Science Scholar Award (< 3% awarded per class, merit-based), Global Scholarship (academic full ride)

TECHNICAL SKILLS

Languages: Python, Java, C++, Dart
Robotics & AI/ML: ROS2, PyTorch, Scikit-Learn, OpenCV, Gazebo, CasADi
Scientific Computing & Data Analysis: Mathematica, NumPy, Pandas, SciPy, Matplotlib, Seaborn
Development Tools & Platforms: Linux, Git, Android Studio, Flutter, RESTful API design
Hardware & Electronics: Arduino, Proteus, Eagle EDA, Sensor Integration, Circuit Design

EXPERIENCE

The University of Chicago Data Science Institute, Chicago, IL *June 2025 – August 2025*

Research Software Engineering Intern - Human Computer Integration Lab (Dr. Pedro Lopes)

- Designed and developed the first interactive application (Flutter-based) with a clinician-friendly UI/UX to assess Progressive Supranuclear Palsy by detecting downgaze palsy, reducing manual evaluation time from > 5 mins to < 1 min.
- Implemented computer vision pipeline for pupil detection, eye corner detection using Harris corner detection + k-means clustering, and iris top edge detection through intensity analysis in single eye images to fully automate downgaze palsy detection.

University of Richmond Robotics Lab, Richmond, VA *May 2025 – June 2025; June 2024 - August 2024*

Robotics & Control Research Assistant - Dr. Patrick Martin

- Engineered multi-agent robotic system using Python & ROS2, implementing decentralized coordination with action servers & clients.
- Developed scalable ROS2 packages with custom messages and launch files to streamline agent deployment and communication.
- Designed an experimental setup for formation control with three real differential-drive robots (TurtleBots) and tested the controllers.
- Reviewed existing safety approaches (Artificial Potential Fields, Reinforcement Learning, Control Barrier Functions) and implemented CBF and Exponential CBF-QP controllers in Python to guarantee forward invariance of the safe set in a single-agent system.

University of Richmond Department of Physics, Richmond, VA *January 2025 – May 2025*

ML Research Assistant - Dr. Jack Singal

- Developed data generation pipeline to simulate a harmonic 1D, one-component oscillator both without & with damping and noise.
- Applied physics-informed ML techniques & hyperparameter tuning (network architecture, learning rate, etc) to implement & train Lagrangian & Hamiltonian Neural Networks and computed dynamics using learned Lagrangian & Hamiltonian of the system.

Space Technology & Aeronautical Rocketry Lab (STAR), Surat, India *August 2022 – September 2022*

Avionics Intern

- Developed design criteria for the STP avionics system, covering testing methods, production costs, quality standards, & timelines.
- Simulated the system using Proteus and ArduinoIDE, and designed a PCB using Eagle, focusing on circuit optimization.
- Wrote C++ code for an avionics system with auto-ignition, remote control, warning signals, data handling, & fire extinguisher.
- Supervised work across both the mechanical and avionics departments, overseeing a team of four members to meet project goals.

International Movement for Leisure Activities in Science & Tech (MILSET), Romania *May 2022 – August 2022*

Electronics Lead

- Developed & integrated hardware-software system using Arduino UNO, DS18B20 temperature sensors, RTC module & SD Card.
- Conducted rigorous testing & debugging of the system, troubleshooting issues with hardware connections & software functionality.
- Utilized the integrated system to study the impact of greenhouse layering on internal temperatures & presented results at MILSET.

PROJECTS

LabFlowAPI *November 2024 – December 2024*

- Designed & developed a scalable RESTful API using C++ and Crow micro web service framework for laboratory management.
- Focused on comprehensive API design, rigorous testing, and detailed documentation to deliver a scalable and maintainable solution.

Robotics Manipulator *November 2024 – December 2024*

- Modeled and visualized the dynamics of a multi-link robotic manipulator, which allows customizable link lengths and masses.
- Utilized Hamiltonian mechanics to simulate manipulator's motion, accounting for generalized coordinates & constraints in system.

PROFESSIONAL AFFILIATIONS

- Institute of Electrical and Electronics Engineers (IEEE)
- IEEE Robotics and Automation Society