

# Varun Unnithan

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## Education

### B.S. in Aerospace Engineering and Computer Science

University of Maryland, College Park, MD

Expected Graduation: May 2026

GPA: 3.97

- Honors College: Gemstone Program for Research
- Courses: Algorithms, Intro to AI, Deep Learning, Modern Physics, Differential Equations, Engineering Dynamics

## Work Experience

### MIT Lincoln Laboratory

May 2024 – August 2024

Space Systems Analysis & Test Intern

Lexington, MA

- Designed and optimized algorithms in MATLAB to extract targets in dual-band satellite imagery with 90% accuracy
- Engineered modular systems for modelling various pipelines through optics-based statistical analysis
- Improved real-time star matching algorithms for bias correction, achieving 95% faster runtime and 70x search depth
- Applied system analyses to give project briefs to sponsors, while communicating within multidisciplinary teams

### Amazon Project Kuiper

January 2024 – June 2024

Student Software Engineer

College Park, MD

- Developed scalable systems with distributed ledgers and 5+ microservices to automate satellite operator interactions
- Pioneered game theory-based cost analyses with 20+ parameters and orbital simulations to model operator choices
- Collaborated with team of 10+ App Dev students and Amazon engineers, integrating space standards and SSA data

### Applied Research Laboratory for Intelligence & Security (ARLIS)

May 2023 – January 2024

Software Development & Research Intern

College Park, MD

- Implemented graph-based models using symbolic reasoning for operational workflows with 100+ nodes
- Constructed scalable simulations and automated data analyses with Python, saving 40+ hours per integrated model
- Advise government clients and mentors on project milestones and development plans across cross-functional teams

### Resilience Inc

August 2021 – April 2022

Software Engineering Intern

Remote

- Architected back-end systems with Node.js and JWT, creating 10+ endpoints and mitigating security vulnerabilities
- Optimized data storage by 25% from overhauling MySQL database systems onto AWS and improving data pipelining

## Extracurriculars

### Terrapin Rocket Team

September 2022 – Present

Avionics Team Lead

- Navigate team dynamics and owned the embedded system design lifecycle for flight computers, cutting costs by 70%
- Engineer printed circuit board (PCB) hardware and modular C++ software for sensor fusion via Kalman Filters
- Develop low-level systems and physics models for telemetry and 500+ kbps long-distance live video streams
- Achieved 1st place overall out of 120+ international teams at the Spaceport America Cup in June 2024

### Personal Projects

December 2020 – Present

- Designing a Bayesian autoregressive (ARIMA) model for time-series analysis and predictions on stock data
- Programmed a 3D rendering engine using raymarching algorithms in vanilla Java

## Research

### Satellite Fault Detection using Deep Learning

August 2024 – Present

Undergraduate Honors Researcher, Machine Learning for Dynamical Systems Lab

- Research data manipulation tools and anomaly detection algorithms for satellite fault detection via telemetry data
- Formulate augmented and simulated telemetry streams using the Basilisk spaceflight simulation platform

### Optimizing Toroidal Propellers for Maritime Shipping

August 2023 – Present

Team Researcher, Gemstone Honors Program

- Implement computational fluid dynamics (CFD) on parametrized toroidal propeller geometries to model fluid flow
- Design and optimize genetic algorithms and automated systems for 30+ DOF shape optimization to maximize thrust

## Skills

- **Programming:** C/C++, Python, MATLAB, Java, JavaScript, PyTorch, Node.js, SQL, React.js
- **CAD & Analysis:** Solidworks, KiCad, Ansys STK, Fusion 360, Thermal Desktop, OpenFOAM CFD