

# ADITYA VIVEK

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## EDUCATION

### Carnegie Mellon University

Bachelor of Science in Computer Science

- Focus on **Discrete Mathematics**, **Mathematical Logic**, and **Computational Problem Solving**; executing an advanced training regimen in **Graph Theory** and **Dynamic Programming** for the **ICPC World Finals 2026**.

Doha, Qatar

Class of 2029

### Stanford University Level Online (ULO)

Multivariable Calculus & Linear Algebra (Grade: 91/100)

- Full-ride scholar; selected as **1 of 15 worldwide** (acceptance rate <5%).

Stanford, CA

Jan. 2024 – July 2024

## EXPERIENCE & RESEARCH

### LLM Training Contractor

Mercor

- Synthesizing high-complexity **Olympiad-level mathematical reasoning datasets** to benchmark and fine-tune Frontier Large Language Models (LLMs) on SOTA reasoning tasks.
- Engineering rigorous, **human-verifiable chain-of-thought (CoT)** solutions for IMO-style proofs to enhance model performance in multi-step logical inference and long-horizon abstraction.
- Focusing on long-horizon reasoning and proof construction to push boundaries of model abstraction and logical consistency.

Dec. 2025 – Present

San Francisco, CA (Remote)

### Undergraduate Researcher

University of Bristol

- Authored *Clearing the Cosmos*, supervised by **3 PhD mentors**; manuscript peer-reviewed by **IJHSR**.
- Architected **CNN-based detection** and **Reinforcement Learning (RL)** pipelines for debris tracking, increasing recognition precision by **30%+**.
- Leveraged **PyTorch** and **NumPy** to benchmark deep learning models against classical computer vision techniques (Hough/RANSAC) in low-SNR orbital environments.

2024 – 2025

Bristol, UK (Remote)

### Physics Olympiad Mentor

Ministry of Education of Qatar

- Engineered a rigorous training pipeline for the **top 30 nationally ranked** physics students, authoring **50+ original problems** modeled after IPhO standards to develop advanced analytical intuition.
- Developed **computational physics simulations** using **Python** and **NumPy** to visualize complex electromagnetism and fluid dynamics, bridging the gap between theoretical derivation and physical realization.

2024 – 2025

Doha, Qatar

### Citizen Scientist & Researcher

IASC / NASA

- Optimized data pipelines to process **2B+ celestial detections** from WISE/PAN-STARRS, successfully flagging irregular bodies and planet-forming regions for NASA review.
- Reduced manual triage latency by **25%** through the implementation of standardized visual QA templates.

Aug. 2023 – Present

Remote

## PROJECTS

### Orbital Mechanics Engine | Python, CMU Graphics, NumPy, Physics

2025

- Engineered a custom **n-body gravitational simulation** using **semi-implicit Euler integration** to maintain high numerical stability and energy conservation over long-horizon trajectories.
- Optimized computational bottlenecks via **vectorized integration methods**, maintaining high numerical stability while managing  $O(N^2)$  complexity scaling for long-horizon trajectories.

### Active Debris Removal (ADR) Pipeline | PyTorch, YOLO, Reinforcement Learning

2024

- Built a 3-stage ML pipeline for autonomous debris capture, utilizing **YOLOv8** for detection and RL for pathfinding.
- Optimized trajectory reward shaping, resulting in a **25% reduction** in fuel consumption during simulated missions.

## TECHNICAL EXPERTISE

**Programming Languages:** C++, Python, C, Java, MATLAB, SQL, MongoDB, HTML/CSS

**Libraries & Frameworks:** PyTorch, TensorFlow, OpenCV, Next.js, Three.js, NumPy, SciPy, Matplotlib

**Tools & Environments:** Git/GitHub, Docker, Linux/Bash, Jupyter, L<sup>A</sup>T<sub>E</sub>X, VS Code

## HONORS & ACHIEVEMENTS

### Silver Medal – Africa & Arab Collegiate Programming Contest (ACPC)

Luxor, Egypt

— QUALIFIED FOR ICPC WORLD FINALS 2026 —

### Gold Medal (1st Place) – Qatar Collegiate Programming Contest (QCPC)

Doha, Qatar

National champion in the ICPC federation round.

### Bronze Medal – International Nuclear Science Olympiad (INSO)

Malaysia / Philippines

Represented Qatar in global competitions (2024 & 2025).

### Diamond Award & Hon. Mention – International Scientific Physics Olympiad

Russia

Top-tier recognition in experimental and theoretical physics (2024).

### Research Publication – IJHSR Peer Review

*Clearing the Cosmos: Space Debris Removal Techniques and the Role of ML* (2025).