

AMARNATH S. PATEL

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EDUCATION

University of Central Florida	Undergraduate Student	4.00 GPA
Physics (Optics & Lasers), Mathematics — Computer Science Minor		August 2025 – Present
Florida Atlantic University		3.66 GPA
Computer Science coursework concurrent with High School Diploma (111 Credit Hours)		August 2021 – May 2025

RESEARCH EXPERIENCE

[UCF Astrophotonics Lab](#), CREOL — Undergraduate Researcher August 2025 – Present

Supervisor: Dr. Stephen Eikenberry

- Developing instrumentation and automation software for astrophotonics research at the intersection of photonics and observational astronomy, spanning CREOL and the UCF Physics Department.
- Built an automated end-to-end data acquisition and processing pipeline for characterizing photonic lanterns via digital holography; orchestrates 4 instruments (tunable IR laser, fiber switch, motorized polarization controller, GigE InGaAs camera) across 7-leg \times 7-wavelength (1540–1570 nm) sweeps, with FFT-based fringe extraction and 7-mode LP decomposition.
- Developing PolyOculus, control and automation software for an 8-telescope photometric observation array; implementing INDI-protocol mount control, focuser automation, RA/Dec coordinate slewing, and backlash compensation.
- Developed Python SDK wrapper (gentec-camera) for an IR beam profiling camera enabling automated acquisition, real-time beam analysis, and FITS output.

UCF Physics Department — Paid Undergraduate Research Assistant March 2026 – Present

Physics Education Research — Supervisor: Dr. Zhongzhou Chen

- Developing ESTELA, an automated multi-version exam generation system for AI-assisted isomorphic physics problem banks, supporting scalable and equitable assessment infrastructure for introductory STEM courses.
- Built in Rust with a vanilla JS frontend; parses YAML problem banks across 13 topic areas supporting 11 question types, renders LaTeX math via KaTeX, and exports multi-version exams as LaTeX or print-ready HTML/PDF.
- Funded by NSF award 2421299 and Gates Foundation INV-076932.

[FAU Grant-Funded AI Safety Research Project](#) January 2024 – March 2025

Supervisor: Tucker Hindle, Florida Atlantic University

- Benchmarked 10+ coherence and detection methods (BERT NSP, GPT-2 perplexity, RoBERTa, LSA, NLI, burstiness) across 3,125+ generated sequences to evaluate approaches for identifying AI-generated text.
 - Identified GPT-2 perplexity as the strongest discriminator (3.3 \times gap between coherent and incoherent text); BERT NSP failed to distinguish the two.
 - Characterized a fundamental quality–evasion tradeoff across all humanization approaches tested, including iterative sampling, content abstraction, and RL-based methods.
 - Grant-funded with HPC access; findings presented at the Wilkes Honors College Symposium (2025).
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OTHER EXPERIENCE

Teaching Assistant — Calculus August 2024 – May 2025

- Assisted 70 undergraduate students with learning calculus; office hours, exam review, grading. Part-time (10 h/week).

[Advanced Experimental Vehicles](#) — Programmer, Leader, Builder November 2023 – May 2025

- Configured Arch Linux ARM on Raspberry Pi 5 with Hyprland compositor and WireGuard VPN, enabling worldwide real-time telemetry monitoring of BMS, GPS, and camera feeds.
- Won 2nd Place in Division and Lockheed Martin Award for “Highest Level of Engineering Excellence.”

PRESENTATIONS

Coherence and Detection Approaches for Identifying AI-Generated Text

2025

Wilkes Honors College Undergraduate Research Symposium, Florida Atlantic University.

SELECTED PROJECTS

Photonic Lantern Digital Holography Automation

January 2026 – Present

- Automated data acquisition and processing pipeline for photonic lantern characterization via digital holography. Orchestrates tunable IR laser, fiber switch, motorized polarization controller, and GigE InGaAs camera across 7-leg \times 7-wavelength sweeps (1540–1570 nm). Implements FFT-based fringe extraction and full 7-mode LP decomposition.

[PolyOculus](#) – 8-Telescope Array Control Software

January 2026 – Present

- INDI-protocol mount control, automated focuser, RA/Dec slewing, and backlash compensation for an 8-telescope photometric observation array. Part of ongoing astrophotonics research at UCF CREOL.

ESTELA – Problem Bank Visualizer & Exam Generator

March 2026 – Present

- Rust backend, vanilla JS frontend. Parses YAML problem banks across 13 topic areas and 11 question types. Renders LaTeX via KaTeX. Exports multi-version exams as LaTeX or print-ready HTML/PDF. NSF/Gates-funded research tool.

[gentec-camera](#) – IR Beam Profiling SDK

November 2025

- Python SDK wrapper for Gentec IR beam profiling camera. Automated acquisition, real-time Gaussian beam analysis, FITS output for optical instrumentation research.
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TECHNICAL SKILLS

Programming Languages: C/C++, Rust, Python, Shell (Fish, Bash, tcsh)

Libraries & Frameworks: NumPy, SciPy, Docker, Git, CMake, XMake, INDI

Instrumentation: Tunable IR laser control, GigE camera acquisition, fiber switch automation, motorized polarization control, FITS data format

Operating Systems: Linux (Arch, NixOS, Ubuntu), BSD, Windows

RELEVANT COURSEWORK

Physics

Geometric Optics & Lab (A)
General Physics II – Honors (A)
Chemistry Fundamentals I (A)
Mechanics I (IP)
Theoretical Methods for Physics (IP)

General Physics I (C+)
General Physics III (A)
Chemistry Fundamentals II (IP)
Quantum Information Processing (IP)

Mathematics

Calculus I (A–)
Honors Calculus III (A)
Matrix Theory (B)
Linear Algebra (IP)
Intro to Partial Differential Equations (IP)
Statistical Methods I (IP)

Calculus II (A–)
Differential Equations (A)
Matrix & Linear Algebra (IP)
Introduction to Complex Variables (IP)
Introduction to Graph Theory (IP)
Statistical Methods II (IP)

Computer Science

Data Structures & Algorithms (A)
Computer Architecture (A–)
Discrete Structures (IP)
Foundations of Computing (A)

Computer Logic Design (A)
Intro to Deep Learning (A)
Engineering Analysis & Computation (A)

HONORS & AWARDS

Lockheed Martin Award – “Highest Level of Engineering Excellence,” AEV Competition	2024
2nd Place in Division, Advanced Experimental Vehicles Competition	2024
NSF Award 2421299 – Research Funding (ESTELA project, with Dr. Zhongzhou Chen)	2026
Gates Foundation INV-076932 – Research Funding (ESTELA project)	2026