

# NATALIE ALVARADO

## Applied Physics | Electrical Engineering

Joliet, IL • [a.nataliealvarado@gmail.com](mailto:a.nataliealvarado@gmail.com) • 1(815)405-0475 • [natalie-alvarado.com](http://natalie-alvarado.com) • [www.linkedin.com/in/natalie-alvarado25](http://www.linkedin.com/in/natalie-alvarado25)

### SUMMARY

First-generation college student pursuing a B.S. in Applied Physics with a minor in Electrical Engineering, graduating in 2026. Experienced in circuit design, experimental instrumentation, and hands-on engineering projects involving electronics, signal measurement, and mechanical prototyping. Currently completing a capstone research project involving the design and experimental characterization of a 40kHz ultrasonic transducer array using oscilloscope diagnostics, frequency sweeps, and resonance analysis. Strong leadership and communication skills developed through IEEE research presentations, tutoring, mentoring, and officer roles in multiple STEM organizations. Motivated to apply technical expertise and collaboration skills in entry-level electrical engineering roles.

### ANALYTICAL SKILLS/TECHNICAL QUALIFICATIONS

#### Applications:

- MATLAB, Octave, Fusion 360, LoggerPro, Microsoft Office, KiCad, ImageJ

#### Computer Languages:

- Python, C++, JS/HTML/CSS

#### Hardware/Software Skills:

- Oscilloscope, Function Generator, Multimeter, Signal Conditioning, Arduino, Raspberry Pi, Servo Control, Soldering, 3D Printing, Audio Amplifier Circuits, Bluetooth Module Integration, Optical Alignment, Woodworking, Power Tools

#### Experimental Techniques:

- Acoustic Field Measurement, Resonance Characterization, Signal Analysis, Beam Profiling, BER/SNR Testing, Optical Communication Links, UV Spectroscopy, Contact Angle Analysis

### EDUCATION

**Bachelor of Science in Physics**  
**Minor: Electrical Engineering**  
Lewis University, Romeoville, IL  
Concentration: Applied Physics

Expected: May 2026

### RESEARCH AND PRESENTATIONS

**Fermilab Mu2e Research Assistant** Part-time: February 2024 - October 2024  
Dr. Hooper, Physics Department, Lewis University, Romeoville, IL

- Present research findings bi-weekly to Dr. Hooper's Research Team
- Collaborate with a partner to research and design solutions for pixel cooling mechanism
- Read and design schematics for 3D printed solutions.

#### Presentations:

- IEEE Power Grid Presentation (2022, December). Poster session presented at the annual Lewis University Electrical and Computer Engineering Day, Romeoville, IL.
- IEEE See & Spray Presentation (2023, April). Presented at the annual Lewis University Celebration of Scholarship, Romeoville, IL.

### PROJECTS

**Ultrasonic Transducer Array Characterization:** Capstone Research Project, 2026

- Characterized resonance behavior and electrical response of ultrasonic array to support future experiments involving acoustic flow manipulation and plasma interaction studies.

**Portfolio Website:** Personal Project, 2025

- Designed a website showcasing past and future projects using Javascript, HTML, and CSS.

**Flight Simulator Chassis:** Engineering Design and Tools Project, 2023

- Designed in Fusion 360 and constructed a simulator chassis using wood and power tools.

**Helix Wind Turbine Project:** Student Designed Spring Project, 2023

- Optimize voltage output with a 3D Printed helix propeller design

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**Trebuchet Catapult Project:** Student Designed Spring Project, 2022

- Designed and built a drop weight trebuchet with quick release mechanism

**Student Designed Thermal Expansion Experiment:** Student Designed Physics 3 Experiment, 2022

- Demonstrated how thermal expansion converts temperature change into mechanical displacement using bimetallic materials.
- Built a bimetallic switch between two light bulbs and measured bending distance at switching temperatures.

**Automated Water Bowl:** Intro to Electrical and Computer Engineering Project, 2022

- Designed and built an automated pet water dispenser.
- Programmed Arduino to control motor pump activation.

**Biomedical Metals and Self-Assembled Monolayers (SAMs):** Student Designed Chem 2 Project, 2019

- Determine if the use of SAMs and Lauric Acid can increase the longevity of biomedical metal implants by preventing early corrosion
- Used ImageJ to analyze contact angles of water droplets to determine if SAMs adhered to metal substrate
- Used UV spectrometer to measure absorbance of copper ions

**Current Personal Projects:**

- Free Space Optical Communication Link
- Laser Beam Profiling System
- PID-Controlled Servo Alignment System
- Bluetooth Audio Amplifier and Speaker

## RELATED WORK EXPERIENCE

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**K-12 Subject Tutor**

Part-time: January 2024 – October 2024

Elite Tutoring Place of Plainfield, Plainfield, IL

- Tutor all academic subjects from Pre-Kindergarten to High School, including Algebra, Physics, Chemistry, Biology, Geometry, Foreign Languages
- ACT/SAT Preparation

**Girls Create with Technology Camp Assistant**

Part-time: June 2022 - May 2023

ECaMS Department, Lewis University, Romeoville, IL

- Taught 6th-8th grade students Hummingbird & Snap! Programming.
- Explained components and taught students how to assemble piper computers.
- Led robot building using stepper motors, servos, LEDs, etc.

## LEADERSHIP AND ACTIVITIES

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- IEEE Women in Engineering (WIE) Leadership Summit at Microsoft, 2023
- Member, Lewis University Robotics Club, 2022 - 2025
  - ~President, 2024 - 2025
  - ~Vice President, 2024
  - ~Secretary, 2023
- Member, Lewis University IEEE Student Branch, 2022 - Present
  - ~Secretary, 2022 - Present
- Member, Lewis University Physics Student Advisory Board, 2022 - 2025
- Member, Lewis University Society of Physics Students (SPS), 2021 - 2025
  - ~Secretary, 2021 - 2025
- Member, Lewis University Astronomy Club, 2021 - 2025
- Member, National Society of Hispanic Physicists (NSHP), 2021 - Present
- Member, American Physical Society (APS), 2021 - Present
- Member, Optica (formerly OSA), 2021 - Present