

TRI PHAN

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EDUCATION

Illinois Institute of Technology

B.S. Electrical Engineering

Chicago, IL

Expected December 2027

Relevant Coursework: Digital Systems, Circuit Analysis, Object-Oriented Programming, Signals and Systems, Digital Computing and Assembly

SKILLS

Embedded & IoT: Arduino, ESP32, LilyGO ESP32 LoRa, LoRa Communication, TinyML, Edge Impulse, BMI160 IMU, Accelerometer, Gyroscope, Motion Classification, Sensor Data Acquisition, Embedded Systems, Relays, Hardware Prototyping

Programming & Software: Embedded C++, C++, Python, MATLAB, Java, SQL, Linux, Git, GitHub, SPICE Simulation, Altium Designer, Fusion 360, 3D Printing

Electrical & Test: Printed Circuit Board (PCB) Design, Soldering, Single-Line Diagrams (SLDs), Load Sizing, Cable Sizing, Power Distribution Systems, UPS Systems, Oscilloscope, Waveform Generator, Multimeter, Hardware Testing and Debugging

CERTIFICATIONS

Altium PCB Design Basics | Python and Data Certification | GitHub Foundations | AI Professional Skills Certification | Querying Data Certification

EXPERIENCE

Undergraduate Research Assistant, Photovoltaic Systems

Chicago, IL

Illinois Institute of Technology

February 2026 – July 2026

- Automated a single-cell photovoltaic testbed integrating an Arduino controller, relay-switched power stages, a thermoelectric module, and DS18B20 sensors to sweep temperature and illumination programmatically.
- Developed closed-loop temperature control in C++ firmware and hand-wired relay logic so the thermoelectric module adjusts drive based on live sensor feedback.
- Scripted a programmable power supply in Python to control voltage and current, and repurposed an LED microscope array to run light-intensity sweeps with real-time data logging at 20 samples/min.
- Designed custom mounting brackets in Fusion 360 and 3D printed components to integrate hardware and secure sensors within the testbed.

Undergraduate Research Assistant, Semiconductor Physics

Chicago, IL

Illinois Institute of Technology

August 2025 – January 2026

- Conducted Monte Carlo simulations of electron-hole pair creation in Gallium Arsenide across 13 energy levels (5–65 keV in 5 keV steps) to support semiconductor device research.
- Replaced Excel-based workflows with Python/MATLAB tooling that parses and cleans outputs exceeding 1 million rows, cutting analysis time by 85%, from 20+ minutes to under 3.
- Built repeatable visualization scripts using MATLAB toolboxes and Matplotlib, and benchmarked simulation outputs against published GaAs radiation-response data to validate accuracy.

PROJECTS

ARMOR — Edge-AI Wearable Fall-Detection & LoRa Emergency Alert System

August 2026

LilyGO ESP32 LoRa, BMI160 IMU, Arduino C++, TinyML, Embedded Systems

- Built a battery-powered wearable fall-detection system using a LilyGO ESP32 LoRa platform, BMI160 inertial measurement unit (IMU), buzzer, LED indicators, push-button input, and custom sensor-integration hardware.
- Collected and labeled 441 balanced fall/non-fall motion samples from BMI160 accelerometer and gyroscope data; trained a TinyML classifier with 64- and 32-neuron dense layers, 0.3 dropout, 300 training cycles, and a 0.003 learning rate.
- Deployed the TinyML model on-device for real-time fall classification, achieving 91% accuracy with 1 ms inference time, 1.5 KB peak RAM usage, and 19.4 KB flash usage.
- Developed embedded C++ firmware to acquire sensor data, execute fall detection, and provide an on-device warning/cancellation workflow before an emergency message is transmitted.
- Implemented LoRa communication between the wearable transmitter and receiver/gateway, enabling emergency-alert messaging without cellular coverage, Wi-Fi, or cloud connectivity; documented the project at github.com/LameFingers/armor-fall-detection.

Industrial Power Distribution & EPC System Design

July 2026 – August 2026

SLDs, Load Sizing, Cable Routing, UPS Design

- Developed and analyzed Single Line Diagrams (SLDs) for facility power distribution, modeling switchgear, Motor Control Centers (MCC), power transformers, and load centers.
- Calculated electrical load lists and sized major equipment (transformers, circuit breakers) based on raw process data to support continuous operations.
- Performed power cable sizing and routing calculations accounting for ambient temperature, derating factors, and installation paths (overhead trays vs. underground conduits).
- Designed Uninterruptible Power Supply (UPS) backup systems, determining load classifications and required battery backup capacities for critical loads.
- Participated in simulated QA/QC engineering reviews, annotating design documentation for technical compliance, safety, and constructability.

Autonomous Mobile Robot

August 2024 – November 2024

Arduino C++, Ultrasonic Array, Line Sensors

- Assembled an Arduino Uno robot featuring a 3-sensor ultrasonic array and RGB line sensor, achieving 95% success on obstacle-avoidance and line-following courses.
- Implemented a fast decision-tree control algorithm driving DC gear motors at full speed in opposite directions for tight turns and rapid maneuvers.

Closed-Loop Irrigation Controller

October 2024 – November 2024

Arduino C++, Capacitive Sensing, Relay Logic

- Designed an Arduino-based irrigation controller using a capacitive moisture sensor and relay-driven pump, supporting approximately 1 month of unattended operation per reservoir fill.
- Programmed three plant profiles with distinct moisture thresholds, preventing overwatering and maintaining plant health throughout testing.