

Santiago Troya

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EDUCATION

Temple University, College of Engineering

Expected Dec. 2027

B.S. in Electrical and Computer Engineering, Physics Minor, GPA: 3.83/4.00

Philadelphia, PA

Honors: Merrill Buckley Leadership Scholarship Recipient, Merit Scholarship;

IEEE HKN; Dean's List: Fall 2024, Spring 2025, Fall 2025

Coursework: Signals and Systems, PCB Design, Power System Analysis, Digital Circuit Design

TECHNICAL SKILLS

Programming: C++, C, Python, MATLAB, Verilog, SystemVerilog

Embedded & Hardware: ESP32-S3, Arduino, FPGA, I2C, UART, GPIO, circuit design, soldering, breadboarding

Tools: PowerWorld Simulator, NI Multisim, LTspice, KiCad, SolidWorks, Git, Unix/Linux, n8n, L^AT_EX

EXPERIENCE

Teaching Assistant, ECE 1111

Aug 2026 – Present

Temple University, Electrical and Computer Engineering Department

Philadelphia, PA

- Lead weekly lab checkoffs, guiding students through Linux, Bash, Python, C/C++, and Git workflows used in ECE 1111
- Evaluate programming submissions for correctness, code standards, file ownership, permissions, and deadline compliance
- Provide specific technical feedback on debugging practices, command-line workflows, and organized project structure

Johnson Noise Experiment

May 2026 – Aug 2026

Temple University Physics Department

Philadelphia, PA

- Designed and tested a two-op-amp analog front end and band-pass filter to amplify Johnson noise and reject interference
- Used an oscilloscope to trace gain, filter bandwidth, and setup errors, then refined the circuit to reduce systematic error
- Measured Boltzmann's constant within 1.4 standard uncertainties of the accepted value from recorded thermal-noise data

Electrical Lead, Owl Strike

May 2025 – Present

Temple University Mechatronics Lab

Philadelphia, PA

- Designed a MATLAB-Arduino acquisition system mapping recorded signals to drone position and time
- Integrated a TCA9548A multiplexer and MCP4018 potentiometer to reconstruct signals sampled by the Arduino Uno ADC
- Recreated drone movement with 7.21% position-and-time error, earning the 2026 NDIA Best Undergraduate Research Award

PROJECTS

FlightPod Sensor Pod & Drone Detection | *ESP32-S3, YOLOv11n, Python, ZeroMQ, SolidWorks*

- Designed a custom ESP32-S3 sensor pod integrating an MPU-6050 IMU, GPS, and camera for autonomous drone flight
- Built a YOLOv11n detection pipeline at 40–60 FPS on an RTX 4070 with sub-100 ms camera-to-controller latency
- Led a three-engineer team through hardware bring-up and wireless ZeroMQ camera-to-MATLAB-controller integration

Drone-Mounted Air Quality Sensor System | *ESP32-S3, MATLAB, GPS, KiCad*

- Built an ESP32-S3 payload logging synchronized air-quality and GPS data to microSD during drone flight
- Generated georeferenced AQI heatmaps from 200+ points collected across two 30–90 m test flights using MATLAB
- Earned Best Poster recognition at the 2026 ASME Philadelphia banquet for the drone-mounted sensing design

Digital Piano on FPGA | *SystemVerilog, Intel DE10-Lite FPGA, Quartus Prime*

- Designed an FPGA digital piano with an 8-note frequency lookup table and three-state playback finite-state machine
- Synchronized and debounced physical switch inputs in a 50 MHz clock domain with real-time dual-display note feedback
- Generated clock-divider square-wave tones across selectable notes and octaves on an Intel DE10-Lite FPGA board

7-Bus Grid Expansion | *PowerWorld Simulator, MATLAB, Simulink*

- Optimized a 7-bus, 130 kV grid to accommodate a 510 MW data-center load increase using PowerWorld Simulator
- Used steady-state and N-1 contingency analyses to identify and resolve undervoltage and thermal-overload conditions
- Selected line upgrades, capacitor banks, and a 40 MW solar farm within 75 of 100 available project credits

Musical Light Show | *NI Multisim, Analog Filters, OP482, 2N3904*

- Built a four-stage analog circuit that separates stereo audio into high- and low-frequency LED brightness channels
- Designed an inverting summing amplifier, passive RC filters, and diode-capacitor peak detectors in NI Multisim
- Validated a 350 Hz crossover, 20 ms peak detection, and 2N3904 BJT LED drivers switching up to 30 mA

LEADERSHIP & ACTIVITIES

Treasurer | *Temple University IEEE & IEEE PES*

May 2026 – Present

- Manage chapter financial records, budget planning, reimbursements, and event-related expense tracking
- Coordinate with the executive board to plan member programming and support IEEE student branch operations