Nikhil Mahadevan

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Education

University of Georgia | Athens, GA **Expected May 2028**
Dual major B.S. in Electrical Engineering and Computer Engineering **GPA: 3.93**
Relevant Coursework: Embedded Systems, Sensors and Transducers, Electronics, Linear Systems, Logic Design, Discrete Math
Honors: Eagle Scout, UGA Dean's List, Zell Miller Scholar

Experience

Flight Software Engineer | University of Georgia Small Satellite Research Laboratory **Sep 2026 - Present**
- Developing CubeSat flight software in C++ and NASA F Prime, with Zephyr drivers in C on STM32, for a ~15-person software team
- Reimplemented the legacy 7-state flight state machine with voltage debounce, request prioritization, and safe-shutdown sequencing
- Refactored the legacy file-recycler into thread-safe C++ with path abstractions and safer symlink handling
- Writing unit tests for the state machine and file recycler to catch bugs before system integration
- Reviewing teammates' flight software changes and building UART/RS-485 Zephyr drivers, validated in Renode

Embedded Systems Research Intern | University of Georgia **Aug 2026 - Present**
- Writing C++ drivers (I2C, SPI) to read IMU, temperature, and humidity sensors on an ATmega328P canine health monitor
- Streaming structured multi-sensor packets to a host application in real time via a hardware UART and HC-05 Bluetooth connection

Electronics Lab Assistant | University of Georgia **Aug 2026 - Present**
- Instructing 100+ students across two labs on analog filters, oscillators, transformers and BJT amplifiers with SPICE verification
- Guiding students with TTL circuit builds and benchtop debugging using oscilloscopes, logic analyzers and multimeters

Engineering Peer Tutor | University of Georgia **Sep 2025 - May 2026**
- Tutored 35+ students across courses mainly focused on Logic Design (CSEE 2220) and Circuit Analysis (ECSE 2170)

Projects

Edge AI Wake-Word Engine | Github | Project **Aug 2026**
- Engineered register-level C firmware on an STM32L4 (Cortex-M4) for real-time PDM audio acquisition
- Implemented a DC-blocking filter and energy detector in C to isolate speech buffers and reject background noise
- Developed a 921.6 kbps UART streaming driver with SysTick timestamping to transfer audio buffers to a host PC for analysis
- Built a Python tool to read the UART stream and plot the waveform, verifying the firmware's audio and noise detection before running the machine learning model on the chip
- Trained a "Hey STM" wake-word model (MFCC + logistic regression, 92% accuracy on 200 held-out samples) and ran it on the Cortex-M4 in ~4.5 KB of RAM at ~80 µs per inference

2-Axis Light Tracker (ELEE 4230) | Github | Project **Jul 2026**
- Built a battery-powered dual-axis light tracker in bare-metal C on an ATmega328P, with motor control through MOSFET H-bridges
- Combined LDR array with Hall-effect sensors and potentiometer feedback to keep tilt within safe limits and stop motor over-rotation
- Implemented a fixed-point Kalman filter that reduced ADC noise from 3 LSBs to < 1 LSB without a Floating-Point Unit
- Streamed raw and filtered ADC data, plus I/O data, to a PC over a register-level 115.2 kbps UART driver
- Designed a 4-layer KiCad PCB with separate power, ground, and signal layers, and widened the power traces to reduce voltage drop

Multifunction Instrumentation System (ECSE 2920) | Github | Project **Apr 2026**
- Built a Raspberry Pi digital multimeter and function generator in Python with a ±12 V split-rail supply and active virtual ground
- Designed a SAR ADC with a digital potentiometer and comparator for a ±5V voltmeter, 500-10kΩ ohmmeter, and ±5V reference
- Implemented a multi-function sine and square wave generator (0-10V peak-peak, 0-10 kHz) and a 0-10 kHz frequency counter
- Improved DC resolution ~6x and voltmeter precision ~2x by adding digital potentiometer calibration lookup tables
- Designed a 4-layer mixed-signal Pi HAT PCB in KiCad with dedicated power and ground planes

Technical Skills

Languages: C, C++, Python, ARM Assembly, MATLAB, Java
Embedded Systems: ARM Cortex-M4 (STM32), ARM Cortex-A53 (BCM2837), ATmega328P, ESP32, Raspberry Pi
Firmware & Protocols: Zephyr RTOS, NASA F Prime, UART, SPI, I2C, PWM
Hardware & Tools: KiCad, Altium Designer, SPICE, Fusion 360, Oscilloscopes, Logic Analyzers, Multimeters, Soldering, Renode, Git