Miguel Salvacion

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Education

Carnegie Mellon University Pittsburgh, PA
B.S. and M.S. in Electrical and Computer Engineering — GPA: 3.81/4.00 — Dean's List *May 2027*

Leadership: Filipino Student Association Treasurer – managed $7,000 budget

Technical Skills

Languages: C/C++, ARM Assembly (ARMv7-M Thumb-2), Python, SystemVerilog, MATLAB, SML
Protocols & Peripherals: CAN, I2C, SPI, UART, PWM, ADC, DMA, EXTI, GPIO, NVIC, SysTick
Tools: Git, Linux, GDB, OpenOCD, Cadence, Vivado, SolidWorks, Autodesk Fusion, Oscilloscope, Logic Analyzer
Hardware: STM32 (Cortex-M4), FPGA, Teensy 4.1, Raspberry Pi, Arduino, PCB Design, Schematic Capture

Work Experience

Hardware Systems Intern | *EV Underbody Systems* Jun 2025 – Aug 2025, May 2026 – Present
Ford Motor Company *Detroit, MI*

- Diagnosed a 5.8V drop across sensitive EV control units through schematic review, identifying root causes and proposing hardware modifications that restored nominal power delivery.
- Managed a technical audit of 50+ hardware requirements for three EV programs, identifying and resolving misalignments between systems engineering specifications and fabrication constraints.
- Developed a cost-optimization strategy for underbody components by analyzing technical design specifications and supplier performance data, identifying significant savings for key components.

Embedded Systems Researcher | *Semiconductor Fabrication, RF Hardware* Jan 2026 – Present
CMU Hacker Fab *Pittsburgh, PA*

- Designed a replicable, fully automated RF matching network for $636, achieving an 80%+ cost reduction compared to $3,000+ commercial alternatives while eliminating tedious manual tuning for thin-film depositions.
- Integrated a Teensy 4.1 with high-torque servos driving air-variable capacitors, and implemented a gradient descent control algorithm that reduced VSWR to 1.2 and sustained a stable plasma for over an hour.
- Designed a custom control PCB with shielding to suppress RF interference in the feedback loop, maintaining reliable 95W forward power delivery throughout deposition.

Embedded Systems Teaching Assistant | *RTOS, Firmware, ARM Architecture* Jan 2026 – Present
CMU 18-349: Introduction to Embedded Systems *Pittsburgh, PA*

- Mentored 60+ students debugging custom preemptive RTOS kernels, resolving PendSV context-switch faults, RMS bugs, and HLP priority-inversion edge cases using GDB and OpenOCD over JTAG.
- Guided firmware driver development on STM32 Cortex-M4, including MMIO register configuration, interrupt-driven serial protocols, and hardware PWM, facilitating the integration of sensors and actuators.
- Conducted design reviews for student 2-layer PCBs and oversaw full-cycle development of embedded vehicles, including PID motor control tuning, RMS thread selection, and hardware-software integration testing.

Projects

Real-Time Embedded Vehicle | *Embedded Systems, RTOS, PCB Design, C, Assembly* Aug 2025 – Dec 2025

- Built a preemptive multithreaded RTOS kernel in C and ARMv7-M Assembly on STM32 (Cortex-M4), implementing PendSV context switching, Rate-Monotonic Scheduler, SVC system calls with newlib, and mutexes with HLP.
- Tuned a closed-loop PID motor control system to <10% steady-state error using encoder feedback and hardware PWM, concurrently scheduling it alongside UART telemetry and I2C LCD updates under RMS.
- Designed a 2-layer PCB in Autodesk Fusion and authored the bootloader and bare-metal C drivers (I2C, interrupt-driven UART, EXTI quadrature encoder decoding) to integrate an STM32 with motors, servos, and LCD.

Trash Collection Robot | *Robotics, Electro-Mechanical Systems, Serial Communication* Oct 2024 – Jan 2025

- Engineered a 9V quad-motor drive system using H-bridge drivers and optimized power distribution to support high-torque movement during heavy load collection..
- Implemented UART serial communication to enable bidirectional communication between a Raspberry Pi handling computer vision and an Arduino Uno controlling the robot's movement.