

Zachary Cohen

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Clearance details available upon request

Autonomous & Robotic Systems · Electromechanical Design · Systems Integration

SUMMARY

Electromechanical systems integrator who works the boundaries where mechanical, electrical, controls, firmware, and manufacturing meet — proofing whether systems are buildable and integrable, and carrying field-deployable autonomous platforms from concept through live-water test. Hands-on across mechanical design, custom PCB development, and embedded controls. Published co-author (IEEE/RSJ IROS, ICUAS) doing the hardware and testing behind the data; clearance available upon request.

TECHNICAL SKILLS

Systems Architecture & Integration: Cross-domain electromechanical integration; interface definition & ownership in ambiguous system boundaries; integration-risk identification & mitigation; requirements traceability; verification & validation (V&V); configuration management

Electrical / PCB: Multi-layer PCB design (Altium, KiCad, Fusion Electronics); power distribution & regulation; EMI mitigation; connector selection; signal integrity; electronics bring-up

Embedded / Controls: STM32, ESP32, RP2040, ARM Cortex, ATtiny85; C/C++, MicroPython; CAN, RS-485 / Modbus RTU, I²C, SPI, UART; motor control; ABZ encoders; sensor & actuator integration

Mechanical / CAD: SolidWorks (CSWP), Fusion 360; GD&T & tolerance stack-ups; enclosure architecture for harsh environments; electromechanical packaging; thermal considerations; sealing (O-ring / U-cup); mechanical–electrical interface coordination

Prototyping, Fabrication & DFM: Additive (FDM/SLA) & subtractive (CNC) manufacturing; design for manufacturability & assembly (DFM/DFA); rapid hardware development; prototype-to-field transition; lab & test infrastructure; technical data packages (TDPs)

EXPERIENCE

Senior Electromechanical Systems Engineer

2025–Present

BlackSea Technologies | Baltimore, MD

- Serve as cross-portfolio electromechanical systems integrator — reviewing designs across mechanical, electrical, controls, firmware, and manufacturing boundaries, and proofing new projects at concept and mid-development for electromechanical feasibility, informing staffing and resourcing decisions.
- Led all integration on an experimental autonomous hydrofoil under a 2-month sprint, delivering on schedule and passing sea trials.
- Currently leading integration of a payload-release add-on for an autonomous surface vessel on a one-quarter timeline.
- Identified an oversized power-distribution unit, GPIO margin shortfalls, and reliability-tier mismatches during a controls design review, driving correction before fabrication.
- Make and defend cross-domain design decisions — release mechanisms, sealing architecture, connector selection, power distribution — under schedule and procurement constraints.

Electronics Technician (Engineering), Weapons, Robotics & Controls Eng. Dept.

2023–2026

U.S. Naval Academy | Annapolis, MD

- Designed and deployed 30+ custom PCBs for sensor integration, motion control, power distribution, and embedded processing across autonomous marine and robotics platforms.
- Architected and deployed a fleet of 20+ autonomous surface vessels for swarm and multi-agent research, using a dual-Raspberry Pi control architecture and standardized sensor-payload interfaces; managed integration risk across repeated live-water deployments.
- Designed the electromechanical and PCB architecture for SENTRY, an open-source pan-tilt turret platform later released publicly by the institution.
- Integrated sensors, actuators, embedded controllers, communications, and power electronics into field-deployable platforms; improved reliability through iterative field testing, fault isolation, and redundancy planning.

Adjunct Professor — Engineering Design

2024–Present

Anne Arundel Community College | Arnold, MD

- Teach SolidWorks and advanced CAD for mechatronics and manufacturable part development — assemblies, drawings, tolerancing, and design-for-manufacturing.
- Students achieve a ~75% pass rate on the Certified SolidWorks Associate (CSWA) exam.

Mentor, Lead Mentor & Event Manager

2006–Present

FIRST Robotics Competition | Maryland

- FIRST Robotics mentor for 20+ years; lead mentor for 5, growing a program to 110+ students and mentors across four teams.
- Won the FIRST Chairman's Award multiple times — the program's highest honor, recognizing the team that best represents its mission and impact.
- Event-managed four district competitions and one district championship, running live technical and logistical operations for thousands of participants under fixed schedules.
- Drove statewide robotics advocacy contributing to ~\$250K in annual Maryland robotics funding through legislative testimony.

Engineering Teacher & Program Lead

2012–2022

Various High Schools | MD / PA

- Designed and built engineering fabrication labs (additive manufacturing, CNC, laser cutting, PCB/electronics prototyping) and the project-based curricula that ran in them.
- Guided student teams through full mechanical/embedded design cycles — CAD, fabrication, assembly, test, and troubleshooting.

SELECTED PROJECTS

- SENTRY — Open-source pan-tilt turret platform (originated at USNA, publicly released). Architected and built the complete system — mechanical, PCB, firmware, and enclosure — with reference firmware proving closed-loop operation, then designed the software layer as a student-writable interface. Independently maintain the hardware, PCB, and mechanical design post-departure; used annually by 100+ students, and the subject of an invited Autodesk University 2025 presentation.
- PID Hover Rig — Designed a ping-pong-ball levitation demonstrator end to end (mechanical, electrical, and hardware) as a hands-on PID controls teaching platform; students implement the control loop on the hardware as the core exercise.
- SPARK — Designing a ruggedized STLINK-V3MODS debug-probe breakout with CAN FD (TCAN1051) and fault / power-good telemetry, standardizing embedded bring-up and eliminating wiring ambiguity; owning the full design lifecycle (schematic, PCB layout, validation).
- Fusion System Blocks — Developing an Autodesk Fusion add-in that generates system block diagrams from CAD assemblies — visualizing subsystem boundaries, signal flow, and interfaces to reduce ambiguity in cross-domain design reviews.

PUBLICATIONS & PRESENTATIONS

Built the hardware and ran the experimental testing behind the published data below.

- Co-author — “GNSS Emulator for Test and Evaluation of Flight Controller Performance,” ICUAS, May 2025.
- Co-author and conference presenter — “A Geometry-based Approach for Support-free Additive Manufacturing of Structures with Large Overhang Angles and Closed Features,” IEEE/RSJ IROS, Oct 2024. Presented at IROS 2024 in Abu Dhabi.
- Selected Presenter — “From Schematics to Reality: Turbocharging Mechatronics with Fusion,” Autodesk University, Sept 2025 (based on SENTRY).

EDUCATION

- M.Eng., Engineering Management — Old Dominion University · 4.0 GPA (in progress)
- M.Ed., Instructional Technology — University of Maryland Global Campus · 4.0 GPA
- B.S., Technology & Engineering Education — Millersville University · 3.5 GPA