

conor wood hayes

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SUMMARY

Hands-on robotics and embedded systems engineer with extensive experience building & deploying real-world hardware, autonomy stacks, and mission-critical embedded systems end-to-end. Background includes avionics for rockets & spacecraft, PCBA and embedded firmware for medical wearables, and ROS2 perception & manipulation systems. Strong focus on practical robotics, field testing, and reliability in harsh environments.

SKILLS

Firmware/PCBA: Microcontroller development (ARM Cortex-M, NRF5x, Raspberry Pi), bare-metal development, PCB design (Altium), PCB bring-up & debug (logic analyzer, oscilloscope), BLE, SPI, I2C, CAN, RS-485, NOR/NAND Flash

Control: inverse/forward kinematics, rigid body dynamics, PID, impedance control, joint encoders

Perception: SLAM, state estimation, EKF, particle filter, IMUs, GPS, magnetometer/barometer, depth cameras

Planning: Path planning (A^* , D^* , RRT), MoveIt, OMPL, embodied foundation models

Simulation: Gazebo, RViz, CoppeliaSim (V-REP)

Software: ROS2, Linux, Git, Docker, CI/CD (GitHub Actions, Jenkins, AWS CodePipeline), AWS, API design

AI/ML: pytorch, OpenCV, NumPy, Pandas, Matplotlib, Seaborn, SciPy, scikit-learn, Sympy, Neural Networks, SVM

Languages: Python, C, C++, CMake, Makefile, Rust, SQL, TypeScript, Bash/Zsh, Verilog, Assembly, linker scripts

Systems Engineering: Agile development, JIRA, Failure analysis, Reliability Engineering, QA frameworks

EDUCATION

Northwestern University – M.S. Robotics

2025–Aug 2026 (expected)

Focus on perception, manipulation, and embodied AI. Selected Coursework:

- Robotic Manipulation (Kevin Lynch)
- Reasoning & Planning in the Foundation Model Era (Li Manling)
- AI & Machine Learning for Robotics (Brenna Argall)
- Sensing, Navigation, & ML for Robotics (Matthew Elwin)

University of Southern California – B.S. Computer Engineering & Computer Science

2015-2019

Magna Cum Laude. Minor in Chinese for the Professions, Thematic Option (Honors in Liberal Arts)

PROJECTS

Northwestern University | PenPal – Franka Panda 7DoF Manipulation System

Nov-Dec 2025

- Developed perception → planning → control pipeline in ROS2 for real-time handwriting on arbitrarily-oriented moving surface.
- Implemented camera calibration, pose estimation, trajectory generation, and closed-loop visual cartesian control.
- Tuned controllers, handled noise, delays, and system constraints to ensure consistent physical performance.

USC Rocket Propulsion Lab | *Traveler IV* - First 100% undergrad-made rocket to fly to space

2015-2019

- Built & led 30-person engineering team. Oversaw all software (C++), hardware (Altium), and EGSE for multiple iterations of custom avionics system.
- Designed, tested, and hand-assembled avionics boards robust enough to operate in desert + space + high-G environments.
- Led analysis effort to determine flight path, published [Traveler IV Whitepaper](#) concluding the rocket crossed the Karman Line.
- Co-designed launch procedures coordinating 100+ engineers in remote desert environment, resulting in a successful launch.
- Debugged electrical, software, and radio issues in the field under timing constraints, inclement weather, and poor infrastructure.
- Wrote still-in-use [software](#) providing fault+radiation-tolerant telemetry storage on a NOR flash memory chip.
- Kicked off lab-wide cultural reform after handling an internal harassment case to help the lab be a safer space for young engineers.

Northwestern University | *Algorithms from Scratch* - ML algorithms implemented without ML libraries in Python

April 2025

- Implemented particle filter, developed measurement+control model, and applied to [MRCLAM](#) dataset for robot localization.
- Implemented online A^* planning + trajectory control to navigate simulated diff-drive robot around an arena.
- Proposed, implemented, and trained 97% accurate SVM-based algorithm for landmark visibility prediction on MRCLAM dataset.

CHSC + UCLA | *AustereChain* - Blockchain-Based Resource Management for Autonomous Systems in Austerity

April 2025

- Proposed blockchain-based framework to enable decentralized resource negotiation for autonomous systems in low-resource environments (i.e. space stations), to be submitted to IEEE-SMC-IT 2026.

CHSC + UCLA | *MIDI Glove* - Wearable Accelerometer-Based Human Pose Detection

April-May 2025

- Researched methodologies for ML-based human pose estimation to create a low-cost MIDI instrument controller.
- Created initial hardware prototype of arm+hand pose-estimator glove.

Independent | *Rust Letterboxd Solver*

April 2025

- Designed & implemented A*-based algorithm in Rust to optimally solve *New York Times* letterboxd puzzles.
- Optimized runtime down to <1ms for NYT puzzles; extended to arbitrary puzzle size+geometry.

WORK EXPERIENCE

Conor Hayes Software Consulting (CHSC) | *Independent Consultant*

2023 - 2025, IN/NY/CA

- Provided architecture guidance and hands-on implementation for a reusable hardware testing framework (Python) and its application to two \$500K high-speed test racks (SMU, PSU, PDU, Pickering simulators; CAN, USB, ethernet, GPIB, SCPI) for space & nuclear fusion projects, driving successful on-time delivery after 8mos.
- Designed high-level control software, database, and cloud architecture for a digital-twinned battery test system (Python, SQL, AWS); assisted 8-person team to develop, ship, & deploy the system to the assembly line of a \$22B satellite firm.
- Redesigned BLE protocol (C, TypeScript) for NRF52-based wearable. +2 sensors, +800% bandwidth, -10% power consumption.
- Provided initial computer vision support for autonomous refueling robot for self-driving electric vehicles.
- Set up CI/CD pipelines using AWS+GitHub Actions for backend of an IoT startup, completely automating a previously 3-hour manual deployment process.
- Prototyped a low-latency peer-to-peer telepresence platform for controlling robots via web client (WebRTC, AWS, TypeScript)
- Created [Deep Tech Product Management slide deck](#) to introduce research-oriented tech startups to product design & development best practices.
- Built self-sustaining consulting business as solo entrepreneur; sourced clients, negotiated contracts, ran S-Corp.

Wesper, Inc | *Software Engineer (8th employee @ startup)*

2020 - 2022, New York City

- Owned firmware development (C, NRF5X) to support multiple hardware iterations of a sleep apnea diagnosis wearable, from late-stage prototypes to FDA-approved, mass-produced revenue-generating product.
- Integrated new sensors, developed on-device algorithms, and expanded BLE interface to enable low-power real-time reporting of patient heart rate, blood oxygen level, and sleep posture.
- Developed hardware-in-the-loop simulation infrastructure (C, Python) over JTAG to enable algorithm development in firmware.
- Created automated board programming+testing software used to mass-produce the product in China.
- Improved supply chain resilience by enabling firmware to target multiple MCU's (C, Makefile, linker scripts).
- Led a team of 3 to build backend from scratch (AWS ECS, EC2, λ , S3, RDS MySQL, Python) to ingest and process all patient data.
- Served as devops engineer for the company; owned responsibility for all backend deployments.
- Worked directly with CTO, VP of Engineering, and Director of Algorithms, supporting growth from 8 -> 23 employees, 0 -> 1000+ patients per month
- Worked with iOS team to funnel real-time logging from the firmware, iPhone app, and backend into a single logging aggregator (logz), enabling end-to-end traceability for live support.

Honeybee Robotics | *Software & Electrical Engineering Intern*

May - Aug 2018, Pasadena, CA

- Developed drivers, middleware (C++, ZeroMQ), GUIs (Qt), and PCB's (Altium) for robotic assemblies for extreme environments (Mars, Venus, Europa, Arctic circle)
- Worked directly with project teams of mechanical, electrical, and systems engineers to spec & implement new features in an internal ROS-like testing framework, with 200+ source files and 100,000+ lines of C++ code.
- Designed, tested, and validated PCB to provide human-in-the-loop control of small drills on remote oil rigs.
- Wrote python data processing library on own initiative to save up to 10min/experiment, adopted by 50+ mechanical engineers across company.

NASA Jet Propulsion Laboratory | *Flight Electronics Intern (Group 349E)*

Jan - Aug 2017, Pasadena, CA

- Developed the automated hardware and software test suite (C, Python, SPARC Assembly) for the first deep-space-capable cube-sat C&DH board (Sphinx).
- Supported initial board bring-up, discovered & documented critical bugs in novel rad-hardened NAND flash controller and other peripherals.
- Credited inventor on NASA Copyright of Invention NPO 51462-CP for the above.

AWARDS

American Institute of Astronautics and Aeronautics | *Achievement Award*

Oct 2019

National Academy of Engineering/USC | *Grand Challenges Scholar*

May 2019

University of Southern California | *Renaissance Scholar (0.9% of graduating class)*

May 2019

University of Southern California | *Trustee Scholar (4-year, 1/2 tuition merit scholarship)*

Apr 2015

HOBBIES

Recorded Music: Accumulated 700,000+ Spotify streams on original music under artist name *Wise John* (39 songs, 2 albums, 1 EP).
Live Music: Sold 170 tickets across bill at NYC's Mercury Lounge (2024). Performed 20+ live shows in NYC, LA, and elsewhere.
Travel & Sports: backpacking (wilderness & urban), swimming, basketball, tennis.
Languages: English (native), Mandarin Chinese (conversational)