Dakota Winslow

Electrical & Embedded Systems Engineer | Robotics & Autonomous Systems | Boston, MA
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PROFILE

Electrical and computer engineer (M.S.) specializing in embedded systems, motor control, and power electronics for robotic platforms. Comfortable across the full hardware stack, from PCB design and SMT assembly to ROS-based motion planning, safety-critical control, and computer vision. Lead Electrical Engineer on an award-winning autonomous harvesting robot, with prior industry experience shipping system-level test infrastructure under tight deadlines.

EDUCATION

Boston University — M.S., Electrical & Computer Engineering 2024 – 2026
Specialization: Robotics & Autonomous Systems | Boston, MA

Coursework: *Optimal & Robust Control, Digital Signal Processing, Robotic Motion Planning, Embedded Systems, Computer Architecture, Manufacturing Processes & Design for Manufacturing.*

Western Oregon University — B.S., Chemistry 2015 – 2019
Monmouth, OR

SELECTED ROBOTICS & EMBEDDED PROJECTS

Autonomous Tomato-Harvesting Robotic Arm 2025 – 2026
Lead Electrical Engineer | BU Robotics Club — MassRobotics Form & Function Challenge

- Winner of **Best Project** and **Audience Choice** at the 2026 MassRobotics Form & Function Challenge.
- Designed the complete power and logic electrical systems for a greenhouse robotic arm that uses computer vision and machine learning to autonomously detect and harvest ripe tomatoes.
- Solved a back-driving energy-management challenge by evaluating shunt-resistor circuits and lithium capacitor banks, ultimately selecting a lead-acid battery bank as the optimal trade-off across cost, safety, and energy absorption.
- Architected all safety and protection systems for the platform, including the emergency-stop chain, over current protection, and excess-energy management.
- Built a PLC-based control station with a physical operator interface, isolated power rails, and an integrated Linux computer for powering and commanding the robot from a safe distance.

Hoplite — Coordinated LIMO Robot Swarm 2025
BU EC535 Embedded Systems

- Built a multi-robot coordination system on three AgileX LIMO platforms with Mecanum wheels, enabling omnidirectional formation movement commanded by a wireless gamepad.
- Implemented a leader–follower control architecture in ROS1: a centralized leader node computed target poses via a regular-polygon formation algorithm while followers navigated using potential-field control with collision avoidance.
- Integrated an OptiTrack motion-capture system (120 Hz, <1 mm) for real-time localization and built a ROS1–ROS2 bridge to relay VRPN pose data into the control network. GitHub • Demo video

Acoustic Side-Channel Communications for Autonomous Drones 2026
BU ME740: Vision, Robotics & Planning (Prof. John Baillieul)

- Repurposed a drone's existing BLDC propulsion motors as ultrasonic data transmitters via magnetostriction, achieving acoustic communication with no added transmitter hardware.
- Wrote custom open-loop sinusoidal commutation firmware on an ESP32-S3 + SimpleFOC shield, superimposing a BFSK-modulated ultrasonic carrier onto the commutation waveform (70/30 amplitude split, bounded at 90% full-scale).
- Built the receiver around a single MEMS microphone decoded by Goertzel filter pairs, with a structured packet protocol (64-bit preamble, 16-bit sync word, sequence numbering, CRC-16/CCITT-FALSE); demonstrated 100% end-to-end packet retention at 1.8 m.

RISC-V Processor Implementation 2025
BU EC413 Computer Architecture

- Designed and implemented a limited RISC processor modeled on the RISC-V ISA in Verilog, targeting a Xilinx Basys 3 FPGA board, as the course capstone.

EXPERIENCE

BU RASTIC — Lab Supervisor & Technical Mentor 2025 – 2026
Robotics & Autonomous Systems Center | Boston, MA

- Mentored a robotics makerspace serving students from freshman Arduino builds to doctoral research, advising on motor and servo control, microcontroller programming, mechanical design and fabrication, motion capture, and soft robotics.
- Designed and led a hands-on workshop, “Logic Noise: Getting Analog Sound from Digital Circuits,” guiding students through building a breadboard sequencing synthesizer.

Boston University — Teaching Fellow, EC413 Computer Architecture Spring 2025
Boston, MA

- Invited back as a paid teaching fellow after strong performance as a student; refined Verilog lab materials for digital-systems design on Xilinx Basys 3 FPGA boards and guided students through a RISC-V-based processor capstone.

IrisKinetics — Engineering Intern Summer 2025
Boston, MA

- Joined a sub-10-person biotech startup commercializing an interferometric reflectance imaging sensor; performed failure analysis and root-cause investigations and built data-management infrastructure for high-volume measurement data.

Hewlett-Packard (HP) — Writing Systems Engineer 2021 – 2024
Corvallis, OR (Chemical Technician, 2018 – 2021)

- Designed and built an automated microscopic image-capture robot using an XYZ stage and camera that traversed printed test pages, captured images at defined coordinates, and ran computer-vision edge-raggedness analysis to generate print-quality datasets.
- Led a high-priority component qualification under an assurance-of-supply constraint, identifying and validating a replacement in 45 days against a 90-day deadline.
- Built a suite of Python and JMP data-analysis tools to aggregate and visualize multi-metric print-quality test data, including a longitudinal “stress chart” tracking accumulated degradation across full test suites.
- Collaborated with an AI research team applying deep learning to novel printhead firing architectures; presented findings at an internal innovation fair.

TECHNICAL SKILLS

Embedded Systems: ESP32 / Arduino, ROS & ROS2, motor & servo control, sensor integration, BLDC sinusoidal commutation (SimpleFOC), ArduPilot, RS232/serial debugging, FPGA development (Xilinx Basys 3), Verilog

Robotics & Control: Robotic motion planning, optimal & robust control, leader–follower swarm control, potential-field navigation, computer vision, ML for robotics, OptiTrack motion capture

Electrical Engineering: Multi-layer PCB design (KiCad), power systems & motor drives, switching power supplies, analog & safety/protection circuits, back-drive energy management, SMT assembly & rework

Signal Processing: DSP, Goertzel algorithm, BFSK modulation/demodulation, acoustic channel characterization

Manufacturing & Prototyping: CNC & manual milling/turning, waterjet & laser cutting, sand casting, sheet-metal fab, FDM 3D printing (Voron/Klipper), Design for Manufacturing (DFM)

Software & CAD: Python, C/C++, MATLAB, Simulink, JMP; Onshape, Autodesk Fusion, KiCad, Inkscape

LEADERSHIP & ACTIVITIES

- **Founding Member & Lead Electrical Engineer, BU Robotics Club** — co-founded the 20-member club and co-led its award-winning MassRobotics entry.
- **Chief Engineer, BU AIAA Design-Build-Fly** — led all technical and organizational efforts for the RC-aircraft competition team.
- **Technical Advisor, HackHardware** — mentored student teams on embedded systems and electronics debugging across events.