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.