

Jarrold Homer

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EDUCATION:

Northeastern University

Master of Science in Robotics (ECE Concentration)

GPA: 4.0 / 4.0

Boston, MA

Bachelor of Science in Electrical Engineering

GPA: 3.93 / 4.0

December 2024

May 2023

Coursework: Legged Robotics | Intro to ML & Pattern Recognition | Robot Mechanics & Control | Classical Control Systems | Mobile Robotics | Robotic Sensing & Navigation | Electronic Design | Wireless Communication Circuits | Algorithms

WORK EXPERIENCE:

Amazon Robotics | *Advanced Sensors Electrical Engineer Co-op*

North Reading, MA | Fall 2023

- Researched, conceptualized, and designed a modular machine vision lighting solution resulting in over 50% cost reduction.
- Completed part selection, schematic, simulation, prototyping and layout of a 4-layer PCB, optimizing flexibility and performance.
- Consolidated cabling, reducing BOM lines and preventing improper installation for a product line with roughly 40k+ units.
- Spearheaded UHF RFID concept prototype, providing groundwork for future iterations and identifying 10M in possible savings.
- Debugged camera thermal and power discrepancy, identifying root cause of discrepancy with simulations to guide redesign.

Amazon Robotics | *Advanced Sensors Electrical Engineer Co-op*

North Reading, MA | Fall 2022

- Completed bring-up and debug of processors, LPDDR4s, eMMCs, optocouplers, image sensors, and dot projectors in a smart camera product, salvaging the first revision and the firmware development timeline for 2D and stereo camera configurations.
- Designed a custom PCB with MCU & switching regulators to control Time-of-Flight camera and convert 4 lane MIPI to 2 lanes.
- Created a schematic in ORCAD CIS for a GMSL serializer, ensuring compatibility with 5 different sensor modules.
- Overhauled a PCB with Bluetooth-enabled processor and onboard IMU for a wearable device, fixing all first revision issues.

IDEXX | *R&D Circuit Design Electrical Engineer Co-op*

Westbrook, ME | Fall 2021

- Designed PCBs with differential routing in OrCAD PCB Designer to test the impact of connectors on camera signal integrity.
- Created a test fixture and wrote a Python script capable of simultaneously screening 4 linear potentiometers of varying lengths for linearity and irregularities, allowing for detection of defects prior to installation.
- Designed PCBs and guided the re-design of a test engineering fixture, improving testing reliability and reducing cabling.

PROJECT EXPERIENCE:

Autonomous Battery Swapping Robot | *Co-lead and Electrical Design Lead* Northeastern University | Spring 2023 - Present

- Led a team of 10 to reduce robot downtime by designing and implementing a robotic system for autonomous battery swapping of a fleet of mobile robots, resulting in a top capstone placement and an accepted publication at IEEE Aero Conf. 2024.
- Provided guidance on system-level robot design encompassing mechanical, electrical, and software components, streamlining integration and delivering hardware 1 month early for mechanical and software development.
- Oversaw the entire electrical design, including the development of 3 custom PCBs and circuitry essential for autonomous docking and battery swapping without power loss, increasing reliability and power efficiency.

Robot Armadillo

Personal Research Project | Fall 2022 – Present

- Prototype and model a 100+ part hybrid tumbling and walking robot in Fusion 360 optimizing for additive manufacturing.
- Solved forward and inverse kinematics, designed, and assembled quadruped robot shown at Northeastern University's RISE expo.
- Implemented PID controller to enable stabilization of pitch and roll of quadruped, improving balancing.

Curiosity Rover Photo Identification Neural Net

Machine Learning Final Project | Summer 2022

- Created a convolutional neural network (CNN), using PyTorch, capable of identifying 23 classes spread across 6,737 photographs captured by the Curiosity rover resulting in a model with 96% accuracy on an unseen test set.
- Implemented random grid search and k-fold cross validation to perform hyperparameter optimization, improving accuracy by 10%, while simultaneously improving convergence.

NASA Mars Ice Challenge Finalist | *Systems Lead & Treasurer*

Northeastern SEDS | Fall 2019 – Spring 2022

- Constructed two prototypes, with \$20,000 in stipends, capable of extracting and purifying water from subsurface ice on Mars.
- Managed a team of 15 that won Best Technical Paper, 2nd place in the nation, and doubled the previous competitions' record for volume of water collected with more than 16 L extracted.
- Won the top award in the Innovation Category at Northeastern University's RISE 2022 event out of over 400 teams.

SKILLS & INTERESTS:

Skills: C++ | MATLAB | Python | Verilog | Arduino | OrCAD PCB Design Suite | SPICE | Quartus | ROS | SolidWorks | Fusion 360 | Soldering & Wiring | PCB Bring Up & Debug | Electronics Lab Equipment

Leadership: Eta Kappa Nu & Tau Beta Pi Honor Societies (2021-2022) | Robotics Co-President (2021) | Dean's List (2019-2023)

Interests: Skiing | Hiking & Backpacking | Board Games | Lego | 3D Printing | Robotics | Space & Space Exploration