# Jarrod Homer

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## EDUCATION:

**Northeastern University** **Boston, MA**
Master of Science in Robotics (ECE Concentration) **GPA: 4.0 / 4.0** December 2024
Bachelor of Science in Electrical Engineering **GPA: 3.93 / 4.0** May 2023
**Coursework:** Mobile Robotics | Robotic Sensing & Navigation | Robot Mechanics & Control | Classical Control Systems | Electronic Design | Wireless Communication Circuits | Intro to ML & Pattern Recognition | Algorithms | Legged Robotics

## WORK EXPERIENCE:

**Amazon Robotics** | *Advanced Sensors Electrical Engineer Co-op* North Reading, MA | **Fall 2023**
- Designed a modular machine vision lighting solution and completed part selection, schematic, simulation, prototyping, and layout of a 4-layer PCB. Achieved over 50% cost reduction while meeting strict timing and lighting requirements.
- 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 issues, identifying root cause of simulation inaccuracies and guiding 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 Electrical Engineering Co-op** | *R&D Circuit Design Team Member* Westbrook, ME | **Fall 2021**
- Designed PCBs with differential pairs in OrCAD PCB Designer to evaluate the impact of connectors on camera signal integrity.
- Developed a test fixture and Python script to screen four linear potentiometers of varying lengths for linearity and irregularities, enabling defect detection before installation.
- Created PCBs and led the redesign of a test engineering fixture, improving testing reliability and reducing cabling.

## PROJECT EXPERIENCE:

**Robot Quadruped** | *Sole Engineer* Personal Research Project | **Fall 2022 – Present**
- Designed from scratch a 100+ part robot assembly and remote control in Fusion 360, optimizing for additive manufacturing.
- Wrote C++ code to solve forward and inverse kinematics and implemented a PID controller for a dynamic trot gait.
- Created custom PCBs in Altium for the quadruped and a remote controller, reducing size and streamlining wiring.

**Autonomous Battery Swapping Robot** | *Co-lead & Electrical Lead* Northeastern University | **Spring 2023 – Spring 2024**
- 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.

**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**
- Built two prototypes, with $20,000 stipend, to extract and purify water from subsurface ice on simulated Martian terrain.
- Led 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:** OrCAD PCB Design Suite | Altium | SPICE | Soldering & Wiring | PCB Bring Up & Debug | Electronics Lab Equipment | Python | MATLAB | Arduino | C++ | Verilog | SolidWorks | Fusion 360
**Leadership**: Eta Kappa Nu & Tau Beta Pi Honor Societies (2021-2022) | Robotics Co-President (2021) | Dean's List (2019-2024)
**Interests**: Skiing | Hiking & Backpacking | Board Games | Lego | 3D Printing | Robotics | Space & Space Exploration