

Hudson Kortus

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Robotic systems engineer with 4+ years of experience designing, building, and deploying hardware-software systems spanning embedded firmware, perception, and machine learning. Proven ability to onboard quickly, take ownership of ambiguous problems, and deliver production ready results in hard-tech environments.

Education

BS Robotics Engineering 05/2026

Worcester Polytechnic Institute GPA 3.9/4.0

Coursework: *On Device Deep Learning, Software Engineering, Aerial Robotics, Deep Learning for Perception*

Work Experience

Computer Vision Engineer Co-op, Untill ag 05/2025 – 08/2025

- Designed and deployed an ultra-low-cost, camera system for monitoring vertical farm, owning mechanical design (Onshape), embedded hardware (KiCad), firmware (C), and backend integration (Python, MongoDB).
- Prototyped and shipped 2-axis gantry-mounted vision system for autonomous plant monitoring in 4 weeks.
- Designed and shipped mass production-ready sensor mesh network for plant monitoring featuring cameras and environmental sensors at <\$8 per node.
- Designed and manufactured ESP32 camera PCB (KiCad) with integrated power regulation and RS-485 bus.
- Developed firmware (FreeRTOS, ESP-IDF) for motor control, camera capture, and data transmission across RS-485, ESP-Mesh WiFi, and TCP.
- Deployed backend (Python) on Raspberry Pi to coordinate cameras and store imagery (MongoDB) for downstream ML workflows.

Deep Learning and Perception Researcher ↗, PeAR Group (WPI) 08/2025 - Present

- Optimized the design of a lightweight, palm-sized drone enabling 20 m/s flight with limited space constraints.
- Deployed deep learning models on a Jetson Orin Nano and integrated hardware and software stack to achieve realtime performance (>30Hz) in high speed navigation
- Developed a data collection platform for multi-pinhole cameras, speeding up data collection by 2x
- Designed and manufactured micron scale coded aperture for monocular depth camera.
- Built and trained a monocular depth estimation CNN, incorporating uncertainty-aware loss to improve convergence and quantify model confidence.

Advanced Manufacturing and Automation Co-Op, TTM Technologies 06/2023 – 08/2024

- Designed and executed a detailed tooling study using statistical process control and ANOVA analysis (Minitab), resulting in a re-evaluation of machine design that saved the company \$25,000 per unit.
- Developed a robotic workcell with integrated vision (Teledyne Sherlock) to pick, place, and solder 0505 electric components, within a precision of less than 0.001 in, improving process throughput by 8x.

Full-Stack Web Intern, Shodor Education Foundation 02/2021 – 05/2022

- Applied Java, PHP, and JavaScript skills to develop and maintain a LAMP website accumulating 3 to 4 million views per month to provide award winning, free educational tools for students and educators in STEM.

Skills

Languages: Python, C/C++, MATLAB, Java/TypeScript, Java, MongoDB, PostgreSQL

Packages: PyTorch, TensorFlow, BlenderAPI, OpenCV, React

Software: ROS2, Docker, Git, Blender, MATLAB, Linux, Bash, High Performance Compute (HPC) Clusters

Hardware: NVIDIA Jetson, ESP32, ESP-CAM, ESP-IDF, Raspberry Pi, Arduino, Arducam, Realsense D435, Ardupilot, Solidworks, Onshape, FusionCAM, KiCad, Manual Machining, Soldering

Projects

Optical Flow based Autonomous Navigation ↗	12/2025
<ul style="list-style-type: none">Built an end-to-end UAV autonomy stack for navigating unknown gaps using only a single RGB camera.Combined RAFT optical flow and Temporally Stacked Spatial Parallax (TS2P) for gap detection, with Perspective-n-Point (PnP) used to estimate relative pose for control and navigation.	
Unscented Kalman Filter for Attitude Estimation ↗	09/2025
<ul style="list-style-type: none">Implemented an Uncentered Kalman Filter for attitude estimation using quaternions, including sigma-point generation and iterative quaternion mean computation.Addressed unit-norm constraints, 6D/7D state transitions, and sequential measurement updates to improve numerical stability.	
Lead Software Engineer ↗	04/2025
<ul style="list-style-type: none">Led a team of 11 peers in the rapid 5-week Agile development of a full-stack PERN web application for Mass General Brigham hospitals, enabling patients to navigate from home to specific hospital departments.Organized work using Scrum methodology, Git for version control, and Jira for task tracking.Architected and integrated pathfinding algorithms (DFS, A*) with animated routes, text-to-speech directions, multi-floor support, and real-time map updates.	
Sim2Real CNN Model ↗	09/2024
<ul style="list-style-type: none">Developed a U-Net style Convolutional Neural Network (CNN) to identify and segment drone racing windows.Generated 50,000 synthetic images in Blender to train the model and achieved 95% accuracy in real-world deployment.	
Pathfinding Autonomous Robot ↗	05/2024
<ul style="list-style-type: none">Programmed mobile robot to navigate and map unknown maze using A* and SLAM using ROS with Python.Integrated a Monte-Carlo Particle filter for localization using generated map.Filtered noise with Kalman filter to implement reactive obstacle avoidance and pure pursuit path finding.	
Payload Division Lead ↗	05/2024
<ul style="list-style-type: none">Led the design and manufacturing of an autonomous rocket payload that ejects mid-flight and steers via a novel circular parachute to a self-selected landing site.Managed a 46 member team to design and manufacture an autonomous payload to be launched to 10,000ft.Integrated 7 subsystems, and collaborated with Rocket and Programming teams to meet system requirements.	
Vision-Based Color Sorting Robot Arm ↗	01/2024
<ul style="list-style-type: none">Programmed vision-based object detection with real-time trajectory planning to pick and place objects.Calculated inverse, forward, and velocity kinematics for a 4-DOF robot arm using MATLAB.Built a custom simulator for data collection, singularity detection, and collision detection.	