

# Shane Holmes

Computer Engineer

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## Summary

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Computer Engineer with experience in embedded systems, robotics, and software development. Passionate about working on novel challenges in an interdisciplinary environment.

## Education

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**Northeastern University**, Master of Science in Computer Science – Boston, MA Jan 2024 – Jan 2026

**Florida Polytechnic University**, Bachelor of Science in Computer Engineering – Lakeland, FL Jan 2019 – Jan 2023

- Graduated Magna Cum Laude

**University of Toronto**, Exchange Student in Computer Science – Toronto, ON Sept 2022 – Jan 2023

- Academic Exchange with Fulbright

## Experience

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**Computer / Robotics / Embedded Engineer**, Overhead Intelligence – Lake Wales, FL Oct 2023 – May 2024

- Worked on the electrical and computer systems of a battery-powered UAV
- Designed and implemented LiDAR-based mapping
- Collaborated with a multidisciplinary team of engineers and participated in in-field deployment
- Technologies: Odroid, STM32, Raspberry Pi, C++/C, Python

**Computer / Robotics / Software Engineer**, SS Innovations (Formerly AVRA Medical Robotics) – Orlando, FL May 2022 – Sept 2022

- Worked on the computer vision sensor system for a surgical robot arm to identify facial landmarks
- Achieved accurate simulation test results for surgical motion and object identification
- Technologies: Python, OpenCV, Robot arm

**Research Assistant / Robotics & Software Engineer**, Advanced Mobility Institute – Lake Wales, FL Jan 2021 – Jan 2022

- Developed a fleet of small robot vehicles to autonomously navigate and coordinate in an environment
- Built electrical motor systems and an ArUco sensor system to identify vehicles
- Achieved vehicle convoy movement and dynamic obstacle avoidance of objects greater than 3 inches consistently
- Technologies: Python, C++/C, OpenCV, Electronics

## Skills

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**Programming Languages:** Python, C++, C, Java

**Python Libraries:** NumPy, Pandas, Matplotlib, OpenCV, Threading, PyTorch, TensorFlow, Keras, Scikit-learn

**Embedded & Hardware:** Raspberry Pi, Arduino, ESP32, STM32, Odroid, AVR, Linux, Embedded Linux

**Robotics & Autonomy:** Computer Vision, LiDAR, IMU, SLAM, GPS, UAV

**Software Development:** Git, OOP, Software Design, Software Testing, Software Documentation, Embedded Systems

**Technical Areas:** Machine Learning, Artificial Intelligence, Computer Vision, Digital Signal Processing, Robotics, Hardware, Software

**Collaborative Tools:** Jira, Confluence, Slack, Microsoft Teams, Zoom, Visual Studio

## Projects

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**Mock Rover — FSI Capstone Project** Sept 2022 – May 2023

built a mock rover for the NASA Space Grant Consortium program through Florida Space Institute.

- Led technical integration of embedded control systems designing a Raspberry Pi-based architecture coordinating four AC motors, stereoscopic camera feed, and wireless command interface
- Achieved ~100ft wireless range, 300lb payload capacity, and 5mph traverse speed
- Technologies: Python, C++, Raspberry Pi, Arduino Uno, motor control systems, OpenCV, 3D printing

## Hand Robot — Commissioned Project

Nov 2020 – Feb 2021

Designed and fabricated a fully articulated robotic hand with individual finger control and accompanying arm.

- Iteratively designed hand and arm in CAD with custom 3D printed components
- Engineered servo control circuits on Arduino platform for individual finger articulation
- Developed desktop application in C++ for real-time articulation control
- Technologies: Arduino, C++, CAD, 3D printing, servo control systems

## 3D CPU Software Rasterizer

Dec 2025 – present

Built a 3D software rendering engine from first principles in C++ for CPU.

- Full graphics pipeline — model space through screen space — implemented manually using 4x4 matrices
- Triangle rasterization using edge functions and barycentric coordinates
- Scene graph with hierarchical parent-child entity system and automatic world matrix propagation
- Technologies: C++, CMake, Eigen, SFML, CppUnitLite

## Latent Explorer

Apr 2026 – present

End-to-end tool for training and interactively visualizing the latent space of image datasets in the browser.

- Trained a convolutional decoder on ~202k face images with PCA post-processing to surface principal axes of variation
- Exported model to ONNX and built a pure-JavaScript browser interface running inference with no backend
- Technologies: PyTorch, ONNX Runtime Web, scikit-learn, HDF5

## Motor Babbling — RL for Inverse Kinematics

Jan 2025 – Apr 2025

Implemented DQN, DDPG, and SAC to teach a simulated planar robot arm to reach arbitrary targets in MuJoCo.

- Compared value-based (DQN), deterministic actor-critic (DDPG), and stochastic actor-critic (SAC) against the same environment; SAC achieved ~80% success
- Built the MuJoCo environment with a configurable number of links and a shared BaseAgent interface for clean algorithm comparison
- Technologies: Python, PyTorch, MuJoCo, Gymnasium, NumPy, Matplotlib

## Relevant Coursework

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**Mathematics:** Probability and Statistics, Differential Equations, Linear Algebra, Discrete Mathematics, Analytical Geometry and Calculus (1, 2, 3)

**Computer Engineering:** Physics (1, 2), Computer Architecture and Organization, Microcomputers, Digital Logic Design, Circuits (1, 2), Digital Electronics, Computer Systems

**Software Engineering:** Operating Systems Concepts, Data structures and Algorithms, Object Oriented Programming, Computer Programming, Computer Networks, Secure Software engineering, Programming Design Paradigms, Database Systems, Foundations in Software Engineering

**Robotics Systems:** Autonomous Robotic Systems, Digital Signal Processing, Systems and Signals, Kinematics and control of Robotic Systems, Artificial Intelligence (1, 2), Machine Learning (1, 2), Computer Vision

## Awards

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**Fulbright Canada Killam Fellowship:** Fulbright Canada · 2022 · Competitive fellowship awarded to outstanding students for academic exchange between Canada and the United States.

**Magna Cum Laude:** Florida Polytechnic University · 2023-05 · Graduated with high academic distinction.

**IEEE HKN Member:** IEEE Eta Kappa Nu · 2023 · Member of the IEEE honor society chapter recognizing excellence in electrical and computer engineering.

**President's List:** Florida Polytechnic University · 2023

**Bright Futures Scholarship:** State of Florida · 2019

**Florida Polytechnic University Institutional Scholarship:** Florida Polytechnic University · 2019

## Languages

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**English:** Native speaker