

Hamza Khan

Chicago, IL | 847-331-2995 | hamkha3111@gmail.com | Anticipated Graduation: May 2027

EDUCATION

Purdue University
B.S. in Robotics Engineering

West Lafayette, IN
Spring 2027

TECHNICAL SKILLS

Robotics and Simulation: ROS2 (nodes, TF2, Nav2, launch files, topic inspection), NVIDIA Isaac Sim, Gazebo, digital twin development, sim-to-real calibration, LiDAR-based SLAM, autonomous navigation, localization, sensor fusion, path planning

Robot Learning and AI: Imitation learning (ACT, π 0.5 LoRA, Multitask DiT), LeRobot framework, HuggingFace dataset and model deployment, policy training and evaluation, VLA model research, bimanual manipulation

Programming: Python, C++, MATLAB, Docker, Linux (Ubuntu), Git, NumPy, pandas, scikit-learn, PyTorch (exposure), data pipeline development, REST APIs

Hardware and Sensors: NVIDIA Jetson Orin Nano, Intel RealSense depth cameras, LiDAR, IMUs, encoders, WidowX bimanual robotic arms, SolidWorks, FEA, 3D printing, electromechanical integration

Certifications: MATLAB and ML Onramps (MathWorks); FEA: Mesh and Stress Analysis (Purdue); Python Foundations and OOP (Udemy)

EXPERIENCE

Research Assistant — Digital Twin and Autonomous Robot Navigation
CIMS Lab, Purdue University (Dr. Young-Jun Son)

Summer 2026 – Present

- Built a digital twin of an autonomous mobile UGV in NVIDIA Isaac Sim integrated with ROS2 and Nav2; deployed and validated autonomous navigation behaviors including SLAM, localization, and path planning on a physical Jetson Orin Nano platform.
- Designed structured sim-to-real calibration experiments to quantify and reduce odometry drift, LiDAR sensing errors, and controller tuning gaps; iterated on sensor configurations and navigation parameters based on empirical results.
- Debugged complex multi-node ROS2 systems using RViz2, rqt_graph, and topic inspection tools; resolved perception and navigation failures across simulation and physical deployment.

Robotics Intern — Robot Learning and Bimanual Manipulation

Summer 2026

Trossen Robotics | Downers Grove, IL

- Built and deployed imitation learning pipelines using LeRobot on WidowX bimanual arms, training ACT, π 0.5 LoRA, and Multitask DiT policies on real-world manipulation tasks; published 5+ datasets to HuggingFace under hamza-trossen.
- Evaluated policy performance across manipulation benchmarks using async inference pipelines on physical hardware; debugged full-stack issues spanning dataset format conversion (MCAP to LeRobot v3), hardware configuration, and model deployment.
- Researched and presented MolmoAct 2 (Allen AI VLA architecture) to engineering team; analyzed model design for integration with Trossen's Isaac Sim simulation and physical robot stack.

Research Assistant — ML and Model Validation

Fall 2025 – Present

Purdue University (Prof. Sundararajan)

- Built end-to-end ML classification pipeline in Python evaluating SVM, Random Forest, Logistic Regression, KNN, and Naive Bayes on clinical datasets; achieved best F1 of 0.97; co-authored paper presented at SOET Research Day April 2026.
- Developing anomaly detection and perception pipeline extensions applying validated methods to robotics sensor data.

Mechanical Engineering Intern — Robotic Systems

Summer 2025

Panera Innovation Lab

- Developed simulation models to evaluate autonomous system behavior before physical deployment; validated hardware-software integration through structured testing across multiple concurrent robotic subsystems.

PROJECTS AND LEADERSHIP

Founder and President — EcoRobotics

Fall 2025 – Present

Purdue University

- Founded and lead a multidisciplinary robotics organization building a fully autonomous outdoor robot; architect ROS2 navigation, sensor integration, and perception systems while coordinating hardware, controls, and software teams.
- Applying CIMS Lab sim-to-real methods and Trossen imitation learning research directly to EcoRobotics navigation and manipulation stack; secured internal Purdue funding through SOGA, ESG, and PSG grants.

Motorized Iron Man Helmet — Electromechanical Personal Project

Summer 2025

Personal Project

- Designed and fabricated a fully motorized multi-component assembly from scratch using Fusion 360 and 3D printing; integrated Arduino UNO, servo motors, and LED circuits with custom firmware for automated faceplate actuation.
- Systematically debugged mechanical alignment and electrical interference issues through root cause analysis; iterated until reliable repeatable performance was achieved across all actuation cycles.