Chahit Uppal

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Experience

AI/ML Hardware Engineer May 2023 – Aug 2024
Qualcomm *Markham, ON*

- Boosted verification efficiency by 20% through UVM-based streaming order checker for cache allocation registers, optimizing memory interface verification with virtual interfaces and transaction-level modeling.
- Reduced manual effort by 35% using Perl scripts to automate test and coverage generation, streamlining design verification processes and integrating data from sub team specific XLS files.
- Conducted QNX RTOS-based hardware-software co-verification for the Neural Processing Unit, validating real-time performance, interrupt handling, and memory management

Robotics Engineer | 6ix-Pac Sep 2023 – Nov 2024
University of Toronto Robotics Associations *Toronto, ON*

- Developed an A* search-based control algorithm using 4 VL530X TOF sensors, achieving $O(n \log n)$ time complexity to identify the 10 closest grid locations and improving localization accuracy by 25%.
- Utilized an IMU sensor for magnetic actuation and orientation control with $\pm 0.5^\circ$ precision, incorporating motor encoders to maintain 2 mm movement tolerance; designed and assembled a 4-layer PCBA.

Projects

NexusBot | *ROS2, Gazebo, Docker, Multi-Robot Path Finding, PID controller* March 2025

- Designed and simulated a semi-decentralized robotic warehouse system in Gazebo using ROS2 and Docker-based containers, enabling scalable multi-robot coordination for shelf transport in an Amazon-style environment.
- Implemented PID-based motion control for mobile robots and benchmarked against a centralized system in simulation, achieving a 20% reduction in deadlocks, 35% decrease in average idle time, and 18% increase in throughput across scenarios with up to 500 robots.

Single Leg Robot Stabilization | MuJoCo, Python, Stable-Baselines3 November 2024

- Developed a high-fidelity MuJoCo simulation of a 3-DoF single-legged robot with articulated hip, knee, and ankle joints; trained a PPO-based RL policy to maintain upright balance under randomized lateral disturbances, achieving >92% success rate across 1000+ test episodes.
- Implemented joint-level torque control with actuator constraints, contact modeling, and CoM-based reward shaping, reducing fall rate by 75% and improving stabilization response time by 30% compared to a baseline PD controller.

Popeyes Arm | *ROS, Gazebo, Computer Vision, Machine Learning* June 2024

- Engineered and controlled a Universal UR5e robot manipulator to identify and sort recyclable items, securing a spot in the RoboCup 2024 Finals among 300 global participants.
- Designed and implemented a YOLO-based item identification and sorting system using RGB images and depth sensors, achieving precise 3D actuator manipulation in Gazebo with ROS.

Adaptive Cruise Control with Model Predictive Control | Simulink, MATLAB May 2024

- Developed a longitudinal vehicle dynamics model and implemented a real-time Model Predictive Controller in Simulink, achieving sub-5% steady-state distance error across variable-speed scenarios.
- Simulated diverse lead vehicle profiles and optimized throttle and brake commands in real-time to maintain safe following distance and reduce acceleration jerk by 35%.

Education

University of Toronto May 2025
Bachelor of Computer Engineering + PEY Co-op *Toronto, ON*

- Awards: Dean's List, University of Toronto Scholars Award
- Relevant Coursework: Intelligent Image Processing, Adaptive Control and Reinforcement Learning, Digital Electronics, Linear Control Systems, Robot Modeling and Control, Fundamentals of Deep learning

Technical Skills

Languages: C++, C, Python, C#, MATLAB, Verilog, System Verilog, ARM Assembly, HTML, Arduino Language
Frameworks: Git, JIRA, Numpy, Pandas, Bash, Shell Scripting, SolidWorks, KiCAD, Agile, ModelSim
Specialized Skills: Multithreading, Motion Planning, Robot Manipulation, Autonomous Mobile Robots (AMR), HTTP, SQL, TCP, ClearCase (version control), Vehicle Dynamics, PID controller, Gazebo, MuJoCo