Chahit Uppal

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EXPERIENCE

AI/ML Hardware Engineer
Qualcomm

May 2023 – Aug 2024
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
University of Toronto Robotics Associations

Sep 2023 – Nov 2024
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 $\pm 0.5°$ precision, incorporating motor encoders to maintain 2 mm movement tolerance; designed and assembled a 4-layer PCBA.

PROJECTS

Model-Based Thermal Management for EV Battery System | *MATLAB, Simulink, Stateflow, SIL*   Sept 2024

- Designed a Simulink-based closed-loop thermal control system for EV battery cooling, implementing PID and MPC algorithms to reduce peak temperature deviations by 35% and prevent thermal runaway.
- Developed a physics-based battery heat dissipation model with real-world thermal data validation (95% correlation), enabling precise control logic tuning and reducing software iteration cycles by 50%.

Popeyes Arm | *ROS, Gazebo, Computer Vision, Machine Learning*   May 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.

Real-Time Locomotion Control & Simulation | *MuJoCo, WebSockets, Python, AsyncIO, EtherCAT*   Feb 2024

- Engineered a real-time WebSocket-based control system, achieving 30% lower latency in actuator commands for MuJoCo simulations of bipedal locomotion.
- Developed inverse kinematics (IK) and inverse dynamics (ID) models, optimizing motor torque control and reducing oscillations by 40% in simulated environments.

NavBot | *Unity, ML-Agents, Reinforcement Learning, Three.js, Docker*   July 2023

- Developed an autonomous navigation system using Unity 2021.3 and ML-Agents 2.0, training an RL agent with TensorFlow 2.6 to achieve a 95% success rate in target navigation.
- Implemented a web-based simulation using Three.js and WebGL to visualize the real-time movement of 1,000 reinforcement learning-trained robots, integrating WebSockets and Node.js for synchronized multi-agent updates.

EDUCATION

University of Toronto
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