Ashwin Rohit Alagiri Rajan

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Education

University of California, San Diego (UCSD) — La Jolla, CA
Ph.D. in Computer Engineering — *Sep. 2026 – Present*

University of California, San Diego (UCSD) — La Jolla, CA
M.S. in Computer Engineering — *Sep. 2024 – Jun. 2026*

University of California, San Diego (UCSD) — La Jolla, CA
B.S. in Computer Engineering; Warren Provost Honors — *Sep. 2021 – Jun. 2024*

Experience

Researcher, ACT Lab — Jan. 2024 – Present
University of California, San Diego — *La Jolla, CA*

- Engineered custom hardware accelerators for robotics and secure Large Language Model (LLM) inference workloads, improving performance and energy efficiency using cycle-level and analytic simulations.
- Benchmarked and profiled complex robotics workloads on NVIDIA GPUs and Jetson embedded platforms, identifying computational bottlenecks and optimizing CUDA code to enhance parallel performance.
- Orchestrated large-scale RAG and LLM inference pipelines on the Nautilus cloud platform using Kubernetes and Docker, demonstrating expertise in distributed systems for machine learning.
- Developed end-to-end robotics pipelines utilizing C++ and ROS for custom accelerator evaluation and system integration.

Undergraduate Researcher, Kastner Research Group — Jan. 2024 – Jan. 2025
University of California, San Diego — *La Jolla, CA*

- Co-authored and published a peer-reviewed paper at IGSC 2024 by investigating GPU workload performance on repurposed Android devices to reduce the carbon footprint of EdTech.
- Pioneered the conversion of the CSE 160 (Parallel Programming) curriculum from CUDA to OpenCL, developing new course assignments to improve cross-platform hardware compatibility for 100+ students.

Intern, Qualcomm Institute — Jun. 2023 – Jun. 2024
University of California, San Diego — *La Jolla, CA*

- Developed novel audio raytracing algorithms in C++ for AR/VR applications, creating a simulation pipeline to recreate personalized Head-Related Transfer Functions (HRTFs) from 3D scanned models.

Projects

Autonomous UAV | *C++, Python, PX4, Jetson Nano, OpenCV, SLAM*

- Architected and deployed an autonomous UAV on a Jetson Nano with a PX4 flight controller, implementing custom SLAM algorithms for real-time environmental mapping and localization.
- Integrated computer vision-based obstacle detection and avoidance using OpenCV within a C++/Python robotics pipeline, ensuring safe navigation in dynamic environments.

Robotics Reinforcement Learning Environment | *Python, OpenAI Gym, PyTorch*

- Designed a reinforcement learning environment using OpenAI Gym to train robotic actuators, achieving 100% accuracy on key manipulation tasks like pick-and-place and obstacle avoidance.

Distributed Collective Communication Framework | *Python, pyACCL, FPGAs*

- Built a high-performance Python framework over AMD's pyACCL to streamline the development of FPGA-accelerated applications, creating custom endpoints for distributed LLM inference workloads.

Technical Skills

Languages: C++, Python, CUDA, Rust, OpenCL, C, Java
Frameworks & Libraries: PyTorch, TensorFlow, ROS, Kubernetes, Docker, OpenCV, NumPy, Pandas
Developer Tools: Git, Cycle-level Simulators, Analytic Simulators, NVIDIA Jetson Platforms, FPGAs
Technical Areas: Robotics (Manipulation, Perception, SLAM), Machine Learning (Reinforcement Learning, LLMs, Foundation Models), Computer Architecture, Parallel Computing, Embedded Systems