GURPREET S. DHILLON

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Education

University of California, Santa Cruz **Sept 2023 - June 2025 (Expected)**
Master of Science, Computer Science and Engineering *GPA: 3.78*

- Master's Project: "In The Trenches: An Exploratory Study of GPU Atomic Performance" (Spring 2024)

University of California, Santa Cruz **Sept 2019 - June 2023**
Bachelor of Science, Computer Engineering *GPA: 3.75*

Work Experience

University of California, Santa Cruz **June 2023 - Present**
Graduate Research and Teaching Assistant *Santa Cruz, CA*

- Investigated and characterized the performance of low-level GPU synchronization primitives
- Produced research presented at Vulkanised 2024 - The Vulkan Developer Conference; ongoing collaborations with Samsung SARC
- Assisted in administering courses: Computer System Design, Parallel Programming, and C++ Game Emulator Capstone
- Helped students understand ILP exploitation, mutex construction, concurrent data structures, and basics of GPU computing and memory models

Advantest **June 2022 - Sept. 2022**
Application Engineer Intern *San Jose, CA*

- Expanded NVMe command and regression testing support for internal performance tooling as part of SSD Product Application Engineering team
- Implemented NVMe Sanitize/Format functionality for new NVMe software releases to make QA regression test coverage more comprehensive

IBM **June 2021 - Aug. 2021**
Accelerate Participant *Remote/Virtual*

- Created and deployed full-stack applications with IBM Cloud, as part of the IBM Accelerate program
- Mentored by IBM Z test team on SDLC, scrum and agile methodologies, and automation testing

Projects

GPU Atomic Performance Microbenchmark

- Designed and implemented cross-platform microbenchmarks in Vulkan to uncover performance characteristics of synchronization primitives, atomic read-modify-write instructions and mutexes on GPUs
- Derived preliminary atomic microbenchmark results, identifying novel performance profiles across various GPUs from different vendors and providing insights into programming atomics for performance optimizations

Concurrency Testing Tool

- Analyzed and tested linux kernel 5.12-rc3 by adapting and validating methods of Snowboard, a testing framework for detecting kernel concurrency bugs
- Increased testing efficiency and maximized data race coverage by 1.4x through prioritizing more sequential kernel test inputs rather than more concurrent input coverage on fewer sequential inputs

HTTP Reverse Proxy Server

- Created a reverse proxy from scratch in C, which supports GET requests, persistent connections, load balancing, and caching
- Distributes connections over a set of servers, while ignoring missing servers and caching results for fast responses

Skills

Languages	C/C++, OpenCL, CUDA, Python, Javascript
Frameworks	Git, Vulkan, TortoiseSVN, Docker, Node.js, Express