

# Alexander Shah

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## SKILLS

C/C++ • Python • Scala • Java • JavaScript • HTML/CSS • SQL • MATLAB • React • Flask • OpenGL • PostgreSQL

## EXPERIENCE

**CITADEL** | SOFTWARE ENGINEERING INTERN | Winter 2020

**KHAN ACADEMY** | SOFTWARE DEVELOPER INTERN | Summer 2019

**GOOGLE** | SOFTWARE DEVELOPER INTERN | C++, Python, JavaScript | Fall 2018

- Optimized hit-test submissions by detecting when data is expected to change, improving the total cpu usage time of the Chrome rendering pipeline by 9%
- Designed hit-test visualization and logging tools for Chrome DevTools to allow for developers to see the arrangement, hierarchy, and status of frames
- Added flow-tracing events to the Chrome Event Targeting Pipeline for the profiling of tasks communicating between different processes
- Connected code review and code searching tools for Chromium during internal hackathon, used by reviewers to jump to the definition of highlighted regions in diffs

**SIDEFX** | 3D SOFTWARE DEVELOPER INTERN | C++, MATLAB | Winter 2018

- Extended the Convex Ridge Separation algorithm for approximate 3D convex decomposition to improve the performance of collision simulations
- Trained an SVM on results from graph cuts over 3D meshes to obtain temporally coherent segments, allowing for the decomposition of animated models
- Traced geodesic paths by following the heat gradient returned from the Geodesics in Heat algorithm
- Optimized convex hull merging algorithm by initially pruning with an R-tree, resulting in a 200% speed increase

**PAVEAI (YC W16)** | SOFTWARE ENGINEERING INTERN | Python, JavaScript, SQL | Summer 2017

- Designed a job queue with Celery and Redis to distribute tasks across servers
- Replaced Elasticsearch key-value store with PostgreSQL resulting in a 1000% speed increase and improved reliability
- Worked with PostgreSQL, using Alembic for migrations and SQLAlchemy for ORM

## PROJECTS

**HALITE III AI** 🧠 | C++, Python

- Ranked top 10 in Two Sigma's AI challenge (out of 4000+)
- Modelled game states as bipartite graphs and computed the maximum weighted matching to determine move selection

**RAYTRACER** 🧠 | C++

- Wrote a photorealistic graphical renderer based on simulating light rays
- Implemented reflections, refractions, and translucency for spheres and planes

**SCALA COMPILER** | Scala, Assembly

- Compiled a subset of the Scala language into MIPS Assembly using an Earley Parser
- Implemented closures, nested functions, type checking, tail recursion, and automated garbage collection

**SLIME FARMING SIMULATOR** 🧠 | Java

- Developed a multithreaded server and client for a rogue-like dungeon crawler
- Designed a procedural map generation algorithm and a pathfinding AI

## EDUCATION

**UNIVERSITY OF WATERLOO** | BACHELOR OF COMPUTER SCIENCE | 2016 - 2021

- Dean's Honour List, CGPA: 3.95/4.0

**COURSERA** | STANFORD UNIVERSITY MACHINE LEARNING | MATLAB | 2016