# Alexander Shah

**Software Developer**

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**Languages** Java, C/C++, Python, Scala, JavaScript, HTML, CSS, SQL, MATLAB, Rust, Go

**Tools / Tech** Git, Bash, PostgreSQL, ReactJS, jQuery, Flask, OpenGL

**Experience**

**SideFX** | **3D Software Developer - R&D** | C++, MATLAB | *Winter 2018*

- Developed an algorithm for **approximate 3D convex decomposition** to improve the performance of collision detections in Houdini simulations
- Trained a **linear SVM** on data obtained from iterative **graph cuts** to produce clipping planes at semantically meaningful locations
- Implemented the **Geodesics in Heat** algorithm and added the feature to trace paths through following the heat gradient
- Optimized convex hull merging algorithm by initially pruning with a **R-tree**, resulting in a **2x speed increase**

**PaveAI** | **Software Engineer - Full Stack** | Python, Javascript, SQL | *Summer 2017*

- Designed an **async service** with Celery and Redis to distribute tasks across servers
- Replaced Elasticsearch key-value store with PostgreSQL JSONB resulting in a **10x speed increase** and increased reliability
- Worked with PostgreSQL, using Alembic for migrations and SQLAlchemy for ORM

**Projects**

**Lacs Compiler** | Scala, MIPS Assembly

- Compiles a subset of the Scala language into MIPS using an Earley parser
- Supports closures, nested functions, first class functions, and type checking
- Included **automatic garbage collection** using Cheney's algorithm

**Raytracer** | C++

- Wrote a **photorealistic graphical renderer** that works by simulating light rays
- Implemented reflections, refractions, and translucency for spheres and planes

**Slime Farming Simulator** | Java

- Developed a **multithreaded server and client** for a rogue-like dungeon crawler
- Incorporates collision detection and double-buffering to reduce screen tearing
- Designed a procedural map generation algorithm and a pathfinding AI

**Education**

**University of Waterloo** | *2016 - 2021*

- Candidate for Bachelor of Software Engineering
- Dean's Honour List

**Coursera - Stanford University Machine Learning** | MATLAB | *2016*

- Implemented Linear & Logistic Regression, ANN, k-NN, and SVM

**Awards**

- Top 30 Canadian Computing Olympiad Qualifying Round | *2016*
- Platinum Division USA Computing Olympiad | *2016*