

Michael Xu

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EDUCATION

UNIVERSITY OF TORONTO

B.A.Sc. IN ENGINEERING SCIENCE

May 2020 | Toronto, ON

CGPA: 3.53

LINKS

Github: [mshoe](#)

Website: [mshoe.github.io](#)

LinkedIn: [mxumichaelxu](#)

LANGUAGES

C++

C

GLSL

C#

Python

VBA, Tcl, Perl, Verilog, HTML, CSS

SKILLS

Git

Visual Studio

ImGui

Eigen

OpenGL

Unity

Blender

Microsoft Office Suite

MATLAB

LaTeX

Azure DevOps

ffmpeg

COURSEWORK

Algorithms and Data Structures

Operating Systems

Computer Graphics

Physics-based Animation

Linear Algebra

Calculus

Differential Equations

Classical Mechanics

Machine Learning

Deep Learning

OTHER INTERESTS

Computer Graphics Papers

Game Engine Architecture

Cinema

Musical Composition

PROFESSIONAL EXPERIENCE

ROCSCIENCE INC. | GEOTECHNICAL SOFTWARE DEVELOPER

May 2020 – Present | Toronto, ON

- Implementation of 3D rigid body and lumped mass physics simulators in C++ to compute rockfall trajectories for the product RocFall3 released in 2022
- Extensive experience with C++ math library Eigen, C++ immediate GUI library ImGui, and graphics library OpenGL for Windows systems
- Continuous collision detection for triangle meshes, spheres, and boxes, accelerated with spatial partitioning structures
- Rigid body friction and non-penetration constraints formulated as a linear complementarity problem with Eigen, and solved using Lemke's algorithm
- Researched penalty based, impulse based, and intersection-free rigid body methods to compare against constraint based methods
- Applied Material Point Method (MPM) to 2D landslide run-out analysis

DYNAMIC GRAPHICS PROJECT | RESEARCH STUDENT

September 2019 – April 2020 | Toronto, ON

- Implementation of a 2D differential physics simulator based on the Material Point Method (MPM) in C++, which can control movement through gradient descent, using derivatives of final position with respect to deformation gradients which were computed via back-propagation
- Implementation of a volume renderer for MPM data

ROCSCIENCE INC. | SOFTWARE DEVELOPER INTERN

May 2019 – August 2019 | Toronto, ON

- Used Microsoft Azure to design an automatic test suite using the cloud to replace in-house servers
- Derived new parameters for ellipsoids to use in meta-heuristic search methods for slope stability analysis

MICROCHIP TECHNOLOGY INC. | SOFTWARE ENGINEERING INTERN

July 2018 – April 2019 | San Jose, CA

- Used SQLite and C++ to implement an SQL database for storing and retrieving messages from all sorts of FPGA design tools within the Libero FPGA software
- Used Tcl, Perl, and Python to implement an automated regression suite for the Libero FPGA software in Linux

TORONTO HYDRO | TECHNICAL STUDENT

May 2016 – August 2016 | Toronto, ON

- Developed VBA scripts to be used in analyzing electrical control room data

AWARDS

| | | |
|------|-----|---|
| 2018 | 3rd | Ontario Engineering Competiton - Programming |
| 2018 | 1st | UofT Engineering Competition (UTEK) - Programming |
| 2016 | 2nd | WearHacks Toronto Hackathon |
| 2016 | 3rd | UofT Game-Making Deathmatch |

SOCIETIES

| | | |
|-----------|-------------------|---|
| 2017-2018 | Graphics Director | UofT Machine Intelligence Student Team |
| 2014-2015 | Lead Guitarist | Senior Jazz Ensemble, Cawthra Park S.S. |