

# 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 differentiable 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.