Omar Farag

+1 647 700 7342 | omarfarag74@gmail.com | linkedin.com/in/omar-h-farag | github.com/o-farag/ | omarfarag.ca

Education

University of Toronto — Toronto, ON
Bachelor of Applied Science in Computer Engineering — *September 2019 – April 2024 (expected)*

Experience

Red Hat Inc. — May 2022 – August 2023
Software Engineering Intern — *Toronto, ON*

- Worked with the Advanced Cluster Management team on the HyperShift middleware for hosting OpenShift control planes. Worked with **AWS**, **Kubernetes**, & **Golang**.
- Used **Golang** & the Kubernetes controller pattern to create controllers that sped up cluster re-import speed by **30x** and to automatically import newly created clusters.
- Used **Tekton CI/CD** and **Bash** to create an Openshift pipeline to run daily smoke tests on new Hypershift builds.
- Optimized how the Hypershift operator stores and caches secrets, reducing cache size and improving reliability.
- Fixed **40+** frontend and backend issues using **React**, **Typescript** & **Golang**.
- Prototyped a method to load balance the placement of hosted clusters on hosting clusters.

Medical Computer Vision & Robotics — July 2021 – November 2021
Research Assistant — *Toronto, ON*

- Used **C#** to implement a physics simulation using the MPM method to help surgeons simulate the cutting of flesh during surgical operations.
- Implemented a laser that cuts through flesh in real time and implemented *De Casteljau's algorithm* to create bezier curves for the laser to follow.
- Used the Burst Compiler and Jobs System in Unity to improve frame rendering from **20 fps to 300 fps**.

UofT Aerospace Team — June 2021 – November 2021
Software Developer & Researcher — *Toronto, ON*

- Researched and worked on a compression algorithm that uses neural networks in **Python** to predict voxel values in a hyper-spectral cube.
- Encoded the weights and biases of the neural network into a bit-stream to be sent down to the ground station.
- Implemented the *SHA256 hashing algorithm* to secure communications between the ground station and the HERON MK II CubeSat.

Side Projects

AWS Hackathon, 3rd Place - Toronto AWS Office

- Developed an innovative solution that addressed student issues, winning a place in a competitive AWS hackathon.
- Demonstrated cloud computing skills by developing an app using AWS technologies (S3, Bedrock, Lambda, etc).
- Presented the project's technical architecture to a panel of judges and an audience at the AWS Toronto office.

3D Software Renderer

- Used **C++** to build a software renderer entirely pipelined in the CPU that renders meshes to the Windows console. Built from scratch with no graphics APIs, just linear algebra.
- Used a variation of the *Painter's Algorithm* to render distant objects before closer objects.
- Used back face culling and clipping out of view triangles to speed up the renderer by **500%**.

Mini C Compiler

- Implemented a compiler for a C language subset using LLVM.
- Built a lexical analyzer for syntax parsing using tokenizer concepts.
- Constructed an AST to represent program structure, allowing for efficient node visiting and manipulation.
- Applied the Visitor pattern to traverse and perform operations on the AST, facilitating code generation and optimization.

Technical Skills

Languages: C/C++, Golang, Python, JavaScript, ARM Assembly, Verilog, HTML/CSS
Developer Tools & Technologies: LLVM, Kubernetes, Docker, AWS, Git, Jira, Tekton CI/CD, Google Cloud Platform, Blender 3D