

# Spencer Karjala

Creatively-driven software engineer passionate about developing productive tools for complex problem domains.

spencerkarjala@gmail.com  
604-842-3870  
Coquitlam, British Columbia  
[github.com/spencerkarjala](https://github.com/spencerkarjala)  
[skarja.la](mailto:spencerkarjala@gmail.com)

## Experience

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### Damon Motorcycles

Vancouver, British Columbia

Software Engineer

Jan 2022 - Mar 2024

- Engineered an on-premises Linux server-based CI/CD platform used by all engineering staff to develop and test software, enabling engineering to scale its workforce by more than 300%
- Created containerized build environments using Docker to encapsulate platform dependencies, ensuring identical builds across all environments, greatly improving R&D iteration time
- Designed CI/CD build pipelines using Python, Bash, and PowerShell scripting over TeamCity to automate build formats like Yocto, CMake, Eclipse IDE, Android, iOS, and .NET
- Created a C++ unit testing framework on top of GoogleTest to maintain a high level of confidence in the stability and functionality of legacy code
- Acted as resident expert in Docker and C++ software testing, writing technical documentation and hosting lunch-and-learn meetings
- Thrived in a fast-paced startup environment, demonstrating versatility and the ability to handle multiple new roles and responsibilities

Junior Embedded Software Engineer (Co-op)

Sep 2021 - Jan 2022

- Implemented features for embedded software in C++ on STM32 architecture, contributing to Agile/Scrum process by executing design specifications
- Participated in design meetings and took ownership of future CI/CD systems, establishing Linux server infrastructure and creating base automation tools used to enhance early-stage R&D iteration speed
- Established a prototype over-the-air (OTA) firmware deployment system using local Linux servers, AWS infrastructure, and Raspberry Pi devices to demonstrate value of CI/CD systems to upper management
- Brought on as permanent employee and promoted at end of co-op term

### HP Anyware (prev. Teradici)

Burnaby, British Columbia

Associate Web Developer (Co-op)

Jan 2020 - Aug 2020

- Implemented and shipped user-facing frontend features for managing remote workstations using React JS
- Created, maintained, and tested backend Express.js REST API endpoints used by team members and advanced users
- Built a standard Python-based wrapper around key REST API features for manual testing during development, increasing team development speed

## Technical Skills

### Languages

C++, C, CMake, Bash, Python, MATLAB/Octave, JavaScript, Rust, GLSL, HLSL, CUDA

### Technologies & Practices

Linux, Docker, AWS S3, ECR, IAM, Yocto, WebGL, multithreading, networking, TCP/IP, automation

### Tools

Git, GitHub, GitLab, Bitbucket, Jira, Confluence, TeamCity, VS Code, Visual Studio, Rider

## Education

### Simon Fraser University

BASc Engineering,  
Computer Engineering  
concentration  
Jan. 2018 - Dec. 2022

## Interests

Music, graphics programming, signal processing, game development, sound design, live performance

# Technical Projects

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## Proximity Entrance System (Capstone project)

A remote keyless entry system using ultra-wideband (UWB) communications to triangulate the position of a user's handheld device (RID) relative to the proximity detection module (PDM) mounted on an electric bike.

- Designed and implemented firmware for STM32-based devices in C, utilizing STM32 HAL
- Developed a custom communication protocol similar to TCP that guaranteed reliable transmission with real-time encryption and decryption of device secrets
- Created prototype devices using STM32 Nucleo boards during initial proof of concept phase
- Tracked down and resolved bugs in Qorvo UWB transceiver driver code, enabling its usage on many more target devices than those in the initial demos
- Assembled multiple iterations of PCBs for the handheld, battery-powered RID component
- Designed and 3D printed an enclosure for the handheld RID component to protect and house device internals
- Led project documentation efforts as a major contributor to the project proposal, requirements specification, and design documentation

## Grid Navigator (Unreal Engine 5.3 Plugin)

A plugin for Unreal Engine 5.3 that implements grid-aligned pathfinding at the engine level, working as an in-place replacement for the default Recast navigation system.

- Implemented in Unreal C++ and Blueprint for optional extensions
- Extended Unreal Engine's navigation system to support grid-aligned movement by overriding default pathfinding behavior without requiring engine recompilation
- Designed a custom navigation data model using adjacency lists for efficient random- and neighbor-node access
- Integrated asynchronous map data builds that occur automatically as map geometry and navigation bounds are updated in-editor
- Created 3D cursor component that dynamically traces and displays paths in real-time using spline meshes
- Created rendering component for visual debugging of map data as it is created
- [Demo available](#)

## Fourier Filter & Diatonic Vocoder (VST Plugins)

A pair of plugins for digital audio workstations used as tools for unique harmonic spectral sound design - one creating log-periodic sine pulses through the spectrum, and the other attenuating frequencies that lie outside of a specified chord or scale.

- Implemented in C++ using the JUCE framework for VST development
- Designed a custom FFT buffer structure that supports N input and output audio channels (eg. 2 for stereo signals) and M overlapping windows of audio
- Built a short-time Fourier transform (STFT) implementation on top of JUCE's platform-optimized FFT for realtime spectral processing of audio data
- Prototyped functionality in MATLAB for validation prior to C++ implementation
- Ported the Fourier Filter from Max/MSP to C++ to utilize JUCE's cross-platform capabilities
- Implemented a graphical spectrum analyzer for debugging and to improve user feedback
- [Demo available for Diatonic Vocoder](#), and [demo available for Fourier Filter](#)