

# Karl Hiner

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## EDUCATION

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### Portland State University

Bachelor of Science, Computer Science | GPA: 3.82

Portland, Oregon

2010 – 2013

### Georgia Institute of Technology

Master's, Computational Science and Engineering | Expected GPA: 3.9

Atlanta, Georgia

Sep. 2022 – graduating Apr. 2024

## RELEVANT COURSEWORK

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**GA Tech:** Modeling and Simulation, Computational Physics, Computational Data Analysis, Computer Graphics, Computer Animation, Numerical Linear Algebra, High Performance Computing, Machine Learning with Graphs

**PSU:** Machine Learning, AI and Game Design, Parallel Programming

**Coursera:** Machine Learning, Deep Learning, Probabilistic Graphical Models, Audio Signal Processing

## SKILLS

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**Languages:** C++, Python, TypeScript/JavaScript, Java, Ruby, Julia, Faust, SQL

**Technologies:** Git, React, ImGui, Linux, Postgres, JAX, PyTorch, Vulkan/OpenGL, Node, Docker

**Expertise:** Full-stack development, technical leadership, physical modeling and simulation, applied machine learning

## EXPERIENCE

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### Axiom Data Science

Lead Software Engineer

Portland, Oregon

Feb 2020 – Jul 2022, Full-time

Lead developer on the next generation of the Research Workspace, a web application for collaboratively managing data for scientific projects. Designed and implemented the following major projects:

- An extensive admin application supporting many internal Research Workspace use cases.
- A user authentication and authorization service backend and UI library used across multiple Axiom services.
- Internal React packages to modularize and improve UI components, including time pickers and charts.
- Data portal features, including a cross-portal feature called *Map Views*, enabling users to create, edit, share, and publish multiple portal map instances.
- A remote browser service for internal QA to help quickly discover regressions across portals and landing pages.

### Cozy

Senior Software Engineer

Portland, Oregon

Oct 2018 – Jan 2020, Full-time

- Led development of major components of Cozy's web app and payments system.
- Transitioned components and services to be presented and consumed by Apartments.com after Cozy's acquisition by CoStar Group.
- Mentored junior engineers and led product development efforts on large projects, including project and sprint planning, organizing team efforts, and presenting project progress.

### Self

Independent Study

Portland, Oregon

Dec 2017 – Oct 2018, Full-time

I took an unpaid sabbatical to focus on learning more about fields I am passionate about. Ultimately, I decided to pursue a Master's degree, aiming to transition into software domains that interest and inspire me.

- Released an [Android app](#) for sample-based music production.
- Studied digital audio signal processing, machine learning, C++, and Python, and produced in-depth Jupyter notebooks for each chapter of eight technical books on these topics.
- Completed online courses in deep learning and statistics.
- Developed digital audio workstation software.
- Implemented a declarative static site generator in React and used it to build my portfolio/blog website.

## New Relic - Applied Intelligence Services Team

Senior Software Engineer

Portland, Oregon

Oct 2016 – Dec 2017, Full-time

- Researched, architected, and built products, including dynamic baselines, error profiles, and host outlier detection.
- Leveraged machine learning and statistical techniques on data from multiple monitoring sources to provide customers with actionable information and context to find, understand, and fix software problems quickly.

## New Relic - Mobile Product Team

Software Engineer / Senior Software Engineer

Portland, Oregon

Apr 2014 – Oct 2016, Full-time

- Acted as the technical lead on significant features, including activity tracing and version trends, as well as features for crash reporting, network reporting, and real user monitoring.
- Designed and shipped APIs, UI features, and high-throughput services using Java, Ruby, and React.

## New Relic - Mobile Team

Junior Software Engineer

Portland, Oregon

May 2013 – Apr 2014, Full-time

- Co-produced the frontend for the Mobile product Rails application.
- Developed data collection and aggregation service features.
- Implemented components of the Android application monitoring agent.

## Thetus Corporation

DevOps Intern

Portland, Oregon

Jan 2013 – May 2013, Half-time

- Automated host environment setup and web application deployment.

## Jive Software

Software Engineering / Quality Engineering Intern

Portland, Oregon

Jan 2012 – Dec 2012, Half-time

- Developed features and fixed bugs for the Jive platform.
- Designed and implemented an automated test framework for Jive's web application on a small team.
- Co-implemented a modular testing framework, and wrote comprehensive functional tests using this framework.

## PROJECTS

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### MeshEditor | C++/Vulkan/ImGui | [GitHub](#)

Real-time mesh viewer and editor with rigid body audio modeling, and interactive [RealImpact](#) dataset explorer supporting comparison of audio models with real-world impact recordings.

### mesh2audio | C++/OpenGL/ImGui | [GitHub](#)

Real-time modal audio synthesis from 3D meshes, with interactive vertex excitation.

### Jupyter notebooks | Python | [GitHub](#)

Python Jupyter notebooks covering each chapter of several books, including:

- Gareth Loy's Musimathics [Vol 1](#). [Vol 2](#).
- Julius O. Smith's [Mathematics of the DFT](#), [Intro to Digital Filters](#), and [Physical Audio Signal Processing](#)

### Generating Music with WaveNet and SampleRNN | Python | [GitHub](#)

Exploring musical raw audio generation using these popular models.

### JAXdsp | Python/JAX/TypeScript/React | [GitHub](#)

Parameterize audio graphs in real-time to model an incoming/outgoing audio stream pair with differentiable DSP components, with data and audio over WebRTC.

### DrumClassification | Python/PyTorch | [GitHub](#)

A drum instrument classification model and preprocessing pipeline.

### FlowGrid | C++/ImGui | [GitHub](#)

Immediate-mode interface for the Faust functional audio language, backed by a persistent store supporting navigation to any point in the project history in constant time.

### BeatBot | Java/C/OpenGL | [GitHub](#)

A sample-based music production app for Android, with an OpenSL audio/effects backend implemented in C, and a custom OpenGL-based 2D UI designed to minimize draw call submissions for optimal performance on low-end devices.

### Auto-Sampler | MaxMSP/Ruby/Javascript/C | [GitHub](#)

A Max4Live instrument that streams looping audio segments matching the pitch of incoming MIDI notes in real-time.