Karl Hiner

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Education

Georgia Institute of Technology — Atlanta, Georgia
Master's, Computational Science and Engineering | Expected GPA: 3.9 — Sep. 2022 – Apr. 2024

Portland State University — Portland, Oregon
Bachelor of Science, Computer Science | GPA: 3.82 — 2010 – 2013

Skills

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

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

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

Experience

Axiom Data Science — Portland, Oregon
Lead Software Engineer — Feb 2020 – Jul 2022

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 — Portland, Oregon
Senior Software Engineer — Oct 2018 – Jan 2020

- Led the 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 — Portland, Oregon
Independent Study — Dec 2017 – Oct 2018

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 Portland, Oregon

Senior Software Engineer - Applied Intelligence Services Team Oct 2016 – Dec 2017

- 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.

Software Engineer / Senior Software Engineer - Mobile Product Team Apr 2014 – Oct 2016

- 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.

Junior Software Engineer - Mobile Team May 2013 – Apr 2014

- 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.

Relevant Coursework

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

Projects

MeshEditor | C++/Vulkan/ImGui | GitHub Nov 2023 – Apr 2024

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 Jan 2023 – May 2023

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

Drum classification | Python/PyTorch | GitHub Nov - Dec 2023

A drum instrument classification model and preprocessing pipeline for the Expanded Groove MIDI Dataset dataset.

GeoLDMViz | C++/Python/OpenGL/ImGui | GitHub Nov 2023

3D visualizer app for inspecting chains of 3D molecules generated with Geometric Latent Diffusion Models.

Generating Music with WaveNet and SampleRNN | Python | GitHub Aug 2019

Exploring musical raw audio generation using these popular models.

FlowGrid | C++/ImGui | GitHub Mar 2022 – Present

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.

JAXdsp | Python/JAX/TypeScript/React | GitHub Dec 2020 – Feb 2022

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

Jupyter notebooks | Python | GitHub Jan 2018 – Jan 2020

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

BeatBot | Java/C/OpenGL | GitHub 2012 – 2018

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 2015

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