Aaron Goidel

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Dynamic Software Engineer and AI Researcher leveraging advanced technology to make amazing products. Experienced in architecting software, contributing to large projects, and implementing ML solutions.

Education

University of Toronto (3.77/4.0) **Toronto, ON**
B.S. Computer Science 2019–December 2023
Coursework Deep Learning, Natural Language Processing, Image Understanding, Compilers, Machine Learning, Software Design, Theory of Computation, Programming Languages, Distributed Systems

Experience

University of Toronto **Toronto, ON**
Research Assistant June 2023–
- University of Toronto Excellence Award grant to pursue NLP research under Prof. Barend Beekhuizen
- Used transformers, deep learning, and graph theory to investigate word meaning distribution
- Implemented novel distributed models using PyTorch, NumPy, spaCy, and a testing pipeline for processing large natural language data across 1,200 languages

MLabs **Remote**
Software Engineer June 2022–Feb 2023
- Backend and OnChain engineer on an agile team implementing an NFT marketplace and crypto platform
- Wrote Cardano smart contracts: minting native tokens and NFTs, handling listing, purchases, royalties
- Implemented critical features and blockchain interactions on the client side in React & PureScript
- Contributed to integral tooling for the Cardano blockchain including a Haskell library for generating transactions and a performant robust property testing framework
- Worked across engineering teams to implement features, fix bugs, and write documentation for user facing applications and in-house libraries

NASA **Remote**
Software Engineering Intern Jan 2022–May 2022
- Contributed mission critical software to the launch of Artemis I
- Added code and tests to low-latency, high-throughput, Class-A safety critical launch sub-system in C++
- Created configuration tools for fine-grained control over automated data logging and review
- Created a safe and extensible interface for a massively-parallel launch subsystem which acts as a message bus providing pub/sub between end user applications and data collection systems
- Contributed comprehensive tests for mission-critical distributed data-monitoring applications

University of Toronto **Toronto, ON**
Teaching Assistant Sept 2021–Dec 2021
- TA for Introduction to the Theory of Computation
- Taught concepts including: Runtime complexity, proving correctness of iterative & recursive algorithms, finite automata, regular languages, state machines
- Assisted in lectures by answering questions and coaching students through handouts and activities
- Taught lab of 30+ students, reinforcing lecture through problems and QA

Highsnobiety **Remote**
Junior Software Engineer Jul 2020–Aug 2021
- Rewrote existing data-collection pipeline as a parallel system in Python and C++ saving 80% execution time on retail data aggregation

- Implemented, maintained, and improved upon web scraping and data parsing infrastructure for increased performance in data collection from retail partners
- Implemented internal content management tools in NodeJS, React, and AWS

National Security Agency **Fort Meade, MD**
Cybersecurity Research Intern Jun 2019–Aug 2019

- Authored a patch in the Linux operating system, implementing a security hook and permissions for controlling file system watches, including test suite
- Experimented with machine learning models to estimate the proximity of Bluetooth Low Energy enabled IoT devices in obstructed spaces
- Presented progress and findings to groups of 20+ researchers in biweekly technical briefings

🔧 Skills

💻 **Languages**: Python, C, C++, JavaScript (TS, Node, Express, React), Java, Haskell, x86 Assembly
💾 **Technologies, etc:** PyTorch, Pandas, TensorFlow, SciKitLearn, Numpy, LLVM, Cardano, Solidity, Linux, Bash, Git, Jira, OOP, Agile, Functional Programming, HuggingFace
🌐 **Soft Skills:** Collaborative, eager learner, great presenter, effective communicator, adaptable to new technologies

👷 Projects

ML 3D Scanner *Deep Learning, PyTorch, OpenCV*

- Implemented a Neural Radiance Field (NeRF) deep learning model for optimizing the radiance and 3D structure of a scene from 2D photographs. Developed a comprehensive pipeline from image input to 3D mesh extraction including an AR viewer.

AaronAI *LLaMa-2, React, PineconeDB, HuggingFace*

- A custom LLM chatbot based on LLaMa-2 trained to act as an interactive resume
- Implemented a custom knowledgebase using embeddings and a vector db to add dynamic information to prompts at infrence-time

Visual Product Recommendations *Artificial Intelligence, PyTorch*

- Implemented a deep learning system to recommend products which match the user's image aesthetics
- Used PyTorch to implement a CNN for feature extraction, deep learning to embed product and user image features, and an attention mechanism. Trained in parallel using CUDA

Cookie *ReactNative, SciKitLearn*

- Created a smart cookbook application that uses ML and Graph Theory to optimize cooking in the home kitchen (Research with Prof. Michael Liut)
- By viewing recipes as a dependency graph, and not as a list of steps, Cookie can intelligently merge smaller recipes into novel combinations and schedule steps in a way that makes sense

Linux Security Module *C, Linux Kernel*

- Added new hooks to the Linux Security Module which allow for setting permissions on file system watches to prevent bad actors from obtaining pattern of life data from applications, and getting file descriptors through fs watches which they should not have
- I had to learn about writing new OS code, the filesystem and related syscalls, and how to navigate the complexities/politics of adding code to the Kernel.

Simulating Galaxies *C, OpenGL*

- Written in pure C and OpenGL, this particle simulation shows us why galaxies formed into they shapes they did after the Big Bang
- By optimizing numerical methods, leveraging parallelization, and more, I was able to simulate 100,000+ particles on my laptop in real time