KHYBER SEN

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LANGUAGES

Rust
Kotlin
TypeScript
C++
C
Python
Java
Haskell
Bash

SOFTWARE

LLVM, Clang
gdb (Python API)
WebAssembly
Linux
JVM, Graal
Node, Deno
React
CMake
Webpack
Keras (TensorFlow)

HONORS

1st Place in Two Sigma Data Science Competition

1st Place in PClassic Programming Competition at UPenn

Scholar Athlete of 850 person high school class

EDUCATION

Columbia College, Columbia University 2018 - 2023
(gap year 2020-2021)
Rabi Scholar, CS Major (GPA 3.84, CS GPA 4.17)

Stuyvesant High School 2014 - 2018
97.5 GPA unweighted, Captain of Varsity Baseball Team

EXPERIENCE

Compiler Intern at MediaTek (Woburn, MA) MAY 2020 - PRESENT

Louper — Helped optimize MediaTek's LLVM-based digital signal processing compiler by using deep learning to predict difficult optimization decisions. Previously, these decisions were guessed by the programmer or chosen by arbitrary compiler heuristics, so over the summer, I developed the hyperheuristic Louper, a framework for making the loop optimization decisions intelligent, improving code performance, and avoiding slow and costly heuristics and offline analysis. After training Louper on 550k loops, I created a register pressure estimator 3x as accurate as the current one.

Little Doctor — Built the Little Doctor, a framework for testing the debug info quality generated by the compiler and the debugger, gdb. Using gdb's python API, I test randomly generated programs within gdb, verifying that gdb can correctly interpret the debug info. In only 2 months, the Little Doctor has already discovered 8 significant bugs, as well as hundreds of others that have yet to be classified.

Presented daily to my manager (Stan Kvasov), weekly to the compiler team to incorporate their feedback, and twice to 40+ employees for my final presentations.

TA for Columbia's Analysis of Algorithms (taught by Prof. Clifford Stein, the S in CLRS) FALL 2019

Acted as liaison between professor and students. Graded exams and problem sets for class of 140 students. Taught students during office hours and answering email questions throughout the week.

Smart Neural Fuzzer Internship at Columbia University SPRING & SUMMER 2019

github.com/kkysen/SmartNeuralFuzzer

Developed a code coverage tool that records all the decisions (branches) a potentially multi-threaded, multi-process program makes, which allows for time travel and record-replay debugging of control flow. Collaborated with Kexin Pei and Junfeng Yang to integrate this decision data into a neural net that can intelligently guide fuzzing, taint analysis, and profile-guided optimizations, helping to uncover hidden data dependencies and elusive bugs. Written in modern C++ 17 as an LLVM optimization pass.

Fruit Fly Brain Observatory Internship at Columbia University SUMMER 2017

Built a robot to model the fruit fly vision system and its motion detection capabilities using massively parallel programming (under direction of Aurel Lazar).

PROJECTS

Change Journal at Codeprentice (Rust) | github.com/codeprentice-org/fanotify

Leading 5-person team at Codeprentice on the Change Journal project. We are developing a cross-platform change journal library in Rust, using the fanotify backend on Linux and the USN journal backend on Windows we're writing. Ultimately we plan to use the change journal to create an instantaneous and cross-platform file searcher application. I have also helped teach my teammates Rust.

N Queens (Java) | github.com/kkysen/MKS22X/blob/master/02NQueens/NQueens.java

Developed a novel, extremely efficient bitwise solution to the classic N Queens problem faster than any other known software solution.

Flight Delay Visualizer (TypeScript, WebAssembly (C++17), d3) | github.com/kkysen/r3d3

Designed an interactive website to visualize all 6 million flights over the US in the past year, watching how certain airlines and airports are chronically delayed, and applying complex filters to the flights. Used C++ compiled to WebAssembly to make feasible performance- & memory-wise.

Weather or Not at Stuy Hacks (JS) | github.com/wertylop5/WeatherOrNot

Led 4-person team in 24 hours, ~200 person Major League Hackathon. My team created a website that overlays maps, traffic, weather, and more to better plan your trip.