

# KHYBER SEN

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## LANGUAGES

Kotlin (ADVANCED)  
TypeScript (ADVANCED)  
Java (ADVANCED)  
JS (ADVANCED)  
Rust  
C++17  
C  
Haskell  
Python 2, 3  
Cuda C/C++  
Bash

## SOFTWARE

LLVM, Clang  
WebAssembly  
Linux  
JVM, Graal  
Node.js  
React  
ReactiveX (RxJS, RxKotlin)  
CMake  
Webpack  
Express  
Flask  
MongoDB  
Sqlite  
d3  
Keras (TensorFlow)

## HONORS

U.S. Presidential Scholar  
Nominee  
1st Place in Two Sigma Data  
Science Competition  
1st Place in PClassic  
Programming Competition at  
UPenn  
National Merit Scholarship  
Finalist  
Stuyvesant representative for  
PSAL Baseball Showcase  
National Chinese Honor Society  
Chosen Male Scholar Athlete of  
850 person high school class  
High School Academic Awards  
in Physics, Computer Science,  
Chemistry

## EDUCATION

### Columbia College, Columbia University

Rabi Scholar. CS Major (GPA 3.84, CS GPA 4.17)

2018 - 2023  
(gap year 2020-2021)

Relevant Courses: Parallel Functional Programming - in Haskell  
Fundamentals of Computer Systems - from transistors to modern CPU architecture  
Computer Networks  
Analysis of Algorithms - CLRS taught by the "S" in CLRS (Stein)  
Advanced Programming - UNIX systems programming in C and C++  
CS Theory - models of computation, computability, complexity  
Modern Algebra  
Honors Math - proof-based real analysis and linear algebra

### Stuyvesant High School

97.5 GPA Unweighted. Captain, Varsity Baseball Team

2014 - 2018

## EXPERIENCE

### Compiler Intern at MediaTek (Woburn, MA)

MAY 2020 - PRESENT

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, but over the course of my internship, I developed a framework for making the loop optimization decisions intelligent, improving code performance, and avoiding slow and costly heuristics and offline analysis.

Presented daily to my manager (Stan Kvasov) and weekly to a larger group to show progress of my work through PowerPoint Presentations.

### TA for Columbia College's Analysis of Algorithms (taught by Prof. Clifford Stein)

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

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 Ph.D. student Kexin Pei and Prof. 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.

<https://github.com/kkysen/SmartNeuralFuzzer>

### Fruit Fly Brain Observatory Internship at Columbia University

SUMMER 2017

Collaborated with a research team and independently used parallel programming to model the fruit fly brain and built a robot to model the fruit fly vision system and its motion detection capabilities with one other high school student (under direction of Prof. Aurel Lazar and Dr. Yiyin Zhou).

### Microbiology Internship at Columbia University

SUMMER 2015

Studied the effect of oxygen deprivation on biofilm formation in *Pseudomonas aeruginosa* and *Bacillus subtilis* with 3 other undergrad students (under direction of Prof. Lars Dietrich).

# KHYBER SEN

## INTERESTS

Baseball  
Tennis  
Squash  
Crepe Making  
String Theory  
Quantum Mechanics

## ACTIVITIES

### Fruit Fly Hackathon

Joined a Columbia University sponsored hackathon with other programmers and scientists from around the world. Goal was to explore innovative ways of extending and improving the Fruit Fly Brain Observatory. My 4-person team created a Twitter Bot that automatically replied to tweets querying data about the fruit fly brain to make that data more accessible.

### Two Sigma Workshop

Accepted into a pilot program to study data science and machine learning at Two Sigma. Won 1st place in Two Sigma Data Science Competition for an analysis of UFO sightings.

### Stuy Hacks

Led 4-person team in 24 hours, ~200 person Major League Hackathon. My team created a website that overlaid maps and weather to help travel planning.

### PClassic

Won 1st place in PClassic Programming Competition at University of Pennsylvania

## PROJECTS

### N Queens (Java)

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

### Silicon Scratch (C++17, LLVM, WebAssembly, TypeScript) - in progress

Compile Scratch 2.0 projects to LLVM IR and to WebAssembly for running in the browser.

### Project Schedule Viewer (TypeScript, React, SSR, d3, Express)

View staffing projections from modifiable Excel files as a stacked area graph in the browser, which is filterable, viewable, and scalable at multiple levels. Designed for Handel Architects.

### Flight Delay Visualizer (TypeScript, WebAssembly (C++17), d3)

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.

### TexDBook (TypeScript, React, Python, Flask)

Developed a tracking and borrowing system for textbooks and other books for my high school.

### UFO Tracker (Python)

Analyzed UFO sightings in the US in the last century in relation to overhead airplane traffic.

### Weather or Not (JS)

Developed a website that overlays maps, traffic, weather, and more to better plan your trip.

### Quick Trip (Java, JavaFX)

Designed an automated trip planner that finds the optimal vacation and books the cheapest hotels, flights, and car rentals.

### Scramble (Java, libGdx, rewritten in TypeScript, React)

Invented a simple but fun word unscrambling game made to challenge puzzle-lovers.

### Polybius (TypeScript, React)

Pioneered a Chrome extension that allows the user to define route handlers that will re-route downloads to specific directories or invoke actions based on user-defined filters.