

# XUAN(TOM) ZHAO

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\*All links in this resume are clickable

## EDUCATION

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### Imperial College London, London

September 2019 - June 2023

3rd year Undergraduate at Department of Computing

Obtained First Class Honour in both Year 1 and Year 2

First-year Topics: Logic and Math, Graph and Algorithm I, Relational Database(SQL), Hardware and Computer Architecture, Haskell, Java(Object-Oriented Programming, Multi-threading, JVM, etc.), C/C++

Second-year Topics: Operating System, Model of Computation, Compiler, Software Engineer Design, Algorithm II, Probability and Statistics, Prolog, Network and Communication, Computational Techniques

### San Domenico School, San Francisco, CA

### Cornell University, Ithaca, NY

GPA: 3.50 / 4.00

High School GPA: 3.94/4.00 August 2016 - June 2019

Summer Session

June 2017 - August 2017

## TECHNICAL SKILLS

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<b>Languages</b>	Java, Python, Haskell, C/C++, C#, Swift, Dart, JavaScript, Bash, MySQL, Prolog
<b>Libraries</b>	Python: numpy, matplotlib, pandas, opencv-python. Flutter and React Native Javascript: React.js, jQuery, Jest, Vue.js.
<b>Utilities</b>	Linux, Git, Jenkins, Matlab, VirtualBox, Docker, VSCode, Office, L <sup>A</sup> T <sub>E</sub> X

## ACHIEVEMENTS

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LeetCode Cup 2021 Spring Group Competition National Top 100(Top 3.4%)	2021
LeetCode Cup 2020 Fall Individual Competition National Top 500(Top 4.7%)	2020
Imperial First Year Best Overall C Group Project	2020
Artificial Intelligence Competition China Finalist	2018
Rensselaer Polytechnic Institute STEM Medalist	2018

## WORK EXPERIENCE

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### Arm Ltd. (Ongoing)

June 2021 - Present

*Firmware Engineer in Morello Kernel team*

Remote Intern for the Cambridge Office

- Currently learning about Armv8 ISA and architecture, including Armv8 **Exception Levels**, **Security state** and **TrustZone** technology, **Memory & cache model** and management
- Currently involved in the development of **Morello kernel** related to **CHERI** technology, including writing kernel test cases related to **system calls** and **memory safety**.

### Swift Assist (Part-time)

March 2021 - June 2021

*Frontend & Backend Developer*

Remote Part-time

- Developed company finance management platform for both manager end and employee end. Used **React.js** and **ant design** for frontend development, **flask** for backend framework, **mongodb** for the database and **flask\_restx** as well as **jwt** for login and verification.
- Used **opencv-python** to implement QR code scan feature with high precision.
- Main functionalities include creating form templates, creating form processing procedure, managing employee accounts and bank information, and recording employee expense and compensation status.

### Adaps Photonics

September 2020 - January 2021

*Computer System Engineer & Software Engineer*

Onsite Intern at Shanghai Office

- Finished designing of **Linux driver**(written in **C**) on **96Boards** for the next generation mobile depth sensor/camera, involving **v4l2**, **I2C** drivers in Linux kernel. Designed the DevOps page and CI/CD(**Jenkins**) for all teams.
- Currently developing a sensor manager and integrated it with Android Hardware Abstraction Layer(**HAL**) controlling exposure and data stream of the dToF sensor. Customizing the kernel of Android Open Source Project(**AOSP**) based on **codeaurora**, main objective is to utilize Digital Signal Processor(**DSP**) with Qualcomm **Hexagon** to perform fast computation and design communication between **DSP** and **CPU**.

### Pulse Secure

July 2020 - September 2020

*Software Engineer & UI Testing Engineer*

Remote Intern for the Cambridge Office

- Wrote a syntax transformer/parser in **Python** and **bash** for migrating mocha/chai test cases to **Jest** with **Enzyme**, **reduced 50-day workload into one week**. Wrote a simple test case generator based on component features.
- Used **React.js**, **Storybook**, **Jest**, and **Jenkins** to build and test UI components which will be used across all company products. Used **Google Puppeteer** to perform visual regression testing and integrated with **Jenkins**.
- Tested/created components involving **Javascript asynchronous** callbacks, animation libraries and factories, **React hooks**, **refs**, and **portals**, as well as more complex JS/React structures

## PROJECTS

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### Pintos

Second Year Group Project

*A Simple Operating System implemented Using C*

[github.com/zhao-xuan/pintos\\_45](https://github.com/zhao-xuan/pintos_45)

- Developed a simple operating system with three other group members. Implementation includes a **Round-Robin process scheduler** and a **priority-based scheduler** based on CPU time of each process, the synchronization mechanisms (including **lock**, **semaphore**, and **monitor**).
- Enabled execution/running of **user-space programs** and several standard Unix system calls, such as **file open()** and **close()**.
- Implemented **virtual memory** and page management, including **page allocation**, **copy-on-write** and shared-pages, **memory-mapped files**, and **page swapping** based on **Second-Change algorithm**. All implementations choices related to memory management are original by our team.

### WACC Compiler

Second Year Group Project

*A WACC Language Compiler Implemented Using Java*

<http://blog.tomzhao.me/?p=572>

- Implemented a WACC language compiler capable of generating both **Armv6/Arm11** architecture assembly and **Intel x86-64**. WACC is a simple language whose syntax is like C/Pascal designed for educational purpose.
- Used **ANTLR** tool to generate the language parser and used the generated parser to construct syntax tree, during which **symbol table** is constructed and **syntax and semantic checks** are performed, as well as the generation of error messages if any **syntax or semantic errors** occur.
- The WACC compiler can analyse basic control flows, including **if-else** statement, **for/while** loops, **switch** and **break/continue**. It supports basic, pointer, and **struct** types, as well as functions and **nested functions**. It also supports **import** third party libraries, native **List**, **Map**, and **Set**, **system calls** (**read**, **print**, **exit**, etc.) and **-O1** level compiler optimization.

### ARM11 Emulator/Assembler

First Year C Group Project

*Running four basic types of ARM11 instructions on x86-64 machines*

<http://blog.tomzhao.me/?p=572>

- Built **ARM11 emulator** and **assembler** that support four basic types of **Armv6/ARM11** instruction set.
- Used **function pointer**, macro functions in both emulator and assembler. Implemented a **decoder** to decode binary in emulator. Implemented **hash-table** and **tokenizer** to convert assembly lines to binary codes in assembler.
- Used advanced **Makefile** techniques such as **MMD** flag that drastically reduced bugs and development time. Fully utilized **git** issues/merge requests and other git features for group work.

### Tetris++

First Year C Group Project Extension

*Human Playing Tetris Using Accelerometer Against AI*

[github.com/zhao-xuan/TetrisPlusPlus](https://github.com/zhao-xuan/TetrisPlusPlus)

- Responsible for building the AI using **genetic algorithm** and fine-tuned it for both a conservative AI and a risky AI. Implemented another AI using **reinforcement learning** as well. Used **ncurse** to build the command line interface.
- Implemented **Raspberry Pi** version using C. People can play it using different sensors on an LED screen.

### LinguoMusic

ICHack 2020 Group Project

*A Music Player Helping People Learn New Languages*

[github.com/zhao-xuan/LinguoMusic](https://github.com/zhao-xuan/LinguoMusic)

- Built the scrolling lyric with word-by-word translation interface and player using **React.js**. Used **Netease Music Box** to access music and lyric data. Used **Python** and **jiagu** library to tokenize lyrics and perform word categorization.

### Niched

Second Year Design for Real People Project

*An Interest-based Micro-community Platform*

[github.com/zhao-xuan/Niched-Frontend](https://github.com/zhao-xuan/Niched-Frontend)

- Niched is a web app helping students discover micro-communities within their college. They can create new community/spaces, initiate and organize activities, post text or media and create comments.
- Used **Vue.js** and **Element+** UI library to develop the frontend pages, including using new features in **Vue 3**.
- Used **FastAPI** and **MongoDB** to quickly build backend, including login, register, and verification using **JWT**. Support real-time commenting.

### Igloo App

Part-time Development

*A Social Media Helping People Find Similar Minds*

- Igloo is a social media for students and youngsters to discover new groups and locations with similar interests.
- Used **React Native** to develop the initial version of the frontend, including login/register page, space and channel page, personal account page, find and add friends, etc.
- Used **Flutter** to develop a second version of frontend and wrote a **re-usable UI library**.

### OpenWRT Internet Usage Monitor

Independent Project

*An Add-on for OpenWRT system*

[github.com/zhao-xuan/Openwrt-Internet-Monitor](https://github.com/zhao-xuan/Openwrt-Internet-Monitor)

- Built the frontend with **JavaScript**, **chart.js** and **Bootstrap**. Built the backend with **Python**, **Flask** and **SQLite**.
- It can extract Internet usage information periodically from the OpenWRT router system and visualise it in a webpage.

## CAD Connect

Closed Source Group Project

*A Cloud Collaboration Platform for AutoCAD*

- Designed **RESTful** API. Developed backend using Java with **Spring framework** and **MySQL**. Implemented authentication through **Spring Security** with **JWT**. Helped build frontend using **React.js** and **Ant Design** UI.
- It works like git: User can upload, download, and merge drawings, create and manage projects, as well as track commit history, etc.

## Attenddetector

Independent Project

*A Facial Expression Detector*

*github.com/zhao-xuan/Attenddetector*

- Used **opencv-python** to capture images periodically and crop user faces. Used trained **VGG convolutional neural network** to detect 6 different types of facial expression.
- It can detect the status of users as free or busy

## MIT NuVu Studio: Neural Networks

Team Leader and Programmer

*A Self-driving Robot*

*github.com/zhao-xuan/MITNuVu2018*

- Built a self-driving bot on a Raspberry Pi running Linux.
- Used Python and OpenCV library to implement Hough Transformation to detect any lines and shapes in an image by the PiCamera, programmed motor movements based on detected lines to achieve self-driving.
- Used Convolutional Neural Network to implement object detection by the PiCamera.

## Cornell Summer College Final Project

Independent Project

*An Email System and A Visualised Navigation Map*

*github.com/zhao-xuan/CornellCS2110*

- Constructed an email system using **Java** that allows user to login, logout, register, send, receive, and search emails from different folders.
- Constructed a **directed graph** map that can find the **shortest path** from one node to another. User can add new nodes and edges in the graph.

## Robot 3149

Team Leader and Programmer

*High school robot team for 3 years*

*github.com/zhao-xuan/FTC2019*

- Competed 3 years in First Tech Challenge and used **Java** with FTC libraries to program the robot.
- In the first year, we built a robot that can click beacons using mechanical hand, raise yoga balls to a certain height, and locate particles and carry them to a designated destination.
- In the second year, we added ability to **detect colors** on its rotatable mechanical hand. In the third year, we added a hook that can lift the robot off the ground.

## PERSONAL SKILLS & HOBBIES

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Currently learning Japanese, French, Russian, and Arabic. I'm proficient in **Mandarin (native)**, **English**, and **Japanese (conversational level)**

Playing piano and **accordion**, mountain/road biking, running, badminton.

Traveling, photography, R&B music and movies