Rui Xiang (Steven) Chai

rxchai@uwaterloo.ca
github.com/RuixiangChai

SUMMARY OF QUALIFICATION

- Proficient in Object-Oriented Programming with C++, Python, Java, and Kotlin
- Proficient in TensorFlow Lite and Numpy. Familiar with Keras, TensorFlow, and PyTorch
- Knowledgeable in CNN, RNN, Autoencoder, SVM, Gaussian process, and Bayesian regression
- Experienced in autonomous vehicle and robotics simulation design and development using ROS
- Knowledgeable in SQL query, database design, indexing, query processing, and transactions
- Experienced in Android SDK and NDK, database, distributed system, and OS
- Adept at scripting, Linux environment, Git, and Jupytor Notebook
- Passionate, self-motivated, and independent learner

RESEARCH EXPERIENCE

Undergraduate Research Assistant

Multi-stage Risk-aware Adaptive Authentication and Access Control App — University of Waterloo
Supervised by Prof. Urs Hengartner — Jan. 2021 - April. 2021

- Designed and programmed sensitive widget visibility control, integrated with the server-client sharing-aware access control framework
- Established complex data structure passing using AIDL between the server and the client
- Proposed and developed a friend list mechanism to direct legal visits between friendly apps
- Coded a home button escape prevention mechanism that detects malicious escape and enforces to remain in the active app

Undergraduate Research Assistant

Privacy-preserving Crowd-sensing — Joint by U of Waterloo, Stanford University, U of Cambridge
Supervised by Prof. Srinivasan Keshav — Jan. 2021 - May. 2021

- Integrated multiple TensorFlow Lite models (using MLKit), such as object detection, image labeling, and text recognition, to extract corresponding features for general crowd-sensing tasks
- Hosted ML models on MLKit server and enabled custom model uploading by task creator
- Designed a location and bearing aware validation mechanism (using GMap API) to check the integrity of the collected crowd-sensing data
- Added automated facial masking to conceal sensitive facial images
- Separated a lightweight validator app for easy certification. Added shared databases between apps using Android content provider

Undergraduate Research Assistant

GeoScenario Simulation Development for Autonomous Vehicle — WISE Lab, University of Waterloo
Supervised by Prof. Krzysztof Czarnecki and Michał Antkiewicz — May 2020 - Aug. 2020

- Researched and worked on an interactive agent (car and pedestrian) maneuver model that enables dynamic scenario execution in AV simulators. The agents can be remotely controlled using python scripts
- Coded the Lidar point cloud mixing in UE4 using laser ray trace

Autonomous Vehicle Software Developer

Autonomoose Software Development — WISE Lab, University of Waterloo
Supervised by Prof. Krzysztof Czarnecki and Michał Antkiewicz — Sept. 2019 - Dec. 2019

- Extended mixed-reality simulation by designing and developing a 3D lidar point cloud mixing algorithm in C++
- Implemented the camera sensor simulation in UE4 and fed the camera stream to the simulator core
- Developed time and location-based scenario triggers for the AV simulator
- Benchmarked the simulator's performance by developing a data frequency and age diagnostics logger in ROS
- Accelerated scenario creations by developing a real-world traffic trajectory extractor
- Extended the simulation infrastructures in ROS using publishers and transform library
- Added publishing buffer to compensate for delays in real-time data in mixed-reality simulation

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WORK EXPERIENCE

Machine Learning Research Engineer
May. 2021 - Aug. 2021

Huawei Technologies

- Developed a modified H.264 video decoder on a custom AOSP build that extracts motion vectors and exposes them to Android SDK
- Built the pipeline for custom AOSP development and deployment to Android Studio
- Independently developed Android action recognition app and integrated TensorFlow Lite models that utilize motion vectors and substantially accelerate the inference speed
- Coded scripts to automate video decoding, video frame extraction, and motion vector generation
- Automated video label generation and training/validation data grouping

Machine Learning Research Engineer
Sept. 2020 - Dec. 2020

Huawei Technologies

- Developed Android app for distracted driving behaviour detection
- Built Android live video feed pipeline using Camera2 and integrated TensorFlow Lite models
- Implemented Out-Of-Distribution detection mechanism using entropy and energy score
- Implemented logits buffer for output smoothing and integrated facial localization
- Coded custom post-processing operators such as softmax, sigmoid, and normalization

Software Infrastructure Engineer
May. 2018 - Aug. 2018

Ford Motor Company

- Worked on low-level functionalities of Sync4 infotainment application life cycle manager in C++
- Accelerated system start-up by implementing multi-threads application launching
- Defined application start-up priority groups and revised logic on suspension and termination signals upon shutdown
- Modified and cleaned system logging by creating macros
- Resolved code smells and improved code quality using SonarQube

Software Engineer In Test
Sept. 2017 - Dec. 2017

Finastra Limited

- Accelerated back-end API testing by developing automation and performed 300 test runs
- Developed a UI automation to perform accessibility tests for different UI designs

TECHNICAL PROJECTS

WatDFS A distributed file system with simple file operations

OS161 Implemented concurrency, system calls and process address space

Drawing Pad An interactive drawing software using Swing and AWT

AWARDS AND ACHIEVEMENTS

- Patents in Application — Nov. 2021
  - Co-inventor of the Patent : METHODS AND DEVICES FOR EXTRACTING MOTION VECTOR DATA FROM COMPRESSED VIDEO DATA
  - Co-inventor of the Patent : METHOD, DEVICE, AND MEDIUM FOR ADAPTIVE INFERENCE IN COMPRESSED VIDEO DOMAIN
- President Scholarship of Distinction — Sept. 2016
- Scholarship for Excellence in Math/Science — Sept. 2016 - May. 2021
- Jean Haakoneen Outstanding Mathematics Award (Top scoring student in math courses) — June. 2016

EDUCATION

University of Waterloo — Sept. 2016 - Expected Apr. 2022
Honours Computer Science (Business Option) with Co-operative program — Final-year Average: 87.9%
Statistics Minor — Cumulative Average: 83.08%