

Kaiyuan (Eric) Chen

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RESEARCH INTERESTS

Computer Networks, Cloud Robotics, System Security, Mobile and Ubiquitous Computing, Edge Computing, Data-intensive Systems

EDUCATION

Ph.D in Computer Science

UNIVERSITY OF CALIFORNIA, BERKELEY | Sept 2020 – Present

GPA Overall: 3.8 / 4.0

Bachelor of Science (BS), Computer Science

UNIVERSITY OF CALIFORNIA, LOS ANGELES | July 2016 – June 2020

GPA Overall: 3.95 / 4.0; GPA Major: 3.98 / 4.0

RESEARCH EXPERIENCE

Graduate Research Assistant: Fog Robotics Research Group

UC BERKELEY COMPUTER SCIENCE | Sept 2020 – Present

Project: Paranoid Stateful Lambdas | Advisor: Prof. John Kubiatowicz

- (a) Designed a secure **Function-as-a-Service** execution framework with **Openenclave, Asylo and Kubernetes**
- (b) Implemented **inter-secure enclave communication** protocol with confidentiality, verifiability and provenence
- (c) Designed inter-enclave communication protocol stack with **44x** latency improvement, and an actor-based cryptographic processing pipeline with **81x** throughput improvement

Project: FogROS/FogROS2 | Advisor: Prof. Ken Goldberg and Prof. John Kubiatowicz

- (a) Designed FogROS2 as an extension of **ROS2** and FogROS that enables robotics applications to leverage cloud resources
- (b) Contributed FogROS2 to official ROS2 release and deployed to applications, such as vSLAM, with up to 34x improvement

Research Assistant: Wireless Networking Group

UCLA COMPUTER SCIENCE | Winter 2018 – June 2020

Project: 5G, LTE and Wi-Fi | Advisor: Prof. Songwu Lu

Spearheaded design and implementation across projects:

- (a) high-rate Wi-Fi multicast (Ath9k, Windows, Android, Linux) that improves wireless multicast rate **450 times higher**
- (b) 5G/LTE cross-layer packet dependency analyzer with MobileInsight
- (c) designed and implemented key management and Security for eSIM for 5G

REU Summer Research Assistant

UCLA MATHEMATICS | Spring 2018 – Summer 2018

Project: Classification on Large-scale Lyme Disease Data | Advisor: Prof. Deanna Needell

Proposed dual neural network model for mining the difference between recovered and unrecovered 10,000 Lyme disease patients; Provided interpretable recommendations for unrecovered patients; implemented data mining and classification methods to identify inherent patterns between recovered and unrecovered patient groups' features

PROFESSIONAL EXPERIENCE

Research Intern

VMWARE RESEARCH GROUP | Summer 2022

Project: Certifier for Confidential Computing | Supervisor: Dr. John Manferdelli

Designed and implemented a certifier, a unified certification framework for heterogenous secure enclaves (Intel SGX, TDX, AMD SEV)
Designed and implemented in-enclave multi-party data analytics and motion planning with certifier

Founding Engineer

MOBIQ TECHNOLOGIES INC. | Fall 2018 – June 2020

Project: MobIQ Boosts Deep Learning on Cloud | Supervisor: Dr. Yuanjie Li

Designed and implemented a video streaming and analytic platform (Android, Linux); reduced LTE latency by 50ms and improved deep learning model accuracy by 10% for processing videos on cloud

Project: LTE Target Advertising

Designed and implemented a target advertisement platform to low-latency high-speed network access to improve 30% advertising revenue for outdoor billboard advertisers; contributed to a provisional patent contribution

Program: NSF Innovation Corps Program

Served as Entrepreneur Lead during interviews for an NSF funded program to bridge prior demos with emerging products and reached more than 100 potential customers in 6-weeks

Project Consultant and Leading Software Developer

BOTECH LTD | Winter 2018 – June 2020

Project: Smart City Video Analytics Platform

Designed and implemented deep learning modules (e.g., multi-object detection; monitor quality, human pose checks) to aid decision making of law enforcers; implemented body camera management system and deployed over 100 workstations

Project: Automatic Medical Examination Machine

Designed and implemented deep learning modules—checked hand completion and eye shading; used by provincial DMVs and schools (100s)

Software Engineer Intern

SIEMENS LTD | Summer 2017

Project: Industrial Data Anomaly Detection | Supervisor: Dr. Wenchao Wu

Proposed a dynamic Bayesian model for real-time high dimensional industrial data anomaly detection; deployed various clustering approaches for time-series industrial data; deployed anomaly detection algorithms for a refinery with 3,000 IoT sensors.

PUBLISHED WORKS

Conference Papers

- [1] Jeffrey Ichnowski*, **Kaiyuan Chen***, Karthik Dharmarajan, Simeon Adebola, Michael Danielczuk, Victor Mayoral-Vilches, Nikhil Jha, Hugo Zhan, Edith LLontop, Derek Xu, John Kubiawicz, Ion Stoica, Joseph Gonzalez, Ken Goldberg. "FogROS 2: An Adaptive and Extensible platform for Cloud and Fog robotics using ROS 2." In Proc. IEEE Int. Conf. Robotics and Automation (ICRA) 2023.
- [2] **Kaiyuan Chen**, Yafei Liang, Nikhil Jha, Jeffrey Ichnowski, Michael Danielczuk, Joseph Gonzalez, John Kubiawicz, and Ken Goldberg. "FogROS: An Adaptive Framework for Automating Fog Robotics Deployment." In 2021 IEEE 17th International Conference on Automation Science and Engineering (CASE), pp. 2035-2042. IEEE, 2021.
- [3] Yunqi Guo, Zhaowei Tan, **Kaiyuan Chen**, Songwu Lu and Ying-Nian Wu. "A Model Obfuscation Approach to IoT Security" In IEEE Conference on Communications and Network Security (CNS), 2021
- [4] **Kaiyuan Chen** and Jinghao Zhao. "Skip The Question You Don't Know: An Embedding Space Approach". In: *International Joint Conference on Neural Network (IJCNN)*. Budapest, Hungary, June 2019.
- [5] Jinghao Zhao, **Kaiyuan Chen**, Zengwen Yuan, and Songwu Lu. Intelligent Wi-Fi Multicast for NDN AR. Information-Centric Networking in Wireless Edge Networks(ICN WEN) Workshop. July 2019
- [6] **Kaiyuan Chen**, Jingyue Shen, and Fabien Scalzo. "Skull Stripping Using Confidence Segmentation Convolution Neural Network". In: *International Symposium on Visual Computing (ISVC)*. Las Vegas, US, Nov. 2018.
- [7] Wenchao Wu, Yixian Zheng, Kaiyuan Chen, Xiangyu Wang, and Nan Cao. "A Visual Analytics Approach for Equipment Condition Monitoring in Smart Factories of Process Industry". In: IEEE PacificVis Conference (PacificVis). Kobe, Japan, Apr.

Posters and Presentations

- [1] Jinghao Zhao, **Kaiyuan Chen**, Zengwen Yuan, and Songwu Lu. Intelligent Wi-Fi Multicast for NDN AR. Information-Centric Networking in Wireless Edge Networks(ICN WEN) Workshop. July 2019
- [2] **Kaiyuan Chen**, Rong Huang, Diyi Liu, Catherine Wahlenmayer, Jiewen Wang, and Deanna Needell. *Classification of Large-Scale Lyme Disease Data*. Poster and abstract in *Joint Mathematics Meeting (JMM) by Mathematical Association of America*. Baltimore, Jan. 2019.

Patents

- [1] **Kaiyuan Chen**, Yuanjie Li, Songwu Lu, Zhaowei Tan, Jinghao Zhao. *Optimizing the wireless-powered outdoor target advertising*. 18-Nov 2019, 62/937,037
- [2] **Kaiyuan Chen** and Benqiang Wang. *High-resolution Omnipotent Video Codec*. ZL 2015 2 0197947.6.

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SERVICES

Conference Reviewer for

2022 IEEE RSJ International Conference on Intelligent Robots and Systems (IROS)

2023 International Conference on Robotics and Automation (ICRA)

HONORS

Dean's List

UNIVERSITY OF CALIFORNIA, LOS ANGELES | 2016 – 2020

Honor Society membership

UPSILON PI EPSILON (UPE) | 2017 – 2020

Innovation-Corps Grant \$25,000

NATIONAL SCIENCE FOUNDATION (NSF) | 2019

Latin Honor *summa cum laude* track

UNIVERSITY OF CALIFORNIA, LOS ANGELES | 2019

Highest Distinction

INTERNATIONAL EUCLID MATHEMATICS CONTEST | 2017

OTHER PROJECTS

Sampling with Original Data

UNIVERSITY OF CALIFORNIA | Fall 2018

Designed a novel and simple approach using Spatial Transformer architecture to encode an image from original pixels—leveraged positional information and denoising autoencoder (DAE) scheme; **Achieved 97% MNIST classification accuracy with 4% sampling rate**; of 784 pixels, a selection of 37 pixels encode the MNIST dataset

ClassUCLA

UNIVERSITY OF CALIFORNIA | Fall 2017 – June 2020

Automated UCLA class open seating to notified users in terms of class availability or satisfied requirement (Twilio SMS, MySQL, Google Cloud API) **ClassUCLA active users = 1,000+**; user numbers continue to grow