Kaiyuan (Eric) Chen

2949 King St | Berkeley 94703 | (424) 535-6503 | kych@berkeley.edu

RESEARCH INTERESTS

Cloud Robotics, Computer Networks, 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*: 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*

***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*

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 — **BOSCH RESEARCH** | Summer 2024

***Project*: FogROS2- | Supervisor: Christian Juette**

Designed and implemented a reliable cloud robotics routing system that empower robot to leverage multiple network interfaces to improve reliability

Research Intern — **BOSCH RESEARCH** | Summer 2023

***Project*: FogROS2-Latency Sensitive | Supervisor: Dr. Nan Tian**

Designed and implemented a A Location-Independent Fog Robotics Framework for Latency Sensitive ROS2 Applications (ICRA 2024)

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 mutli-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 Consultor 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] **Kaiyuan Chen**, Kush Hari, Rohil Khare, Charlotte Le, Trinity Chung, Jaimyn Drake, Jeffrey Ichnowski, John Kubiatowicz, and Ken Goldberg. “FogROS2-Config: A Toolkit for Choosing Server Configurations for Cloud Robotics”. In Proc. IEEE Int. Conf. Robotics and Automation (ICRA) 2024

[2] **Kaiyuan Chen**, Michael Wang, Marcus Gualtieri, Nan Tian, Christian Juette, Liu Ren, Jeffrey Ichnowski, John Kubiatowicz and Ken Goldberg. FogROS2-LS: A Location-Independent Fog Robotics Framework for Latency Sensitive ROS2 Applications. In Proc. IEEE Int. Conf. Robotics and Automation (ICRA) 2024.

[3] Adam Rashid*, Chung Min Kim*, Justin Kerr*, Letian Fu, Kush Hari, Ayah Ahmad, **Kaiyuan Chen**, Huang Huang, Marcus Gualtieri, Michael Wang, Christian Juette, Nan Tian, Liu Ren, Ken Goldberg. Lifelong LERF: Local 3D Semantic Inventory Monitoring Using FogROS2. In Proc. IEEE Int. Conf. Robotics and Automation (ICRA) 2024.

[4] **Kaiyuan Chen**, Ryan Hoque, Karthik Dharmarajan, Edith LLontop, Simeon Adebola, Jeffrey Ichnowski, John Kubiatowicz, Ken Goldberg “FogROS2-SGC: A ROS2 Cloud Robotics Platform for Secure Global Connectivity” In Proc. IEEE Int. Conference On Robotics and Systems (IROS) 2023

[5] Jeffrey Ichnowski*, **Kaiyuan Chen***, Karthik Dharmarajan, Simeon Adebola, Michael Danielczuk, Vıctor Mayoral-Vilches, Nikhil Jha, Hugo Zhan, Edith LLontop, Derek Xu, John Kubiatowicz, 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.

[6] **Kaiyuan Chen**, Yafei Liang, Nikhil Jha, Jeffrey Ichnowski, Michael Danielczuk, Joseph Gonzalez, John Kubiatowicz, 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.

[7] 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

[8] **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.

[9] 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

[10] **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.

[11] 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] Alex Thomas, Shuhbam Mishra, Kaiyuan Chen, John Kubiatowicz. Paranoid Stateful Lambdas. In: Symposium on Operating Systems Principles (SOSP) 2023, Poster, August 2023

[2] 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

[3] **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.

SERVICES

Leading Workshop/Tutorial Organizer for
Cloud and Fog Robotics: A Hands-on Tutorial with ROS2 and FogROS2 (ICRA 2024)

Conference Reviewer for
2024 IEEE RSJ International Conference on Intelligent Robots and Systems (IROS)
2024 IEEE 17th International Conference on Automation Science and Engineering (CASE)
2024 International Conference on Robotics and Automation (ICRA)
2023 International Conference on Robotics and Automation (ICRA)
2022 IEEE RSJ International Conference on Intelligent Robots and Systems (IROS)

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