

Zengwen Yuan

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Research Interests

Next-gen low-latency mobile networks (5G/IoT), mobile system security, cloud computing

Education

- **Ph.D. candidate**, Computer Science All But Dissertation, 2021
University of California, Los Angeles, CA, United States
Emphasis: Networked Systems, Mobile Security
Advisor: Prof. Songwu Lu
- **M.S.**, Computer Science 2017
University of California, Los Angeles, CA, United States
Project: *Demystifying Multi-Carrier Access in Google Project Fi*
- **B.S.**, Information Engineering (with Honors) 2015
Shanghai Jiao Tong University, Shanghai, China
Thesis: *The Design and Implementation of an Academic Search System*

Awards

- UCLA Dissertation Year Fellowship 2019
- ACM MobiCom 2017 Best Community Paper Award 2017
- ACM MobiCom 2016 Best Community Paper Award 2016
- National Science Foundation (NSF) Student Travel Grant 2016, 2018
- Outstanding Graduates of Shanghai Jiao Tong University 2015

Grants

- National Science Foundation (NSF) SBIR Phase-I Grant (\$225,000) 2019
- National Science Foundation (NSF) I-Corps™ Grant (\$25,000) 2018

Experience

- **University of California, Los Angeles** 2015 — 2021
Graduate Student Researcher
 - Studied Rich Communication Services security loopholes and showed proof-of-concept attacks

- Analyzed inter-carrier switching policy conflicts in multi-carrier access and its adopter Google Fi
 - New platform designs for low-latency mobile network: DPCM for 4G LTE and Tick SDR for 802.11ac
 - Core contributor of [MobileInsight](#), a runtime mobile network analytics tool used by 268 universities
 - Measurement study of web access latency in 4G LTE networks through 4 million cellular traces
 - Prototyped a mobile Hadoop platform that runs on smartphones with Wi-Fi Direct
 - Devised a proof-of-concept attack on VoLTE signaling bearer using ICMP tunneling
- **MobIQ Technologies, Inc.** 2018 – 2019
Lead Software Engineer
 - Developed and patented a mobile gaming latency reduction solution (1 pending US patent)
 - Lead and oversaw the in-SIM network optimization for smart IoT devices
 - Cooperated with two of the top-five global phone vendors (Xiaomi & Vivo) for integration
 - Conducted 102 customer interviews in 7 weeks in NSF I-Corps™ incubator phase
 - **IBM T. J. Watson Research Center** Summer 2016
Cognitive Computing Research Intern. Manager: Dr. Petros Zerfos
 - Cloud metrics prediction for cloud analytics in IBM Watson IoT platform (1 pending US patent)
 - Adapted Long Short Term Memory for dependency analysis among multivariate time series
 - **Shanghai Jiao Tong University** 2013 – 2015
Undergraduate Research Intern. Supervisor: Prof. Xinbing Wang
 - Founding technical lead of [AceMap](#), a system dedicated to visualize academic relations
 - Built a phase-coherent 8×8 cooperative MIMO relay system using 16 USRPs
 - Proposed a spectrum sharing algorithm for cognitive radio using MIMO testbed

Publications

CONFERENCE PAPERS

- **Zengwen Yuan**, Qianru Li, Yuanjie Li, Songwu Lu, Chunyi Peng and George Varghese. “[Resolving Policy Conflicts in Multi-Carrier Cellular Access](#)”, *ACM MobiCom 2018*
- **Zengwen Yuan**, Yuanjie Li, Chunyi Peng, Songwu Lu, Haotian Deng, Zhaowei Tan and Taqi Raza. “[A Machine Learning Based Approach to Mobile Network Analysis](#)”, *IEEE ICCCN 2018*
- Yuanjie Li, **Zengwen Yuan** and Chunyi Peng. “[A Control-Plane Perspective on Reducing Data Access Latency in LTE Networks](#)”, *ACM MobiCom 2017*
- Syed Yousaf Shah, **Zengwen Yuan**, Songwu Lu and Petros Zerfos. “[Dependency Analysis of Cloud Applications for Performance Monitoring using Recurrent Neural Networks](#)”, *IEEE BigData 2017*
- Haoyang Wu, Tao Wang, **Zengwen Yuan**, Chunyi Peng, Zhiwei Li, Zhaowei Tan, Boyan Ding, Xiaoguang Li, Yuanjie Li, Jun Liu and Songwu Lu. “[The Tick Programmable Low-Latency SDR System](#)”, *ACM MobiCom 2017 (Best Community Paper Award)*
- Haotian Deng, Qianru Li, Yuanjie Li, Songwu Lu, Chunyi Peng, Taqi Raza, Zhaowei Tan, **Zengwen Yuan** and Zhehui Zhang. “[Towards Automated Intelligence in 5G Systems](#)”, *IEEE ICCCN 2017*
- Yuanjie Li, Chunyi Peng, **Zengwen Yuan**, Jiayao Li, Haotian Deng and Tao Wang. “[MobileInsight: Extracting and Analyzing Cellular Network Information on Smartphones](#)”, *ACM MobiCom 2016 (Best Community Paper Award)*

- Yuanjie Li, Haotian Deng, Chunyi Peng, **Zengwen Yuan**, Guan-Hua Tu, Jiayao Li and Songwu Lu. “[iCellular: Device-Customized Cellular Network Access on Commodity Smartphones](#)”, *USENIX NSDI 2016*
- Yuanjie Li, **Zengwen Yuan**, Chunyi Peng and Songwu Lu. “[CAP on Mobility Control for 4G LTE Networks](#)”, *ACM HotWireless 2016*
- Guan-Hua Tu, Chi-Yu Li, Chunyi Peng, **Zengwen Yuan**, Yuanjie Li, Xiaohu Zhao and Songwu Lu. “[VoLTE*: A Lightweight Voice Solution to 4G LTE Networks](#)”, *ACM HotMobile 2016*
- Chi-Yu Li, Guan-Hua Tu, Chunyi Peng, **Zengwen Yuan**, Yuanjie Li, Songwu Lu and Xinbing Wang. “[Insecurity of Voice Solution VoLTE in LTE Mobile Networks](#)”, *ACM CCS 2015*
- Chao Kong, **Zengwen Yuan**, Xushen Han, Xinbing Wang, Feng Yang, Tao Wang, and Songwu Lu. “[VSMC MIMO: A Spectral Efficient Scheme for Cooperative Relay in Cognitive Radio Networks](#)”, *IEEE INFOCOM 2015*

JOURNAL ARTICLES

- Yuanjie Li, Haotian Deng, Chunyi Peng, **Zengwen Yuan**, Guan-Hua Tu, Jiayao Li, Songwu Lu and Xi Li. “[Device-Customized Multi-Carrier Network Access on Commodity Smartphones](#)” *IEEE/ACM Transactions on Networking (ToN)*, vol. 26, no. 6, pp. 2542–2555, Dec. 2018.
- Haoyang Wu, Tao Wang, **Zengwen Yuan**, Chunyi Peng, Zhiwei Li, Zhaowei Tan, Boyan Ding, Yuanjie Li, Jun Liu and Songwu Lu. “[The Tick Programmable Low-Latency SDR System](#)” *GetMobile: Mobile Computing and Communications*, vol. 22, no. 1, pp. 26–30, Mar. 2018.
- Yuanjie Li, Chunyi Peng, **Zengwen Yuan**, Haotian Deng, Jiayao Li and Tao Wang. “[MobileInsight: Analyzing Cellular Network Information on Smartphones](#)” *GetMobile: Mobile Computing and Communications*, vol. 21, no. 1, pp. 39–42, Mar. 2017.
- Joshua Joy, Eric Chung, **Zengwen Yuan**, Jiayao Li, Leqi Zou and Mario Gerla. “[DiscoverFriends: secure social network communication in mobile ad hoc networks](#)” *Wireless Communications and Mobile Computing*, vol. 16, no. 11, pp. 1401–1413, July 2017.

DEMONSTRATION

- Yuanjie Li, Haotian Deng, Yuanbo Xiangli, **Zengwen Yuan**, Chunyi Peng and Songwu Lu. “[Demo: In-device, Runtime Cellular Network Information Extraction and Analysis](#)”, *ACM MobiCom 2016*

US Patents

- Yuanjie Li, **Zengwen Yuan**, Jinghao Zhao, Songwu Lu. “[Methods, systems, apparatuses and devices for facilitating optimizing of a network connection established between the device and one or more servers](#)”, US patent application number: US20210112509A1, Apr. 2021, under review.
- Syed Yousaf Shah, **Zengwen Yuan**, Petros Zerfos. “[Learning dependencies of performance metrics using recurrent neural networks](#)”, US patent application number: US20180300621A1, Oct. 2018, under review.

Invited Talks

- **November 2018**: “Resolving Policy Conflicts in Multi-Carrier Cellular Access”, ACM MobiCom 2018, New Delhi, India

- **May 2018:** “Toward Next-Gen Low Latency Mobile Networks”, Third SJTU Future Information Technology International Forum for Young Scholars, Shanghai Jiao Tong University, Shanghai, China
- **October 2017:** “The Tick Programmable Low-Latency SDR System”, ACM MobiCom 2017, Snowbird, Utah

Tools and Systems

- **MobileInsight:** A cross-platform software that collects, analyzes and exposes runtime cellular network information which was inaccessible outside mobile basebands. MobileInsight runs on smartphones/IoT devices and does not require extra hardware or support from operators. It sheds light on cellular network research and is used by researchers from more than 260 universities to date.
Project URL: <http://mobileinsight.net>
- **Tick SDR:** A new SDR system that provides good programmability and ensures low latency at both PHY and MAC. Tick SDR supports modular design and element-based programming. It achieves real-time requirement for 802.11ac SISO/MIMO and 802.11a/g full-duplex.
Project URL: <http://metro.cs.ucla.edu/tick.html>
- **Multi-hop Wi-Fi Direct:** A pure Wi-Fi-based multi-hop implementation. It allows Android phones to form and manage ad hoc networks, without requiring external access point nor Bluetooth.
Project URL: <https://wing1.cs.ucla.edu/gitlab/zyuan/multihop-wifidirect-pub>
- **AceMap:** An academic search and recommendation system built to visualize scholarly collaboration, research topic evolution and more. As the founding member and team leader, I built the initial system from scratch for my undergraduate thesis.
Project URL: <http://acemap.sjtu.edu.cn>

Teaching Experience

- CS 211: Network Protocol and Systems Software Design for Wireless and Mobile (graduate course), UCLA Computer Science, Teaching Associate – Fall 2017.
- CS 118: Computer Networks Fundamentals, UCLA Computer Science, Teaching Fellow – Spring 2019, Teaching Associate – Spring 2018, Winter 2018, Spring 2017, Winter 2017.
- CS M51A: Logic Design of Digital Systems, UCLA Computer Science, Teaching Fellow – Fall 2020.
- CS 31: Introduction to Computer Science I, UCLA Computer Science, Teaching Assistant – Fall 2016.

Professional Services

- Guest editor for ACM Crossroads (XRDS) magazine
- Reviewer for IEEE Journal on Selected Areas in Communications (JSAC)
- Reviewer for IEEE/ACM Transactions on Networking (ToN)
- Reviewer for IEEE Internet of Things Journal
- Scholarship reviewer for UCLA Engineering