

Shanhe Yi (Fifth-year Ph.D. student)

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Education **Ph.D. in Computer Science** May, 2018(exepcted)
 College of William and Mary (W&M) Virginia, USA

M.S. in Communication and Information System 2013
Huazhong University of Science and Technology (HUST) Wuhan, China

B.Eng. in Communication Engineering 2010
Huazhong University of Science and Technology (HUST) Wuhan, China

Research Interests My research interests focus on the design and implementation of systems in the broad area of mobile/wearable computing and edge computing, with the emphasis on techniques that improve the usability, security and privacy of the applications and systems.

Awards & Honors ACM/IEEE SEC Student Travel Grant Award, 2016, 2017
 IEEE ICDCS Student Travel Grant Award, 2017
 IEEE INFOCOM Best-in-Session Presentation Award, 2016
 IEEE INFOCOM Student Travel Grant Award, 2016
 W&M Student Leadership Development Conference Funds, 2016
 W&M Arts & Sciences Graduate Research Excellence Honorable Mention, 2016
 W&M Arts & Sciences Graduate Research Grant/Conference Funds, 2014,2016,2017
 HUST Scholarship of Graduate Student 2010, 2011, 2012
 HUST Merit Student 2011, 2012
 HUST Graduate with Distinction 2010

Publications **LAVEA: Latency-aware Video Analytics on Edge Computing Platform**

Shanhe Yi, Zijiang Hao, Qingyang Zhang, Quan Zhang, Weisong Shi, Qun Li
2nd ACM/IEEE Symposium on Edge Computing (SEC'17), San Jose, CA, October 12-14, 2017.

Efficient Service Handoff Across Edge Servers via Docker Container's Migration

Lele Ma, Shanhe Yi, and Qun Li
2nd ACM/IEEE Symposium on Edge Computing (SEC'17), San Jose, CA, October 12-14, 2017.

WearLock: Unlocking Your Phone via Acoustics using Smartwatch

Shanhe Yi, Qun Li, Zhengrui Qin, and Nancy Carter
37th IEEE International Conference on Distributed Computing (ICDCS'17), Atlanta, GA, June 5-8, 2017. Acceptance rate: 16.9% (90/531)

Poster: **LAVEA: Latency-aware Video Analytics on Edge Computing Platform**

Shanhe Yi, Zijiang Hao, Qingyang Zhang, Quan Zhang, Weisong Shi, Qun Li
37th IEEE International Conference on Distributed Computing (ICDCS'17), Atlanta, GA, June 5-8, 2017.

Challenges and Software Architecture for Fog Computing

Zijiang Hao, Ed Novak, Shanhe Yi, and Qun Li
IEEE Internet Computing (IC'17), vol. 21, no. 2, pp. 44-53, Mar.-Apr. 2017.

GlassGesture: Exploring Head Gesture Interface of Smart Glasses

Shanhe Yi, Zhengrui Qin, Ed Novak, Yafeng Yin, and Qun Li
35th IEEE International Conference on Computer Communications
(**INFOCOM'16**), San Francisco, CA, April 2016. Acceptance rate: 18% (300/1644)

Poster: **GlassGesture: Exploring Head Gesture Interface of Smart Glasses**

Shanhe Yi, Zhengrui Qin, Ed Novak, Yafeng Yin, and Qun Li
2016 IEEE Conference on Computer Communications Workshops
(**INFOCOM WKSHPs'16**), San Francisco, CA, April 2016.

AMIL: Localizing Neighboring Mobile Devices Through Simple Gesture

Hao Han, Shanhe Yi, Qun Li, Shen Guobin, Yunxin Liu, and Ed Novak
35th IEEE International Conference on Computer Communications
(**INFOCOM'16**), San Francisco, CA, April 2016. Acceptance rate: 18% (300/1644)

Poster: **AMIL: Localizing Neighboring Mobile Devices Through Simple Gesture**

Hao Han, Shanhe Yi, Qun Li, Shen Guobin, Yunxin Liu, and Ed Novak
2016 IEEE Conference on Computer Communications Workshops
(**INFOCOM WKSHPs'16**), San Francisco, CA, April 2016.

CamK: A Camera-based Keyboard for Small Mobile Devices

Yafeng Yin, Qun Li, Lei Xie, Shanhe Yi, Ed Novak, and Sanglu Lu
35th IEEE International Conference on Computer Communications
(**INFOCOM'16**), San Francisco, CA, April 2016. Acceptance rate: 18% (300/1644)

Fog Computing: Platform and Applications

Shanhe Yi, Zijiang Hao, Zhengrui Qin, and Qun Li
3rd IEEE Workshop on Hot Topics in Web Systems and Technologies
(**HOTWEB'15**), Washington, D.C., USA, November 12-13, 2015.

Security and Privacy Issues of Fog Computing: A Survey

Shanhe Yi, Zhengrui Qin, and Qun Li
10th International Conference on Wireless Algorithms, Systems, and Applications
(**WASA'15**), Qufu, China, August 10-12, 2015.

A Survey of Fog Computing: Concepts, Applications, and Issues

Shanhe Yi, Cheng Li, and Qun Li
ACM Workshop on Mobile Big Data (in conjunction with Mobihoc 2015)
(**MOBIDATA'15**), Hangzhou, China, June 21, 2015.

Preserving Secondary Users' Privacy in Cognitive Radio Networks

Zhengrui Qin, Shanhe Yi, Qun Li, and Dmitry Zamkov
33rd IEEE International Conference on Computer Communications
(**INFOCOM'14**), Toronto, Canada, April 2014. Acceptance rate: 19% (320/1645)

Secondary User Monitoring in Unslotted Cognitive Radio Networks with Unknown Models

Shanhe Yi, Kai Zeng, and Jing Xu
The 7th International Conference on Wireless Algorithms, Systems, and Applications
(**WASA'12**), Yellow Mountains, Anhui, China, August 8-10, 2012.

Submitted

Shanhe Yi, Yunlong Mao, Qun Li, Fengyuan Xu, Sheng Zhong. Privacy-preserving Gesture Recognition for Mobile Devices

Shanhe Yi, Zequn Huang, Hui Zeng, and Qun Li. Flow based Anomaly Detection for Advanced Persistent Threats

Zijiang Hao, Shanhe Yi, and Qun Li. EdgeEngine: An Efficient and Customizable Framework for Edge Computing

Yunlong Mao, [Shanhe Yi](#), Qun Li, Jinghao Feng, Fengyuan Xu, Sheng Zhong. Privacy-Preserving Face Recognition with Differentially Private Deep Convolutional Neural Networks
Cheng Li, Zijiang Hao, [Shanhe Yi](#), Qun Li. Coordinating Distributed Controllers in Reliable and High Throughput Software-Defined Networks

Yutao Tang, Zhengrui Qin, [Shanhe Yi](#), and Qun Li. Virtual Machine Migration on Smartphone for IoT Applications

Yutao Tang, Yue Li, Zhiqiang Lin, [Shanhe Yi](#), Qun Li, Fengyuan Xu. Executing Mobile Apps Transparently Through Untrusted OS: A Virtualization-Based Approach

Yafeng Yin, Qun Li, Lei Xie, [Shanhe Yi](#), Ed Novak, Sanglu Lu. CamK: Camera-based Keystroke Detection and Localization for Small Mobile Devices

Research Projects

- **Latency-aware Video Analytics on Edge Computing Platform** 2017
Designed and implemented an event-based video/image processing system, offloading computations to nearby computing nodes in a dockerized environment. Utilized a serverless architecture as each application is partitioned into cloud functions based on its tasks graph. Client-edge configuration realized a speedup on response time up to 4x against running in local.
- **Privacy-Preserving Face Recognition with Differentially Private Deep Convolutional Neural Networks** 2017
Implemented privacy-preserving deep learning VGG-face network training framework between a mobile client and a remote cloud server.
- **Acoustic-based Unlocking of Smartphone via Smartwatch** 2016
Proposed a novel unlocking scheme for smartphone with smartwatch, utilizing acoustics tokens. Built an efficient and highly customizable OFDM acoustic modem on Android from scratch. Implemented computation offloading for computation speedup and energy save. Leveraged motion sensor data similarities to reduce unlocking frequency. Achieved 8% bit error rate on acoustic OTP, and at least 18% speedup in unlocking without entering PINs.
- **Privacy-preserving Gesture Recognition for Mobile Devices** 2015
Proposed a novel template matching algorithm via secure computing without the disclose of inputs. Implemented the protocol and crypto primitives (oblivious transfer, OT-Extension, Paillier cryptosystem) in Java. Outperformed the state-of-the-art by a factor of 10 in time cost, and a factor of 4 in comm. cost.
- **Head Gesture Recognition and Authentication on Google Glass** 2015
Proposed a weighted dynamic time warping algorithm, achieved a gesture recognition accuracy near 96%. Proposed a novel similarity search scheme that reduces the time cost of template matching by 55%. Collected and analyzed 6000 samples from 18 users for feature selection. Applied one-class ensemble SVM classifier for authentication which accept 92% authorized users, and reject 99% attackers.
- **Motion-induced Acoustic-based Indoor Localization using Smartphones** 2014
Implemented an indoor acoustic localization system using speakers and microphones of Android smartphones.
- **A Zero-Knowledge Billing Scheme for DySPANs** 2013
Implemented a zero-knowledge proof system for privacy-preserving billing for secondary users accessing DSA networks.

Professional Experience

VMware Palo Alto, CA
Member of Technical Staff Intern Jun. 2017 - Sept. 2017
Built an NSX management tool with Conversational User Interface as a full stack engineer to simplify SDN network management. (JavaScript/Python, Actions on Google SDK, Postgres, GraphQL) Proposed and extended the Actions on Google SDK with a new enterprise CUI framework with alarm and notification support, efficient CUI programming, and converting

enterprise tasks into conversations Applied modular state machine based dialog state management scheme to construct task-oriented conversation. Project received multiple attentions from inside. Poster ranked 17/133 among all Palo Alto interns.

Intelligent Automation, Inc.

Rockville, MD

Research Intern (Network Security)

Jun. 2016 - Aug. 2016

Built machine learning classifiers on NetFlow data characterizing traffic behavior of botnet. Applied plateau detection algorithm to classifier output to reduce false positives rate and then generate alerts. Performed aggregation and correlation analysis on alerts to form attack scenarios.

Teaching

Instructor:

- CS304 Computer System Fall 2016 (Substitute lecturer)
- CS131 Concepts of Computer Science Spring 2014

Teaching Assistant:

- CS141 Computational Problem Solving Fall 2014
- CS304 Computer System Fall 2013
- CS131 Concepts of Computer Science Spring 2013

Professional Activities

Conference/Workshop Reviewer:

- IEEE/ACM SEC, 2016, 2017
- IEEE INFOCOM, 2014, 2015, 2016, 2017, 2018
- IEEE GLOBECOM, 2015, 2016, 2017
- IEEE CNS, 2014, 2015, 2016, 2017
- IEEE SoftCOM, 2016
- IEEE/ACM IWQoS, 2015
- IEEE ICNP, 2015
- IEEE ICDCS, 2013, 2017
- IEEE ICSC, 2013

Journal Reviewer:

- IEEE Transactions on Wireless Communications
- IEEE Transaction on Parallel and Distributed Systems
- IEEE Transactions on Services Computing
- IEEE Wireless Communications
- KSII Transactions on Internet and Information Systems
- Sustainable Computing: Informatics and Systems
- Wireless Communications and Mobile Computing

Miscellaneous:

- HOTWEB2017 webchair

Computer Skills

Languages: Java, Python, JavaScript, C/C++, Shell Scripting, HTML, Matlab, SQL, JSON, YAML

Dev.: Android/Wear SDK, Node, Git, Kafka, Zookeeper, Redis, Docker, Tensorflow, Deeplearning4j, Design Pattern