

## Cover Letter

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December 16, 2015

Dear Committee Members,

I wish to apply for the tenure track assistant faculty position in the Department of Electrical Engineering and Computer Science at University of Michigan Ann Arbor. Currently, I am a PhD candidate at University at Buffalo - SUNY in the Department of Computer Science and Engineering under the supervision of Dr. Kui Ren.

During my PhD study, my primary research topic is exploring the novel ideas and techniques to solve practical problems and security issues for mobile sensing and cyber physical systems. In the context of mobile sensing systems, I am interested in smartphone-enabled crowdsourcing approaches that can help build large-scale information infrastructures conveniently at a very low cost. I also study cyber-physical system security from the physical layer, leveraging various related characteristics to enable inherently secure and dependable wireless communications. My research made important contributions in the cyber-physical research community and have been published in several highly selective research venues on sensor and sensor-enable smart systems. As for a research agenda immediately after my PhD, I will focus on two hot topics in the cyber-physical domain: mobile crowdsourcing system and sensor-assisted mobile authentication system. My ultimate goal is to explore untapped challenges brought by emerging technologies and investigate novel ideas and techniques to tackle practical problems for today's and tomorrow's cyber physical systems.

As a graduate student, I was very fortunate to have valuable opportunities to teach and mentor students, and I enjoyed them immensely. As my teaching statement indicates, my teaching roles have included teaching assistant, guest lecturer, and mentor. I feel confident about lecturing courses in areas of cyber physical system, smartphone sensing, cloud computing system, smartphone security, and applied cryptography. I feel excited about the opportunity to mentor great graduate students. My ultimate goal is to foster their diverse talents and strengths and guide them on the way to become self-motivated leading researchers. Enclosed are my curriculum vitae. Teaching and research statements and letters of recommendation are being sent under separate cover, and if desired, I would be happy to provide documents in support of my application. Please do not hesitate to contact me if further information is needed.

Sincerely yours,

Si Chen  
Department of Computer Science  
and Engineering  
University at Buffalo - SUNY  
301 Davis Hall, Buffalo NY  
(716) 335-8052

# Si Chen

Email schen23@buffalo.edu  
Web <http://ubisec.cse.buffalo.edu/sichen.html>  
Address 4285 Chestnut Ridge Road, Apt 1-D, Buffalo, NY  
Phone (716)-335-8052

## HIGHLIGHTS

- Strong research background in cyber-physical system security, security and privacy on smart wearable device, mobile security, cloud-assisted mobile sensing and wireless system.
- Active involvement in the preparation and development of grant proposals submitted to different government agencies and companies, such as NSF and MSR.
- Experience in teaching and mentoring both undergraduate and graduate students
- Experience in research collaboration in multicultural environments

## RESEARCH INTERESTS

My research interests include cyber-physical system security, wireless system and smartphone-enabled crowdsourcing system, with current focus on exploring and improving the cloud-assisted mobile sensing security.

## TEACHING INTERESTS

I feel confident about lecturing courses in areas of cyber-physical system security, computer architecture, advanced computer network, cloud computing security, smartphone security, smartphone sensing, and applied cryptography. I am also interested in contributing to new courses and seminars related to security and privacy on smart wearable device, mobile wireless security and crowdsensing system.

## EDUCATION

- **University at Buffalo - SUNY, Buffalo, NY, USA**  
Ph.D. Candidate in Computer Science and Engineering, starting from August 2012  
Advised by Professor Kui Ren
- **University at Buffalo - SUNY, Buffalo, NY, USA**  
M.S. in Electrical Engineering, May 2012  
Thesis: “Groundwave Modelling and Online Simulation System for Advanced HF Radio Networking”  
Advised by Professor Tommaso Melodia
- **China Agricultural University, Beijing, China**  
B.S. in Measuring & Control Technology and Instrumentations (School of Engineering), June 2010

## PUBLICATIONS

### Conference Papers

- C-1. **Si Chen**, Muyuan Li, Kui Ren, Xinwen Fu, Chunming Qiao. Rise of the Indoor Crowd: Reconstruction of Building Interior View via Mobile Crowdsourcing. *The 13th ACM Conference on Embedded Networked Sensor Systems (SenSys'15)*, Seoul, South Korea, November 1-4, 2015, **13-page**.  
**Acceptance ratio** < 20%.

- C-2. **Si Chen**, Muyuan Li, Kui Ren, Chunming Qiao. CrowdMap: Accurate Reconstruction of Indoor Floor Plan from Crowdsourced Sensor-Rich Videos. *The 35th IEEE International Conference on Distributed Computing Systems (ICDCS'15)*, Columbus, Ohio, June 29 - July 2, 2015, pp. 1-10, **10-page** .  
**Acceptance ratio** = 70/543 = 12.89%.
- C-3. Muyuan Li, Haojin Zhu, Zhaoyu Gao, **Si Chen**, Le Yu, Shangqian Hu, Kui Ren. All your location are belong to us: Breaking mobile social networks for automated user location tracking. *The 15th ACM international symposium on Mobile ad hoc networking and computing (Mobihoc'14)*, Philadelphia, PA, August 11-14, 2014, pp. 43-52, **10-page** .  
**Acceptance ratio** = 40/211 = 18.9%. **Citations** > 22.
- C-4. Eric Koski, **Si Chen**, Scott Pudlewski, Tommaso Melodia. Network simulation for advanced HF communications engineering. *The 12th International Conference on Ionospheric Radio Systems and Techniques (IRST'12)* York, UK, May 15-17, 2012, pp. 45, **5-page** .
- C-5. **Si Chen**, Lina Ling, Yuan Rongchang, Longqing Sun. Classification Model of Seed Cotton Grade Based on Least Square Support Vector Machine Regression Method. *The 6th IEEE International Conference on Information and Automation for Sustainability (ICIAfS'12)*, Beijing, China, 2012, pp. 198-202, **4-page**.
- C-6. Rongchang Yuan, Zhengjiang Li, **Si Chen**. Movement and deformation of virtual object based on argument passing method. *The IEEE International Conference on Virtual Environments, Human-Computer Interfaces and Measurement Systems (VEC-IMS'12)*, Tianjin, China, 2012, pp. 103-106, **5-page**.
- C-7. Rongchang Yuan, **Si Chen**, Zhengjiang Li, Shengrong Lu, Li Wang, Haigan Yuan. Simulation and Models on Control of Pests with Ozone in Greenhouses Plant. *The IASTED International Conference on Modeling, Simulation, and Identification (MSI'11)*, Pittsburgh, PA, Nov 7-9, 2011, **5-page**.
- C-8. Rongchang Yuan, HaiganYuan, **Si Chen**, Longqing Sun, Feng Qin, Han Zhang, Yukun Zhu, Daokun Ma. Research on the k-coverage local wireless network and its communication coordination mechanism design. *the 5th International Conference on Computer and Computing Technologies in Agriculture (CCTA '11)*, Beijing, China, Oct 29-31, 2011, **12-page** .

#### Journal and Magazine Articles

- J-1. Bingsheng Zhang, Qin Zhan, **Si Chen**, Muyuan Li, Kui Ren, Cong Wang, Di Ma. PriWhisper: Enabling Keyless Secure Acoustic Communication for Smartphones. *IEEE Internet of Things Journal (IoT)*, 2014. Accepted for publication. Citations > 10.

#### Conference Posters

- P-1. **Si Chen**, Muyuan Li, Zhan Qin, Kui Ren. IndoorCrowd2D: Building Interior View Reconstruction via Mobile Crowdsourcing. *The IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, 2015.
- P-2. **Si Chen**, Muyuan Li, Kui Ren. The power of indoor crowd: Indoor 3D maps from the crowd. *the IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, 2014.
- P-3. **Si Chen**, Muyuan Li, Zhan Qin, Bingsheng Zhang, Kui Ren. AcousAuth: An acoustic-based mobile Application for user authentication. *the IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, 2014.

- P-4. Muyuan Li, **Si Chen**, Kui Ren. Enabling private and non-intrusive smartphone calls with LipTalk. *the IEEE Conference on Computer Communications Workshops (INFOCOM WK-SHPS)*, 2014.

### Papers Under Submission

- U-1. **Si Chen**, Sixu Piao, Cong Wang, Qian Wang, Kui Ren. You Can Hear But You Cannot Steal: Defending against Voice Impersonation Attacks on Smartphones. *The 14th ACM International Conference on Mobile Systems, Applications, and Services ( MobiSys'16)*, Singapore.
- U-2. **Si Chen**, Kui Ren, Xinwen Fu, Chunming Qiao. IndoorCrowd2D: Building Interior View Reconstruction via Mobile Crowdsourcing. *IEEE Trans. on Parallel and Distributed Systems (TPDS)*, 2016.
- U-3. **Si Chen**, Kui Ren, Su Lu, Chunming Qiao. The power of indoor crowd: Accurate Reconstruction of Indoor Floor Plan from Crowdsourced Sensor-Rich Videos. *IEEE Trans. on Mobile Computing (TMC)*, 2016.

### RESEARCH EXPERIENCES

- **Ubiquitous Security and Privacy Research Laboratory.** Jan. 2013 - Present  
*Research Assistant*
  - **AcousAuth.**  
This project aims at developing a **highly secure alternative NFC system** based on friendly jamming technique for acoustic short-range communication.
    - Proposed an alternative NFC technique which provides NFC-like functionalities commercial smartphone applications, and enables much stronger security guarantees but requires less strict hardware support.
    - Designed a smartphone empowered system for personal authentication featuring a seamless, faster, easier and safer authentication process without the need of special infrastructure.
    - Shortlisted in the 19th Annual International Conference on Mobile Computing and Networking (ACM Mobicom'13) App Competition (**Top 10**).
  - **FreeTrack: Tracking Mobile Social Network Users.**  
This project serves as a **critical security reminder** of the current LBSNs pertaining to a vast number of users.
    - Identified severe location privacy leaks from popular location based social networks (e.g. Momo, Skout and Wechat) that allows non-privileged attacker to effectively pinpoint users' locations and even performed long-term tracking to reveal identity.
    - Developed an automated user location tracking system and tested it on these LBSNs.
    - Demonstrated its effectiveness and efficiency via a 3 week real-world experiment with 30 volunteers.
    - The evaluation results showed that this system can geo-locate a target with high accuracy and can readily recover users' Top 5 locations.
    - Proposed using grid reference system and location classification to mitigate the attacks.

- **IndoorCrowd**

This project is **the first to propose, design and implement** a smartphone-based crowdsourcing system that explores the power of untrained individuals to generate building interior views at scale. It **breaks away from established approaches** to reconstruct indoor scenes, and explores an advanced architecture based on crowdsourcing and mobile-sensing.

- Proposed a low-cost crowdsourcing-based method to reconstruct indoor floor plan that by utilizing sensor-rich video data from mobile users.
- Innovatively exploited the sequential relationship between consecutive frames to improve system performance.
- Achieved a significant improvement of accuracy compared with other indoor scene reconstruction systems, according to a long-term real-world experiment on 30 volunteers.
- Readily deployable in real-world scenarios. It is also expected to extend existing online map services (e.g. Google Map) to the indoor environments at an unprecedented scale, which is currently cost prohibitive.
- Served as an important stepping stone towards economically-viable massive indoor 3D model reconstruction.

- **Wireless Networks and Embedded Systems Laboratory.**

2011 - May. 2012

*Research Assistant*

- **Ground Wave Simulator.**

The aim of this project is to **accomplish an online simulation system based on NS-2** open source network simulator to simulate advanced high frequency (HF) network, so as to be useful for analyzing HF radio networks under real-world conditions.

- Studied models of HF channel characteristics, waveforms, protocols, and typical traffic loads.
- Designed an online simulation system to calculate the electric field strength and basic path loss in the real-world environment.
- Implemented an online ground wave simulation system based on NS-2 open source network simulator, GRWAVE and VOACAP Software to simulate advanced high frequency (HF) network.

- **Relay-Assisted D-OFDM for Cognitive Radio Networks.**

The aim of this project is to **improve the throughput of the network** by using a relay-assisted D-OFDM algorithm and resource allocation algorithm.

- Implemented an relay-assisted D-OFDM and resource allocation algorithm to improve the throughput of the network.
- Implemented TCP/IP protocol into GNU Radio testbed USRP2.
- Established bridge and framework abstraction for cognitive radio framework.

- **National University Student Innovation Program.**

2009 - May. 2010

*Research Assistant*

- **Intellectualized Greenhouse Measuring & Control System.**

This project aims at **developing a greenhouse management system** using wireless sensor network.

- Designed a mathematical model specialized for simulating greenhouse environment.
- Used CC2430 wireless node and Zigbee stack (Z-stack) to measure and control a greenhouse model's humidity and temperature.
- Used Python, PHP, Javascript (jQuery), MySQL and C to create a realtime B/S System.
- Designed a PCB with controllers that can use CC2430 with computer to remote control the greenhouse model.

- Implemented PHP reflection mechanism to create a plugin system for further system enhancement.

## TEACHING EXPERIENCE

- **Guest Lecturer** for the graduate course CSE 664 *Applied Cryptography and Computer Security*, Spring 2014/2015, CSE 706 *Selected Topics in Privacy and Security*, Fall 2015, *Sensing, Crowdsourcing with Smartphones and Wearable Devices*, Fall 2014, *Security and Privacy in Emerging Applications*, Fall 2013, *Advanced Topics on Privacy Enhancing Technologies*, Fall 2012 and the undergraduate course CSE 241 *Digital Systems*, Spring 2013.  
Gave guest lectures with security related topics ranging from: web security, cyber-physical system security, security and privacy on smart wearable device, mobile wireless security, smartphone security and malicious software.
- **Teaching Assistant** for the graduate course CSE 664 *Applied Cryptography and Computer Security*, Spring 2014/2015.  
Developed all the course projects including video privacy for public IP camera. Led the quiz reviews and Q&A sessions for a class of 40 students, and graded the project reports.
- **Lab Assistant** for the undergraduate course CSE 241 *Digital Systems*, Spring 2013.  
Led quiz reviews and answered questions for a class of 80 students.

## PROFESSIONAL ACTIVITIES

- **Conference Reviewer** for ICCCN'16, ACM CCS'15, ICDCS'15, ESORICS'15, AsiaCCS'15, Cloud'15, ICCCN'15, DBSec'15, CoudCom'15, ACM CHI'15, CloudNet'15, ISC'15, Securecomm'15, IEEE MSN'15, IPCCC'15, INFOCOM'14, ACM CCS'14, ICDCS'14, ESORICS'14, ICNP'14, AisaCCS'14, MobiHoc'14, CNS'14, CloudNet'14, DBSec'14, SecureComm'14.
- **Journal Reviewer** for IEEE Trans. on Parallel and Distributed Systems, IEEE Trans. on Services Computing, IEEE Trans. on Smart Grid, IEEE Trans. on Vehicular Technology, IEEE Trans. on Wireless Communications, IEEE Security & Privacy magazine, IEEE Network Magazine, Journal of Computer Security, Journal of Mobile Communication, Computation and Information, Journal of Parallel and Distributed Computing.
- **Webchair** for the 27th IEEE Annual Computer Communications Workshop (CCW'13).

## GRADUATE COURSEWORK

Computer Architecture, Applied Cryptography and Computer Security, Wireless Network Security, Theory of Computation, Modern Network Concept, Wireless Networking and Mobile Computing, Multimedia Wireless Sensor Network, Principle of Information Theory and Coding, Operating Systems, Optimization of Wireless Network, Computer Vision and Image Processing, High Performance Computing, Multimedia Systems, Analog Circuits, Biomems & Lab-On-a-Chip, Algorithms Analysis and Design, Consumer Optoelectronics

## HONORS AND AWARDS

- The 19th Annual International Conference on Mobile Computing and Networking (ACM Mobicom'13) App Competition Finalists (top 10), 2013
- Student Travel Grant Awards, IEEE ICDCS 2015
- Top 100 Excellent Graduate Theses in China Agricultural University, 2010
- Excellent Graduate Award in China Agricultural University, 2010
- National University Student Innovation Program Award, 2009-2010
- Undergraduate Research Program Award, 2007-2008
- Third Prize of International Interdisciplinary Contest in Modeling (ICM), 2009

- Third Prize of Scholarship for Excellent Academic Performance, 2007, 2008, 2009
- Awarded “The best debater” title in debate competitions, 2006, 2007

## REFERENCES

Dr. Kui Ren  
Associate Professor, IEEE Fellow  
Department of Computer Science & Engineering  
University at Buffalo, the State University of New York  
TEL: (716)-645-1587  
Email: [kuiren@buffalo.edu](mailto:kuiren@buffalo.edu)  
Web: <http://www.acsu.buffalo.edu/~kuiren/index.html>

Dr. Chunming Qiao  
Professor, IEEE Fellow  
Department of Computer Science & Engineering  
University at Buffalo, the State University of New York  
TEL: (716)-645-4751  
Email: [qiao@buffalo.edu](mailto:qiao@buffalo.edu)  
Web: <http://www.cse.buffalo.edu/~qiao/homepage/Homepage.html>

Dr. Tommaso Melodia  
Associate Professor  
Department of Electrical and Computer Engineering  
Northeastern University  
TEL: (617)-373-3354  
Email: [melodia@ece.neu.edu](mailto:melodia@ece.neu.edu)  
Web: <http://www.ece.neu.edu/wineslab/tmelodia.php>