

Chen Song

CONTACT INFORMATION

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University at Buffalo, SUNY
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RELATED AREAS

Cyber-Physical Systems, Cyber Security, Human Biometrics, Internet-of-Things.

EDUCATION

University at Buffalo, the State University of New York (SUNY), New York

Ph.D., Computer Science & Engineering, Aug. 2014 - Present

Advisor: **Wenyao Xu**

University at Buffalo, the State University of New York (SUNY), New York

M.S., Electrical Engineering, Sep. 2012 - May. 2014

Fudan University, Shanghai, China

B.S., Optic Science & Engineering, Jun. 2006 - Jul. 2010

INTERNSHIP

Microsoft Research, Redmond, Washington

Research Intern in Audio and Acoustic Research Group, May. 2018 - Sep. 2018

Project: Sensor Fusion for Learning-based Motion Estimation in VR

Mentor: **Shuayb Zarar**

AWARDS AND HONORS

- A8. Dean's Graduate Achievement Award, School of Engineering and Applied Sciences, University at Buffalo (SUNY), 2018 (*5 out of 1900+*)
- A7. UB Aging Innovation Challenge 2nd Price, New York State Department of Health, 2018
- A6. Best Poster Award, IEEE Annual International Conference on Biomedical and Health Informatics (BHI), 2018 (*3 out of 164*)
- A5. Best Demo Award, The 19th International Workshop on Mobile Computing Systems and Applications (HotMobile), 2018
- A4. Best Graduate Research Award, Computer Science & Engineering, University at Buffalo (SUNY), 2018
- A3. Best Paper Award, IEEE International Conference on Biomedical and Health Informatics (BHI), 2017
- A2. Student Travel Award, ACM Conference on Computer and Communications Security (CCS), 2016
- A1. Student Travel Award, ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp), 2014

SELECTED PUBLICATIONS

- S8. Zhengxiong Li, Aditya Singh Rathore, **Chen Song**, Sheng Wei, Yanzhi Wang, Wenyao Xu, "PrinTracker: Fingerprinting 3D Printers using Commodity Scanners", ACM Conference on Computer and Communications Security (**CCS'18**), Toronto, Canada, October 2018 (*Acceptance Rate: 16.6%, 134 out of 809*)
- S7. Zhengxiong Li, Zhuolin Yang, **Chen Song**, Zhengyu Peng, Changzhi Li, Wenyao Xu, "E-Eye: Hidden Electronics Recognition through mmWave Nonlinear Effects", ACM International

Conference on Sensor Networked Systems (**SenSys'18**), Shenzhen, China, November 2018 (*Acceptance Rate: 15.64%, 23 out of 147*)

- S6. Feng Lin, Kun Woo Cho, **Chen Song**, Zhanpeng Jin, Wenyao Xu, “*Exploring A Secure and Truly Cancelable Brain Biometrics for Smart Headwear*”, The 16th ACM International Conference on Mobile Systems, Applications, and Services (**MobiSys'18**), Munich, German, June 2018 (*Acceptance Rate: 26.81%, 37 out of 138*)
- S5. **Chen Song**, Feng Lin, Yan Zhuang, Wenyao Xu, Changzhi Li, Kui Ren, “*Cardiac Scan: A Non-Contact and Continuous Heart-Based User Authentication System*”, ACM Annual International Conference on Mobile Computing and Networking (**MobiCom'17**), Snowbrid, Utah, October 2017 (*Acceptance Rate: 18.8%, 35 out of 186*)
- S4. **Chen Song**, Aosen Wang, Feng Lin, Ruogang Zhao, Zhanpeng Jin, Wenyao Xu, “*A Temporal-spatial Compressed Sensing Architecture for Efficient High-throughput Information Acquisition in Organs-on-a-chip*”, IEEE International Conference on Biomedical and Health Informatics (**BHI'17**), Orlando, Florida, February 2017 (*Best Paper Award: 0.3%, 1 out of 322*)
- S3. Jerry Ajay, **Chen Song**, Aditya Singh Rathore, Chi Zhou, Wenyao Xu, “*Instruction Level Power Analysis and Optimization of 3D Printers*”, ACM International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS'17**), Xi'an, China, April 2017 (*Acceptance Rate: 17.4%, 56 out of 321*)
- S2. **Chen Song**, Feng Lin, Zongjie Ba, Kui Ren, Chi Zhou, Wenyao Xu, “*My Smartphone Knows What You Print: Exploring Smartphone-based Side-channel Attacks Against 3D Printers*”, ACM Conference on Computer and Communications Security (**CCS'16**), Vienna, Austria, October 2016 (*Acceptance Rate: 16.4%, 137 out of 831*)
- S1. **Chen Song**, Aosen Wang, Kui Ren, Wenyao Xu, “*EyeVeri: A Secure and Usable Approach for Smartphone User Authentication*”, IEEE International Conference on Computer Communications (**INFOCOM'16**), San Francisco, California, April 2016 (*Acceptance Rate: 18.2%, 300 out of 1644*)

CONFERENCE
PUBLICATIONS

- SenSys '18 Zhengxiong Li, Zhuolin Yang, **Chen Song**, Zhengyu Peng, Changzhi Li, Wenyao Xu, “*E-Eye: Hidden Electronics Recognition through mmWave Nonlinear Effects*”, ACM International Conference on Sensor Networked Systems, Shenzhen, China
- MobiCom'18 Wenjun Jiang, Fenglong Ma, Chenglin Miao, Shuochao Yao, Yaqing Wang, Xin Ma, **Chen Song**, Ye Yuan, Hongfei Xue, Dimitrios Koutsonikolas, Wenyao Xu, Lu Su, “*Towards Environment Invariant Device Free Activity Recognition*”, ACM International Conference on Mobile Computing and Networking, New Delhi, India
- CCS'18 Zhengxiong Li, Aditya Singh Rathore, **Chen Song**, Sheng Wei, Yanzhi Wang, Wenyao Xu, “*PrinTracker: Fingerprinting 3D Printers using Commodity Scanners*”, ACM Conference on Computer and Communications Security, Toronto, Canada
- UbiComp'18 Zhengxiong Li, Yuehang Wang, Aditya Singh Rathore, **Chen Song**, Nikhila Nyayapathi, Tri Vu, Jun Xia, Wenyao Xu, “*PAvessel: Practical 3D Vessel Structure Sensing through Photoacoustic Effects with its Applications in Palm Biometrics*”, ACM International Joint Conference on Pervasive and Ubiquitous Computing, Singapore
- UbiComp'18 **Chen Song**, Zhengxiong Li, Wenyao Xu, Chi Zhou, Zhanpeng Jin, Kui Ren, “*My Smartphone Recognizes Genuine QR Codes! Practical Unclonable QR Code via 3D Printing*”, ACM International Joint Conference on Pervasive and Ubiquitous Computing, Singapore
- MobiSys'18 Feng Lin, Kun Woo Cho, **Chen Song**, Zhanpeng Jin, Wenyao Xu, “*Exploring A Secure and Truly Cancelable Brain Biometrics for Smart Headwear*”, The 16th ACM International Conference on Mobile Systems, Applications, and Services, Munich, German

- BHI'18 Jerry Ajay, **Chen Song**, Aosen Wang, Jeanne Langan, Zhinan Li, Wenyao Xu, “*A Pervasive and Sensor-Free Deep Learning System for Parkinsonian Gait Analysis*”, IEEE Annual International Conference on Biomedical and Health Informatics, Las Vegas, Nevada
- BSN'18 Zhengxiong Li, Michael Brown, Junqi Wu, **Chen Song**, Feng Lin, Jeanne Langan, Wenyao Xu “*Development and Evaluation of a Multimodal Sensor Motor Learning Assessment*”, IEEE Annual International Conference on Wearable and Implantable Body Sensor Networks, Las Vegas, Nevada
- BSN'18 Tri Vu, Hoan Tran, **Chen Song**, Feng Lin, Jeanne Langan, Lora Cavuoto, Wenyao Xu, “*BiGRA: A Preliminary Bilateral Hand Grip Coordination Rehabilitation Using Home-Based Evaluation System for Stroke Patients*”, IEEE Annual International Conference on Wearable and Implantable Body Sensor Networks, Las Vegas, Nevada
- HotMobile'18 Zhisheng Yan, **Chen Song**, Feng Lin, Wenyao Xu, “*Exploring Eye Adaptation in Head-Mounted Display for Energy Efficient Smartphone Virtual Reality*”, ACM International Workshop on Mobile Computing Systems and Applications, Tempe, Arizona
- MobiCom'17 **Chen Song**, Feng Lin, Yan Zhuang, Wenyao Xu, Changzhi Li, Kui Ren, “*Cardiac Scan: A Non-Contact and Continuous Heart-Based User Authentication System*”, ACM Annual International Conference on Mobile Computing and Networking, Snowbird, Utah
- ASPLOS'17 Jerry Ajay, **Chen Song**, Aditya Singh Rathore, Chi Zhou, Wenyao Xu, “*Instruction Level Power Analysis and Optimization of 3D Printers*”, ACM International Conference on Architectural Support for Programming Languages and Operating Systems, Xi'an, China
- CHASE'17 Zhuolin Yang, **Chen Song**, Feng Lin, Jeanne Langan, Wenyao Xu, “*Empowering A Gait Feature-Rich Timed-Up-and-Go System for Complex Ecological Environments*”, ACM/IEEE International Conference on Connected Health: Applications, Systems and Engineering Technologies, Philadelphia
- BHI'17 Tri Vu, Hoan Tran, Kun Woo Cho, **Chen Song**, Feng Lin, Michelle Hartley-McAndrew, Kathy Doody, Chang Wen Chen, Wenyao Xu, “*Efficient and Effective Visual Stimuli Design for Quantitative Autism Screening: An Exploratory Study*”, IEEE International Conference on Biomedical and Health Informatics, Orlando, Florida
- BHI'17 **Chen Song**, Aosen Wang, Feng Lin, Ruogang Zhao, Zhanpeng Jin, Wenyao Xu, “*A Temporal-spatial Compressed Sensing Architecture for Efficient High-throughput Information Acquisition in Organs-on-a-chip*”, IEEE International Conference on Biomedical and Health Informatics, Orlando, Florida
- CCS'16 **Chen Song**, Feng Lin, Zongjie Ba, Kui Ren, Chi Zhou, Wenyao Xu, “*My Smartphone Knows What You Print: Exploring Smartphone-based Side-channel Attacks Against 3D Printers*”, ACM Conference on Computer and Communications Security (), Vienna, Austria
- WH'16 Kun Woo Cho, Feng Lin, **Chen Song**, Xiaowei Xu, Michelle Hartley-McAndrew, Kathy Doody, Wenyao Xu, “*Gaze-Wasserstein: Exploring A Quantitative Screening Approach to Autism Spectrum Disorder*”, IEEE Annual Wireless Health Conference, Washington D.C.
- APSys'16 Jerry Ajay, Aditya Singh Rathore, **Chen Song**, Chi Zhou, Wenyao Xu, “*Don't Forget Your Electricity Bills! An Empirical Study of Characterizing Energy Consumption of 3D Printers*”, ACM Asia-Pacific Workshop on Systems, Hong Kong, China
- CHASE'16 Feng Lin, **Chen Song**, Xiaowei Xu, Lora Cavuoto, Wenyao Xu, “*Patient Handling Activity Recognition Approach Through Pressure-Map Manifold Learning Using Smart Insole*”, IEEE 1st International Conference on Connected Health: Applications, Systems and Engineering Technologies, Washington D.C.
- INFOCOM'16 **Chen Song**, Aosen Wang, Kui Ren, Wenyao Xu, “*EyeVeri: A Secure and Usable Approach for Smartphone User Authentication*”, IEEE International Conference on Computer Communications, San Francisco, California

- ISBA'16 Kun Woo Cho, Feng Lin, **Chen Song**, Xiaowei Xu, Fuxing Gu, Wenyao Xu, "*Thermal Handprint Analysis for Forensic Identification using Heat-Earth Mover's Distance*", IEEE International Conference on Identity, Security and Behavior Analysis, Sendai, Japan
- BHI'16 **Chen Song**, Aosen Wang, Kathy Doody, Michelle Hartley-McAndrew, Jana Mertz, Wenyao Xu, "*Analyzing Dynamic Components of Social Scene Parsing Strategy in Autism Spectrum Disorder*", IEEE International Conference on Biomedical and Health Informatics, Las Vegas, California
- RWS'16 Yan Zhuang, **Chen Song**, Feng Lin, Yiran Li, Changzhi Li, Wenyao Xu, "*On the Feasibility of Non-contact Cardiac Motion Sensing for Emerging Heart-based Biometrics*", IEEE Radio and Wireless Symposium, Austin, Texas
- SPMB'15 Feng Lin, Aosen Wang, **Chen Song**, Wenyao Xu, Zhinan Li, Qin Li, "*A Comparative Study of Smart Insole on Real-World Step Count*", IEEE Signal Processing in Medicine and Biology Symposium, Philadelphia, Pennsylvania
- BioCAS'15 Xiaowei Xu, Feng Lin, Aosen Wang, **Chen Song**, Yu Hu, Wenyao Xu, "*On-bed Sleep Posture Recognition Based on Body-Earth Mover's Distance*", IEEE Conference on Circuits and Systems, Atlanta, Georgia
- BioCAS'15 Aosen Wang, **Chen Song**, Xiaowei Xu, Feng Lin, Zhanpeng Jin, Wenyao Xu, "*Selective and Compressed Sensing for Energy-Efficient Implantable Neural Encoding*", IEEE Conference on Circuits and Systems, Atlanta, Georgia
- BSN'15 Yan Zhuang, **Chen Song**, Aosen Wang, Feng Lin, Yiran Li, Changzhan Gu, Changzhi Li, Wenyao Xu, "*SleepSense: Non-invasive Sleep Event Recognition Using An Electromagnetic Probe*", IEEE International Conference on Implantable and Wearable Body Sensor Networks Conference, MIT, Cambridge
- DAC'15 Aosen Wang, **Chen Song**, Zhanpeng Jin, Wenyao Xu, "*Adaptive Compressed Sensing Architecture in Wireless Brain Computer Interface*", ACM/IEEE Design Automation Conference, San Francisco, California
- IGCC'14 Aosen Wang, **Chen Song**, Wenyao Xu, "*A Configurable Quantized Compressed Sensing Architecture for Low-Power Tele-Monitoring*", International Green Computing Conference, Dallas, Texas
- JOURNAL PUBLICATIONS
- IMWUT'18 **Chen Song**, Zhengxiong Li, Wenyao Xu, Chi Zhou, Zhanpeng Jin, Kui Ren, "*My Smartphone Recognizes Genuine QR Codes! Practical Unclonable QR Code via 3D Printing*", Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
- IOTJ'18 Zhuolin Yang, **Chen Song**, Feng Lin, Jeanne Langan, Wenyao Xu, "*A Smart Environment-Adapting Timed-Up-and-Go System Powered by Sensor-Embedded Insoles*", IEEE Internet of Things Journal
- JETCAS'18 **Chen Song**, Aosen Wang, Feng Lin, Jian Xiao, Wenyao Xu, "*Selective CS: Energy-Efficient Sensing Architecture for Wireless Implantable Neural Decoding*", IEEE Journal on Emerging and Selected Topics in Circuits and Systems
- JBHI'17 **Chen Song**, Aosen Wang, Feng Lin, Ruogang Zhao, Zhanpeng Jin, Jian Xiao, Wenyao Xu, "*Tempo-Spatial Compressed Sensing of Organ-on-a-chip for Pervasive Health*", The Journal of Biomedical and Health Informatics
- SH'16 Feng Lin, **Chen Song**, Xiaowei Xu, Lora Cavuoto, Wenyao Xu, "*Patient handling activity recognition through pressure-map manifold learning using a footwear sensor*", The Elsevier Smart Health
- NAJMS'16 **Chen Song**, Aosen Wang, Kathy Ralabate Doody, Michelle Hartley-McAndrew, Jana Mertz, Feng Lin, Wenyao Xu, "*A Comparative Study of Social Scene Parsing Strategies between Children with and without Autism Spectrum Disorder*", The North American Journal of Medical Sciences

SJ'16 Yin Bi, Mingsong Lv, **Chen Song**, Wenyao Xu, Guan Nan, Wang Yi, “*AutoDietary: A Wearable Acoustic Sensor System for Food Intake Recognition in Daily Life*”, IEEE Sensors Journal

TBioCAS'15 Feng Lin, Yan Zhuang, **Chen Song**, Aosen Wang, Yiran Li, Changzhan Gu, Changzhi Li, Wenyao Xu, “*SleepSense: a Noncontact and Cost-effective Sleep Monitoring System*”, IEEE Transactions on Biomedical Circuits and Systems

GRANT EXPERIENCE

G2. **Significant contributor, National Science Foundation (NSF), CNS-1718375, , \$500K, 2017/09/01 - 2020/08/31**

Project Title: “*SaTC: CORE: Small: Collaborative: Cardiac Password: Exploring A Non-Contact and Continuous Approach to Secure User Authentication*”.

G1. **Co-writer, National Institute of Health (NIH), NICHD, 01R21EB024731, \$425,166, 2017/07/01 - 2019/06/30**

Project Title: “*A Functional Upper Limb Training and Assessment Tool to Enhance Efficacy and Scalability of Rehabilitation in Ecological Environments*”.

INVITED TALKS

T2. “*Eye-based User Authentication in Mobile Smartphones*”, University at Buffalo SUNY, Buffalo, New York, May 2017

T1. “*Machine Learning and Inclusive Design*”, OCAD University, Toronto, Ontario, April 2017

MEDIA COVERAGE

- Research work on “Cardiac scan: a non-contact heart based biometric system” [C19] is reported by **100** public media outlets, including *Hacker News*, *National Science Foundation's news and Communication of the ACM*, October 2017.
- Research work on “Smartphone app for early autism detection” [C8, C13] is increasingly reported by public media outlets, including *Eurekalert*, *HealthNewsDigest* and *UB News Center*, November 2016.
- Research work on “Smartphone hacks 3D Printers” [C14] is reported by more than **80** public media outlets, including *NSF Science'360*, *National Science Foundation's News*, *Communications of the ACM news*, *Science Daily*, *Digital Trend*, *Fedscoop*, and *3DPrint*, October 2016
- Research work on “Smart Necklace for Food-intake Monitoring” [J2] is reported by more than **50** public media outlets, including *UB News Center*, *The Wall Street Journal*, *National Public Radio's News*, *Science Daily*, *Sohu.com* and *IEEE Spectrum*, March 2016

SERVICES

Conference Reviewer:

- ACM Annual International Conference on Mobile Computing and Networking (MobiCom), 2018
- IEEE International Conference on Computer Communications (INFOCOM), 2016, 2017, 2018
- International Conference on Security, Privacy and Anonymity in Computation, Communication and Storage (SPACCS), 2017
- IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE), 2016
- IEEE/IFIP International Conference on Embedded and Ubiquitous Computing (EUC), 2016
- EAI International Conference on Body Area Networks (BodyNets), 2016
- The ACM SIGBED International Conference on Embedded Software (EMSOFT), 2016
- IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2015

Journal Reviewer:

- Elsevier Journal of Information Security and Applications (JISA), 2017
- IEEE Transactions on Vehicular Technology (TVT), 2017
- Proceedings of the ACM on Interactive, Multimedia, Wearable and Ubiquitous Technologies (IMWUT), 2017
- Medical Physics (MS), 2017
- Elsevier Computer Methods and Programs in Biomedicine (CMPB), 2016, 2017
- Springer Journal of Network and Systems Management (JONS), 2016
- IEEE Transactions on Mobile Computing (TMC), 2016
- IEEE Transactions on Information Forensics and Security (TIFS), 2016

EMPLOYMENT

University at Buffalo, the State University of New York (SUNY), New York

Research Assistant, Computer Science & Engineering Department, June 2016 - present

Teaching Assistant, Computer Science & Engineering Department, August 2014 - May 2016

Shanghai Research Institute, Co., Ltd, Shanghai, China

Engineer, Letter Sorting R&D Center, July 2010 - July 2012

TEACHING ASSISTANT

- CSE341: *Computer Organization*, Spring 2016
- CSE341: *Computer Organization*, Fall 2015
- CSE115/116: *Introduction to Computer Science*, Spring 2015
- CSE115/116: *Introduction to Computer Science*, Full 2014