

Song Fang

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Research Interests

Wireless and Mobile System Security; Cyber Physical Systems and Internet of Things (IoT) Security; Mobile Computing; Smart Healthcare; Application of Machine Learning in Cybersecurity.

Education

Ph.D., Computer Science and Engineering Aug. 2013 - Aug. 2018
University of South Florida, Tampa, FL

M.Eng., Communication and Information System Aug. 2011 - Aug. 2013
Beijing University of Posts and Telecommunications, Beijing, China

B.Eng. in Information Engineering, Minor in Computer Science Sep. 2007 - Jul. 2011
South China University of Technology, Guangzhou, China

Work Experience

Assistant Professor Aug. 2018 - Present
School of Computer Science, University of Oklahoma, Norman, OK

Publications

The asterisk (*) marks students advised by me.

- [1] Qiuye He*, Edwin Yang*, and **Song Fang**, “A Survey on Human Profile Information Inference via Wireless Signals,” to appear in *IEEE Communications Surveys & Tutorials (COMST)*, 34 pages, 2024.
- [2] Yan He*, Qiuye He*, **Song Fang**, and Yao Liu, “Precise Wireless Camera Localization Leveraging Traffic-aided Spatial Analysis,” to appear in *IEEE Transactions on Mobile Computing (TMC)*, 2023.
- [3] Yan He*, Qiuye He*, **Song Fang**, and Yao Liu, “When Free Tier becomes Free to Enter: A Non-Intrusive Technique to Identify Security Cameras with no Cloud Backup Subscription,” in *Proc. of the 30th ACM Conference on Computer and Communications Security (ACM CCS’23)*, Nov 2023, Copenhagen, Denmark. (The first two authors are co-first authors; Acceptance Rate: $\frac{?}{?}=?\%$)
- [4] Qiuye He* and **Song Fang**, “Phantom-CSI Attacks against Wireless Liveness Detection,” to appear in *the 26th International Symposium on Research in Attacks, Intrusions, and Defenses (RAID 2023)*, pp. 440-454, Oct. 2023. (Acceptance Rate: $\frac{50}{213}=23.5\%$)
- [5] Jinmiao Chen, Zhaohe (John) Zhang*, Shangqing Zhao, **Song Fang**, Thomas M. Peters, Evan L. Floyd, and Changjie Cai, “Poster: Noninvasive Respirator Fit Factor Inference by Semi-Supervised Learning,” to appear in *IEEE/ACM international conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE)*, 2023.
- [6] Jinmiao Chen, Zhaohe (John) Zhang*, Shangqing Zhao, **Song Fang**, Thomas M. Peters, Evan L. Floyd, and Changjie Cai, “A Data-Driven Respirator Fit Test Model via Human Speech Signal,” to appear in *IEEE/ACM international conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE)*, Orlando, FL, 2023.
- [7] Qiuye He*, Edwin Yang*, **Song Fang**, and Shangqing Zhao, “HoneyBreath: An Ambush Tactic Against Wireless Breath Monitoring,” to appear in *EAI International Conference on Mobile and Ubiquitous Systems:*

- Computing, Networking and Services (EAI MobiQuitous'22)*, 2022, Pittsburgh, PA. [*Best Paper Award*]
- [8] Edwin Yang*, **Song Fang**, and Dakun Shen, “DASK: Driving-Assisted Secret Key Establishment,” in *Proc. of IEEE Conference on Communications and Network Security (IEEE CNS'22)*, pp. 73-81, Oct. 2022, Austin, TX. (Acceptance Rate: $43/122=35.2\%$)
- [9] Edwin Yang*, Qiuye He*, and **Song Fang**, “WINK: Wireless Inference of Numerical Keystrokes via Zero-Training Spatiotemporal Analysis,” in *Proc. of the 29th ACM Conference on Computer and Communications Security (ACM CCS'22)*, pp. 3033-3047, Nov. 2022, Los Angeles, CA. (Acceptance Rate: $17.9\%=58/324$)
- [10] Edwin Yang* and **Song Fang**, “GPSKey: GPS based Secret Key Establishment for Intra-Vehicle Environment,” to appear in *Fourth International Workshop on Automotive and Autonomous Vehicle Security (AutoSec)*, co-located at the Network and Distributed System Security Symposium (NDSS), 2022.
- [11] Edwin Yang*, **Song Fang**, Ian Markwood, Yao Liu, Shangqing Zhao, Zhuo Lu, and Haojin Zhu, “Wireless Training-free Keystroke Inference Attack and Defense,” in *IEEE/ACM Transactions on Networking (ToN)*, vol. 30, no. 4, pp. 1733-1748, 2022.
- [12] Qiuye He*, **Song Fang**, Tao Wang, Yao Liu, Shangqing Zhao, and Zhuo Lu, “Proactive Anti-Eavesdropping With Trap Deployment in Wireless Networks,” in *IEEE Transactions on Dependable and Secure Computing (TDSC)*, vol. 20, no. 1, pp. 637-649, 2023.
- [13] Zhaohe (John) Zhang*, Edwin Yang*, and **Song Fang**, “A Universal Attack Against ASR Systems Leveraging Fast Speech,” in *Proc. of the Annual Computer Security Applications Conference (ACSAC)*, pp. 720–731, 2021. (Acceptance Rate: $24.5\%=80/326$)
- [14] Yan He*, Qiuye He*, **Song Fang**, and Yao Liu, “MotionCompass: Pinpointing Wireless Camera Via Motion-activated Traffic,” in *Proc. of the 19th ACM International Conference on Mobile Systems, Applications, and Services (ACM MobiSys'21)*, pp. 215–227, Mars, Solar System, Milky Way, 2021. (Acceptance Rate: $36/166=21.7\%$)
- [15] Yan He*, Hanyan Zhang*, Edwin Yang*, and **Song Fang**, “Virtual Step PIN Pad: Towards Foot-input Authentication Using Geophones,” in *Proc. of IEEE International Conference on Mobile Ad-Hoc and Smart Systems (IEEE MASS'2020)*, pp. 649-657, 2020. (Acceptance Rate: $29.7\%=65/219$)
- [16] Edwin Yang*, **Song Fang**, Christian Grant, and Le Gruenwald, “Poster: PhotoLock: Autonomous Privacy-preserving Photo Sharing in Online Social Networks,” to appear in *The Network and Distributed System Security Symposium (NDSS)*, February 2020, San Diego, CA.
- [17] **Song Fang**, Ian Markwood, and Yao Liu, “Wireless-Assisted Key Establishment Leveraging Channel Manipulation,” in *IEEE Transactions on Mobile Computing (TMC)*, vol. 20, no. 1, pp. 263-275, 2021.
- [18] **Song Fang**, Tao Wang, Yao Liu, Shangqing Zhao, and Zhuo Lu, “Entrapment for Wireless Eavesdroppers,” in *Proc. of IEEE International Conference on Computer Communications (IEEE INFOCOM'19)*, pp. 2530-2538, 2019, Paris, France. (Acceptance Rate: $19.7\%=288/1464$)
- [19] **Song Fang**, Ian Markwood, Yao Liu, Shangqing Zhao, and Zhuo Lu, and Haojin Zhu, “No Training Hurdles: Fast Training-Agnostic Attacks to Infer Your Typing,” in *Proc. of the 25th ACM Conference on Computer and Communications Security (ACM CCS'18)*, pp. 1747-1760, 2018, Toronto, Canada. (Acceptance Rate: $16.56\%=134/809$)
- [20] Tao Wang, Yao Liu, Tao Hou, Qingqi Pei, and **Song Fang**, “Signal Entanglement based Pinpoint Waveforming for Location-restricted Service Access Control,” in *IEEE Transactions on Dependable and Secure Computing (TDSC)*, vol. 15, no. 5, pp. 853-867, 2018.
- [21] **Song Fang**, “Channel Camouflage and Manipulation Techniques in Wireless Networks,” *Ph.D. Dissertation*, University of South Florida, 2018.
- [22] **Song Fang**, Ian Markwood, and Yao Liu, “Manipulatable Wireless Key Establishment,” in *Proc. of IEEE conference on Communications and Network Security (IEEE CNS'17)*, pp. 393-401, October 2017,

Las Vegas, NV. (Acceptance Rate: 29.9%=41/137)

- [23] **Song Fang**, Yao Liu, Wenbo Shen, Haojin Zhu, and Tao Wang, “Virtual Multipath Attack and Defense for Location Distinction in Wireless Networks,” in *IEEE Transactions on Mobile Computing (TMC)*, vol. 16, no. 2, pp. 566-580, 2017.
- [24] **Song Fang**, Yao Liu, and Peng Ning, “Mimicry Attacks against Wireless Link Signatures and the New Defense using Time-Synched Link Signatures,” in *IEEE Transactions on Information Forensics and Security (TIFS)*, vol. 11, no. 7, pp. 1515-1527, 2016.
- [25] **Song Fang**, Yao Liu, and Peng Ning, “Wireless Communications under Broadband Reactive Jamming Attacks,” in *IEEE Transactions on Dependable and Secure Computing (TDSC)*, vol. 13, no. 3, pp. 394-408, 2016.
- [26] **Song Fang**, Yao Liu, Wenbo Shen, and Haojin Zhu, “Where Are You From? Confusing Location Distinction Using Virtual Multipath Camouflage,” in *Proc. of the 20th Annual International Conference on Mobile Computing and Networking (ACM MobiCom’14)*, pp. 225-236, September 2014, Maui, Hawaii. (Acceptance Rate: 16.36%=36/220)
- [27] **Song Fang**, Yao Liu, Wenbo Shen, and Haojin Zhu, “Virtual Multipath Attacks against Location Distinction in Wireless Networks,” in *ACM Wireless of the Students, by the Students, for the Students (S3) Workshop*, September 2014, Maui, Hawaii. (Invited paper)
- [28] **Song Fang** and Tao Luo, “A Novel Two-timer-based Broadcast Routing Algorithm for Vehicular Ad-hoc Networks,” in *Proc. of IEEE International Conference on Green Computing and Communications (GreenCom), and IEEE Internet of Things (iThings), and IEEE Cyber, Physical and Social Computing (CPSCom)*, pp.1518-1522, 2013.
- [29] Ruina Liu, Tao Luo, Lei Zhang, Jianfeng Li, and **Song Fang**, “A Forwarding Acknowledgement Based Multi-hop Broadcast Algorithm in Vehicular Ad Hoc Networks,” in *Proc. of IEEE International Conference on Computer Science and Network Technology (ICCSNT)*, pp. 1258-1262, 2012.

■ Patents

- [1] Song Fang, Yan He, and Qiuye He, “Method and Apparatus for Determining Locations of Wireless Cameras,” US Patent (provisional application), serial No.: 63/356,211. (Non-provisional application #: 18/341,567, filed in 2023; status: published)
- [2] Song Fang, Zhaohe Zhang, and Edwin Yang, “Method for Generating Adversarial Audio based on Fast Speech,” US Patent (provisional application), serial No.: 63/431,545, filed in 2022.

■ Awards

- Nov. 2022 **Best Paper Award**, EAI MobiQuitous 2022
- Aug. 2022 **Fall 2022 College of Engineering Strategic Research Incentive GRA**, University of Oklahoma
- Apr. 2022 **Faculty Investment Program Award**, Office of the Vice President for Research and Partnerships, University of Oklahoma
- Mar. 2021 **FY21 Junior Faculty Research Award**, Office of the Vice President for Research and Partnerships, University of Oklahoma
- Dec. 2020 **Spring 2021 College of Engineering Strategic Research Incentive GTA**, University of Oklahoma
- Mar. 2020 **CRII award**, NSF

- Mar. 2020 **FY20 Junior Faculty Research Award**, Office of the Vice President for Research and Partnerships, University of Oklahoma
- Feb. 2020 **Computer Security course was selected as an OU Presidential Dream Course for Fall 2020 (deferred to Fall 2021 due to COVID-19)**, Provost's Office, University of Oklahoma
- Jun. 2019 **IEEE CNS Travel Grant for Junior Researcher**, Army Research Office
- Oct. 2018 **NSF Computing Systems Research (CSR) PI Meeting Travel Grant**, NSF
- Oct. 2017 **IEEE CNS Travel Grant**, NSF
- Jul. 2017 **NSF NeTS Early Career Workshop Travel Grant**, NSF
- Sep. 2014 **ACM MobiCom Travel Grant**, NSF
- Sep. 2014 **ACM S3 Travel Grant**, NSF

█ Talks

- [1] Three Minute Talk of Faculty Research
[Feb 2023] General Faculty Meeting, College of Engineering, OU.
- [2] Finding Hidden Eyes and Ears Around Us in the IoT Era
[April 2022] Industry and Government Day 2022, OU.
- [3] Cyber Security, and 5G Intersection
[January 2020] AT&T 5G, Cyber and Radar Visit, OU.
- [4] Panelist on Computing Security and Privacy Discussion Panel
[March 2019] School of Computer Science, OU.
- [5] No Training Hurdles: Fast Training-Agnostic Attacks to Infer Your Typing.
[October 2018] ACM CCS'18, Toronto, Canada.
- [6] Manipulatable Wireless Key Establishment.
[October 2017] IEEE CNS'17, Las Vegas, NV.
- [7] Virtual Multipath Attack and Defense for Location Distinction in Wireless Networks.
[November 2015] Security seminar, Dept. of Computer Science & Engineering, USF.
- [8] Where Are You From? Confusing Location Distinction Using Virtual Multipath Camouflage.
[September 2014] ACM MobiCom'14, Maui, Hawaii.
- [9] Virtual Multipath Attacks against Location Distinction in Wireless Networks.
[September 2014] ACM S3 Workshop 2014, Maui, Hawaii.

█ Teaching

- [1] CS 5173/4173: Computer Security, OU, Fall 2018-2020 & Fall 2022-2023.
- [2] OU Presidential Dream Course: CS 5173/4173: Computer Security, OU, Fall 2021.
- [3] CS 5970: Embedded Systems Security, OU, Spring 2020 & Spring 2021.
- [4] CS 5173-999: Computer Security, online course, OU, Fall 2021-2023.
- [5] CS 3113: Intro to Operating Systems, OU, Spring 2022 & Spring 2023.

█ Professional Activities

Departmental Services:

- Research Committee, 2022-present.
- Faculty Evaluation Committee (Special Committee), April 2021-August 2022.
- Computing Committee, 2020-2021, 2021-2022.
- Undergraduate Recruitment and Engagement Committee, 2019-2020.
- Graduate Recruitment/Engagement Committee, 2018-2019.

Organizing Committee:

- Student Travel Committee Chair, IEEE Symposium on Security and Privacy (S&P) 2022 and 2023.
- Publicity Chair, EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services (MobiQuitous) 2022.

Proposal Reviewer:

- NSF, 2021.

Session Chair:

- IEEE Conference on Communications and Network Security (CNS) 2022.
- IEEE International Conference on Computer Communications (INFOCOM) 2021 and 2022.

Technical Program Committee:

- IEEE International Conference on Computer Communications (INFOCOM) 2021-2024.
- IEEE Conference on Communications and Network Security (CNS) 2020-2023.
- IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS) 2022 and 2023.
- International Conference on Computer Communications and Networks (ICCCN) 2023.
- IEEE International Conference on Communications (ICC) 2023.
- IEEE/ACM International Symposium on Quality of Service (IWQoS) 2022.
- International Conference on Network and System Security (NSS) 2020, 2021, and 2022.
- The 10th International Workshop on Security, Privacy, Trust, and Machine Learning for Internet of Things (IoTSP-TML) 2020.
- Security and Privacy in Edge Computing Workshop (EdgeSP) 2018 and 2019.

Invited Participant:

- NSF Workshop on Next-G Security 2020.
- NSF Computing Systems Research (CSR) PI Meeting 2018.
- NSF NeTS Early Career Workshop 2017.

Reviewer for Conference:

- ACM CCS 2016, 2017; IEEE INFOCOM 2016, 2017, 2020; IEEE CNS 2016, 2017, 2018; IEEE IPCCC 2015; IEEE ICC 2015, 2017; IEEE WCNC 2018.

Reviewer for Journals (21):

- IEEE Transactions on Mobile Computing (TMC)
- IEEE Transactions on Dependable and Secure Computing (TDSC)
- IEEE Transactions on Information Forensics & Security (TIFS)
- ACM Transactions on Privacy and Security (TOPS)
- ACM Transactions on Cyber-Physical Systems (TCPS)
- IEEE/ACM Transactions on Networking (ToN)
- IEEE Transactions on Wireless Communications (TWC)
- IEEE Transactions on Vehicular Technology (TVT)
- IEEE Internet of Things Journal (IoT-J)
- IEEE Systems Journal
- Computer Networks
- IEEE Communications Magazine
- IEEE Wireless Communications Letters
- International Journal of Security and Networks (IJSN)
- International Journal of Electronics and Communications
- IET Information Security
- Wireless Networks
- Transactions on Emerging Telecommunications Technologies

- Internet Technology Letters
- EURASIP Journal on Advances in Signal Processing
- IEEE Open Journal of Vehicular Technology

Student Engagement:

- Faculty Advisor of OU WiCyS Club: Oct 2019 - Now