

Song Fang

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Research Interests

Wireless and Mobile System Security, Cyber Physical Systems and Internet of Things (IoT) Security, Mobile Computing, 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 student advised by me.

- [1] Edwin Yang*, Qiuye He*, and **Song Fang**, “WINK: Wireless Inference of Numerical Keystrokes via Zero-Training Spatiotemporal Analysis,” to appear in *Proc. of the 29th ACM Conference on Computer and Communications Security (ACM CCS’22)*, November 2022, Los Angeles, CA. (Acceptance Rate: $17.9\%=58/324$)
- [2] 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.
- [3] Edwin Yang*, **Song Fang**, Ian Markwood, Yao Liu, Shangqing Zhao, Zhuo Lu, and Haojin Zhu, “Wireless Training-free Keystroke Inference Attack and Defense,” to appear in *IEEE/ACM Transactions on Networking (ToN)*, 2022.
- [4] Qiuye He*, **Song Fang**, Tao Wang, Yao Liu, Shangqing Zhao, and Zhuo Lu, “Proactive Anti-Eavesdropping With Trap Deployment in Wireless Networks,” to appear in *IEEE Transactions on Dependable and Secure Computing (TDSC)*, 2022.
- [5] 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: $24.5\%=80/326$)
- [6] 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: $36/166=21.7\%$)
- [7] 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)
- [8] Edwin Yang*, **Song Fang**, Christan 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.
- [9] **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.
- [10] **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)
- [11] **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)
- [12] 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.
- [13] **Song Fang**, "Channel Camouflage and Manipulation Techniques in Wireless Networks," *Ph.D. Dissertation*, University of South Florida, 2018.
- [14] **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)
- [15] **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.
- [16] **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.
- [17] **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.
- [18] **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)
- [19] **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)
- [20] **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.
- [21] 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.

■ Funding Experience

- [1] OU Office of the Vice President for Research and Partnerships. *OU Faculty Investment Program Award*. Song Fang. \$15,000, 04/2022-03/2023.
- [2] OU Office of the Vice President for Research and Partnerships. *FY21 OU Junior Faculty Research Award: Exploiting Motion-activated Traffic for Wireless Camera Localization*. Song Fang. \$9,401, 03/2021-02/2022.
- [3] OU Office of the Vice President for Research & Partnerships. *Co-Advisor: COVID-19 Rapid Response Research Seed Grant*. Dean F. Hougen, Michael Mumford, Sridhar Radhakrishnan, Aaron M. Wendelboe, Song Fang, and Anindya Maiti. \$27,000 (\$10,000 used for supporting my student), 05/2020-10/2020.
- [4] NSF. *CRII: SaTC: Towards Understanding Typing Privacy: Vulnerabilities and Protection*. Song Fang. \$190,847 (including \$16,000 for an REU supplement), 03/2020-02/2022.
- [5] OU Office of the Vice President for Research and Partnerships. *FY20 OU Junior Faculty Research Award: Non-invasive Attacks on Keystrokes: New Vulnerabilities and Defenses*. Song Fang. \$9,324, 2020-2021.
- [6] OU Provost's Office. *2020-21 Presidential Dream Course (Computer Security) Proposal*. Song Fang. \$18,000, 2020. (*Due to COVID-19, it has been deferred to the 2021-22 academic year)

■ Awards

- 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] Panelist on Computing Security and Privacy Discussion Panel
[March 2019] School of Computer Science, OU.
- [2] No Training Hurdles: Fast Training-Agnostic Attacks to Infer Your Typing.
[October 2018] ACM CCS'18, Toronto, Canada.
- [3] Manipulatable Wireless Key Establishment.
[October 2017] IEEE CNS'17, Las Vegas, NV.
- [4] Virtual Multipath Attack and Defense for Location Distinction in Wireless Networks.
[November 2015] Security seminar, Dept. of Computer Science & Engineering, USF.
- [5] Where Are You From? Confusing Location Distinction Using Virtual Multipath Camouflage.

- [September 2014] ACM MobiCom'14, Maui, Hawaii.
[6] Virtual Multipath Attacks against Location Distinction in Wireless Networks.
[September 2014] ACM S3 Workshop 2014, Maui, Hawaii.

Teaching

- [1] CS 3113: Intro to Operating Systems, OU, Spring 2022.
- [2] OU Presidential Dream Course: CS 5173/4173: Computer Security, OU, Fall 2021.
- [3] CS 5173-999: Computer Security, online course, OU, Fall 2021.
- [4] CS 5173/4173: Computer Security, OU, Fall 2018 & Fall 2019 & Fall 2020.
- [5] CS 5970: Embedded Systems Security, OU, Spring 2020 & Spring 2021.

Professional Activities

Departmental Services:

- Faculty Evaluation Committee (Special Committee), April 2021-present.
- 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'22) (2022).

Proposal Reviewer:

- NSF, 2021.

Session Chair:

- IEEE International Conference on Computer Communications (INFOCOM) 2021.

Technical Program Committee:

- IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS) 2022, security track.
- IEEE/ACM International Symposium on Quality of Service (IWQoS) 2022.
- IEEE International Conference on Computer Communications (INFOCOM) 2021, 2022.
- IEEE Conference on Communications and Network Security (CNS) 2020, 2021, 2022.
- International Conference on Network and System Security (NSS) 2020, 2021.
- The 10th International Workshop on Security, Privacy, Trust, and Machine Learning for Internet of Things (IoTSP-ML) 2020.
- Security and Privacy in Edge Computing Workshop (EdgeSP) 2018, 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 (18):

- 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)
- IEEE/ACM Transactions on Networking (ToN)
- IEEE Transactions on Wireless Communications (TWC)

- IEEE Transactions on Vehicular Technology (TVT)
- 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

Student Engagement:

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