# Weijia He

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## RESEARCH INTEREST

IoT Security & Privacy; Usable Security & Privacy; Human-Computer Interaction (HCI)

## EDUCATION

**University of Chicago, Chicago, IL** **Sep. 2017 - Present**
*Ph.D in Computer Science* (third year currently, expect in Jun. 2023)

**Shanghai Jiao Tong University, Shanghai, China** **Sep. 2013 - Jul. 2017**
*Bachelor of Science in Information Security*

## Employment

**Graduate Research Assistant** **Sep.2017 – Present**
*SUPER Group, University of Chicago*
**Undergraduate Research Assistant** **Mar.2016- Dec. 2016**
*LoCCS Lab, Shanghai Jiao Tong University*

## PUBLICATIONS

**SoK: Context Sensing for Access Control in the Adversarial Home IoT**
**Weijia He**, Valerie Zhao, Olivia Morkved, Sabeeka Siddiqui, Earlence Fernandes, Josiah Hester, Blase Ur
In *Proceedings of the 6th IEEE European Symposium on Security and Privacy(EuroSP).Vienna, Austria, September 2021*.

**Rethinking Authentication and Access Control for the Home Internet of Things (IoT)**
**Weijia He**, Maximilian Golla, Roshni Padhi, Jordan Ofek, Markus Dürmuth, Earlence Fernandes, Blase Ur
In *Proceedings of the 27th USENIX Security Symposium (USENIX Security'18)*, Baltimore, MD, 2018.

**Trace2TAP: Synthesizing Trigger-Action Programs From Traces of Behavior**
Lefan Zhang, **Weijia He**, Olivia Morkved, Valerie Zhao, Michael L. Littman, Shan Lu, Blase Ur.
In *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 4, 3, Article 104 (IMWUT / UbiComp). Online, September 2020.*

**AutoTap: Synthesizing and Repairing Trigger-Action Programs Using LTL Properties**
Lefan Zhang, **Weijia He**, Jesse Martinez, Noah Brackenbury, Shan Lu, Blase Ur.
In *Proceedings of the 41st International Conference on Software Engineering (ICSE)*. Montreal, QC, Canada, 2019.

**How Users Interpret Bugs in Trigger-Action Programming**
Will Brackenbury, Abhimanyu Deora, Jillian Ritchey, Jason Vallee, **Weijia He**, Guan Wang, Michael L. Littman, Blase Ur
In *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*. Glasgow, UK, 2019.

**When Smart Devices Are Stupid: Negative Experiences Using Home Smart Devices**
**Weijia He**, Jesse Martinez, Roshni Padhi, Lefan Zhang, Blase Ur.
In *Proceedings of the IEEE Workshop on the Internet of Safe Things*. San Francisco, CA, 2019.

**Clap On, Clap Off: Usability of Authentication Methods in the Smart Home**
**Weijia He**, Juliette Hainline, Roshni Padhi, Blase Ur
*Proceedings of the Interactive Workshop on the Human Aspect of Smarthome Security and Privacy (WSSP).* Baltimore, MD, 2018.

## RESEARCH EXPERIENCES

**Firewall Rules Generation based on Traffic Data from Smart Devices** Jan.2020 - Present

***Key Word: Security, IoT, Traffic Analysis***

Advisor: Blase Ur (University of Chicago)

- Analyzed the 10GB traffic data from the IoT Inspector dataset (with approval of access from Princeton).
- Statistically generated firewall rules based on the given dataset.
- Implemented the generated firewall rules on real-world smart home devices through iptables and BIND9. Analyzed the traffic generated from the device and understood the minimum set of traffic that maintains the functionalities.

**Multi-User Authentication and Access Control in the Internet of Things** Jul. 2017 - Present

***Key Word: Security, Privacy, HCI, Smart Home***

Advisor: Blase Ur (University of Chicago)

- Proposed access-control specification for the multi-user home IoT based on relationships, capabilities and contexts.
- Discovered the frequent context-dependence of access-control policies from a 425-participant user study. Identified 11 contextual factors that future interfaces should support.
- Mapped desired contexts to sensing mechanisms, evaluated existing sensing technologies in terms of security, privacy, and usability, exploring the possibility of physical attacks to the sensors.

**User Activity based Trigger-Action Programming in the Internet of Things** Jan.2018 – Aug. 2020

***Key Word: HCI, Smart Home***

Advisor: Blase Ur (University of Chicago)

- Implemented customized trigger-action rule-creation website based on Samsung SmartThings.
- Designed a 72-participant survey to understand how end-users creates rules for a given scenario, comparing their behavior in face of trigger-action rule creation or safety-property creation.
- Designed and conducted a field study of synthesizing trigger-action rules based on users' own activities.

**A Security Study of Authenticators in Single-Sign-On** Jan. 2016 - Mar. 2016

***Key Word: SSO, Authentication, Online Social Network***

Advisor: Yuanyuan Zhang (Shanghai Jiao Tong University)

- Conducted a fuzz test on the SSO(Single-Sign-On) implementations on 65 most popular Android apps in Chinese app market by using Burp Suite.
- Discovered that some apps tried to authenticate users with insecure authenticators. Many apps, served as relying party, couldn't defend MITM attack, including some of the most popular apps in China, such as Sina Weibo, a Twitter-like app with over 550 million times download.

## SERVICES

- **Artifact Evaluation Committee Member**, The 30th Usenix Security Symposium, 2021.
- **Shadow PC member**, The 41st IEEE Symposium on Security and Privacy, 2020.
- **External Reviewer**, CHI 2020
- **PC Member**, The European Workshop on Usable Security, 2019, 2020.
- **PC Member**, The CSCW 2019 workshop, Ubiquitous Privacy: Research and Design for Mobile and IoT Platforms

## HONORS & AWARDS

- Student Travel Grant for 2019 IEEE Symposium on Security and Privacy ($1,250)
- Usenix Security 2018 Student Grant ($745)
- SOUPS 2018 Student Grant ($770)

## TEACHING EXPERIENCES

**Ethics, Fairness, Responsibility, and Privacy in Data Science (CMSC 25900)** Spring, 2020
*Teaching Assistant, University of Chicago*
- Duty includes giving lectures, designing problem sets, grading, and holding office hours.

**superpowHer: compileHer Tech Capstone 2019** April 2019
*Instructor*
- Duty includes giving lectures.

**Usable Security and Privacy (CMSC 23210 / CMSC 33210)** Spring 2018, 2019
*Teaching Assistant, University of Chicago*
- Duty includes giving lectures and grading.

**Computer Science with Applications 1 (CMSC 12100)** Sep.2017 – Dec. 2017
*Teaching Assistant, University of Chicago*
- Duty includes leading labs, grading homework and holding office hours.

## SKILLS

**Language:** Python, JavaScript, Java, C++, C#, R, Shell Script, Latex
**Hardware:** Raspberry Pi, Jetson Nano