# XUENING XU

+1 (215)-433-8928 ◇ xuening0912@gmail.com ◇ Jersey City, NJ ◇ Homepage

## SKILLS

- **Programming Languages:** Python, Java, JavaScript/Node.js, C/C++, HTML/CSS, Lua, SQL, Swift
- **Frameworks:** Flask, Express.js, React.js, PyTorch, Scikit-learn, OAuth 2.0, SmartThings SDKs, nRF5 SDK, Alexa Skills Kit
- **Tools & Services:** Docker, Wireshark, tcpdump, Linux CLI Tools, Postman, Git, Firebase, AWS Lambda, Amazon EC2

## SELECTED RESEARCH PROJECTS

**Discovering and Exploiting Vulnerability on Zigbee Devices** Nov 2022 - Feb 2023

- Revealed a vulnerability - *Zigbee Hidden Attributes* that exists on most commodity Zigbee devices.
- Simulated an end-to-end attack by developing a customized Zigbee light switch in **C** using **nRF5 SDK**.
- Disclosed this vulnerability to device manufacturers and received acknowledgements from Samsung, Amazon, and Connectivity Standards Alliance (CSA). Amazon awarded a **$2,500** bounty for the valuable findings.

**Customized Local Server for Connecting IoT Devices to Cloud Platforms** Jan 2022 - Jun 2022

- Built an one-stop-for-all local server using **JavaScript** on **Ubuntu** to connect various types of IoT devices.
- Integrated with two cloud platforms (IFTTT and Samsung SmartThings) using **JavaScript** and implemented **OAuth 2.0** for authentication, enabling device management on the cloud platforms for previously unsupported IoT devices.
- Implemented a database using **SQLite** to manage connected devices and handle tokens received from cloud platforms.

**Detection of Malicious Local Attacks on IoT Devices** Apr 2021 - Dec 2021

- Built an **OpenWrt** Wi-Fi router on a **Raspberry Pi** and adopted **tcpdump** to remotely capture network traffic.
- Designed an analysis tool in **Python** to extract **network layer** information to generate communication patterns.
- Developed an **iOS app** in **Swift** to simulate attacks using device APIs and detected them with the generated patterns.

**End-to-End Smart Speaker Protection System** Sep 2020 - Mar 2021

- Built a **transparent proxy** in **Python** to redirect network traffic of smart speaker for real-time analysis.
- Created an analysis tool in **Python** to detect voice invocations and trigger **Firebase Cloud Messaging (FCM)** notifications.
- Developed an **Android app** in **Java** with FCM integrated to measure smart speaker Bluetooth RSSI upon notifications.
- Implemented an end-to-end system using **Python** to detect and block unauthorized voice commands based on RSSI.

## EDUCATION

**Stevens Institute of Technology** Jan 2022 - Expected Dec 2024
*Ph.D. in Computer Engineering*

**Temple University** (Continued at Stevens Institute of Technology) Sep 2019 - Dec 2021
*Ph.D. Program in Computer and Information Sciences*

**Temple University** (Dual Bachelor's Master's Degree program) Sep 2017 - May 2019
*M.S. in Computer Science*

**University of Science and Technology of China** Sep 2014 - Jun 2018
*B.S. in Mathematics and Applied Mathematics*

## PUBLICATIONS

- **Xuening Xu**, Chenglong Fu, and Xiaojiang Du. "MP-Mediator: Detecting and Handling the New Stealthy Delay Attacks on IoT Events and Commands." In 26th International Symposium on Research in Attacks, Intrusions and Defenses (RAID), pp. 46-62. ACM, 2023. (Acceptance rate: 23.5%)
- **Xuening Xu**, Chenglong Fu, Xiaojiang Du, and E. Paul Ratazzi. "VoiceGuard: An Effective and Practical Approach for Detecting and Blocking Unauthorized Voice Commands to Smart Speakers." In 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), pp. 582-596. IEEE, 2023. (Acceptance rate: 20%)
- **Xuening Xu**, Xiaojiang Du, and Qiang Zeng. "Attacking Graph-Based Classification without Changing Existing Connections." In Annual Computer Security Applications Conference (ACSAC), pp. 951-962. 2020. (Acceptance rate: 23%)
- **Xuening Xu**, Chenglong Fu, Xiaojiang Du, and E. Paul Ratazzi. "Effective UAV and Ground Sensor Authentication." In 2019 IEEE Global Communications Conference (GLOBECOM), pp. 1-6. IEEE, 2019.