

Lanqing Yang



Research Area: Mobile Computing (Computer Science)

TEL: (+86) 17650565095

E-mail:

yanglanqing@sjtu.edu.cn

Tutors: Yi-Chao Chen, Guangtao Xue

Homepage:

<https://lanqing-sjtu.github.io/academic/>

Education

Shanghai Jiao Tong University

09/2017-Now

Ph.D. Candidate, Department of Computer Science

University of Electronic Science and Technology of China

09/2013-06/2017

Undergraduate, Department of Software Engineering

Academic Achievements

- MagPrint: Deep Learning Based User Fingerprinting Using Electromagnetic Signals. 1st author. IEEE Infocom 2020.
- Interacting with Electrical Appliances Using Sounds from Power Supply. 1st author. Submitted to MobiSys 2022.
- Remote Attacks on Speech Recognition Systems Using Power Supply. 1st author. SECURITY 2022 2nd round review.
- MagThief: Stealing Private App Usage Data on Mobile Devices via Built-in Magnetometer. 2nd author. SECON 2021.
- VibWriter: Handwriting Recognition System based on Vibration Signal. 2nd author. SECON 2021.
- Poster: Appliance Fingerprinting Using Sound from Power Supply. 1st author. ACM UbiComp/ISWC 2020 Poster.
- mQRCode: Secure QR Code Using Nonlinearity of Spatial Frequency in Light. 2nd author. ACM MobiCom 2019.
- Hand-free Gesture Recognition for Vehicle Infotainment System Control. 2nd author. IEEE VNC 2018.
- ScreenID: Enhancing QRCode Security by Fingerprinting Screens. 5th author. InfoCom 2021.

Skills & Awards

- Good knowledge of Signal Processing, Machine Learning, Nature Language Processing
- Skilled in Python, Tensorflow, Matlab, Spark, Nosql Database and data visualization;
- Certificate of Participate in Outstanding Youth Paper Award. 2020/7
- Second Prize of National College Green Computing Competition. 2018/11
- Third Prize of IEEE VNC 2018 App Contest. 2018/11

Main Research Projects

Research on Non-local Convolutional Neural Networks

02/2019-03/2022

- In many multi-channel (spatial-temporal) time series scenarios (e.g., multi-sensor physiological signals analysis), it's impossible to hold the non-local assumption for CNN. This project targets at proposing new CNN frameworks.
- Designed a local-connection mining scheme to extract the spatial-temporal relationship, a spatial-temporal reconstruction scheme to reconstruct the relationship, and a feature extraction scheme to use the relationship.
- Experimented on 9 datasets and achieved 8.7% improvements outperforms SOTA methods. Submitted to KDD 2022.

Research on Remote Attack on Speech Recognition Systems

04/2020-Now

- Targeting at attacking on existing SR systems remotely using sounds from nearby power supply.
- Led a team of 3 teammates. Experimented CPU modulation schemes to generate human-like sounds, analyzed the spectrograms, and employed reinforcement learning to learn CPU modulation parameters adaptively.
- Implemented on 10 commercial SR systems, achieved the attack 23 meters away.

Research on Stealthy Data Leakage in Air-gapped Computers

07/2021-02/2022

- Targeting at stealing privacy data from air-gapped (e.g., unconnected to internet) computers.
- Led a team of 2 teammates. Experimented on how different CPU modulation factors affect the overall transmission speed. Designed an error correction scheme basing on different frequency bands.
- Implemented on commercial mobile devices. Achieved a speed of 2,400 bps, outperformed SOTA by 20x.

Research on Appliance Interaction with Appliances Using Mobile Devices

07/2020-05/2021

- Targeting at interacting with home appliances using mobile devices (e.g., mobile phones, smart watches) without extra hardware or hardware modifications.
- Led a team of 4 teammates. Surveyed the principles of Switching-mode power supply (SMPS), and where the sounds were from. Implemented a system to interact with appliances with their SMPS.
- Experimented on 100 commercial appliances. Achieved an identification F1 score of 95%.

Research on Continuous User Fingerprinting using Electromagnetic (EM) Signals

05/2018-05/2020

- Targeting at implementing continuous app/user fingerprint on mobile devices using EM signals.
- Collected EM signals with DIY magnetic sensors and surveyed how user operating habits can be affected on EM signals. Designed a scheme to preprocess human movement noises, a FCN-LSTM classifier to identify users.