

Education

Northwestern Polytechnical University *Sep. 2014 – Jun. 2019*
Ph.D. in Computer Science and Technology

Northwestern Polytechnical University *Sep. 2010 – Jun. 2014*
B.E. in Computer Science and Technology

Projects

Non-auditory speech recognition in head-mounted displays (HMD)

- Introduction: Speech recognition is implemented using the motion sensors in HMD without the help of microphone as the head motion caused by phonation itself is recognizable.
- Contribution: I am in charge of modeling, programming and paper writing. A Multivariate Time Series (MTS) classification method based on Symbolic Fourier Approximation (SFA) and Bag-of-Patterns (BoP) is proposed. The recognition accuracy can be up to 90.97%.

Viewport prediction for spatial adaptive streaming in 360 videos

- Introduction: Viewport prediction is achieved by combining the visual-auditory content and the attention-related signal in electroencephalogram (EEG).
- Contribution: I am in charge of modeling, programming, visualizing and paper writing. The system can save up to 80% network traffic for 360 video streaming.

Video identification using network traffic during video streaming

- Introduction: Based on Variable Bit-Rate (VBR) encoding and Dynamic Adaptive Streaming over HTTP (DASH), identifiable fingerprints can be extracted from network traffic of video streaming.
- Contribution: I am in charge of modeling, programming and paper writing. The identification accuracy can be up to 90% by monitoring the network flow for 3 minutes.

Large-scale privacy preserving content-based image search in cloud

- Introduction: The privacy leakage problem in content-based image search is solved by adopting homomorphic encryption so service providers can still help search images without knowing the content.
- Contribution: I participate in the survey of encryption techniques and the design of key transfer protocol. The prototype system performs well on a dataset containing one million diverse images.

Object discovery and localization using crowdsourced images

- Introduction: By combining the visual content and geographic information in crowdsourced images, objects of interest can be discovered and localized.
- Contribution: I am in charge of algorithm design, programming, data analysis and paper writing. The final localization error can be controlled to near 5 meters.

A webRTC-based video chat solution featuring accessibility

- Introduction: A video chat solution is provided for a nursing home in Shanghai. It features in accessibility, low delay, high definition and stable connection.
- Contribution: I am in charge of system architecture, system development and test. A practical field deployment and demonstration is done and a positive customer response is received.

Open-source projects

- *iStatus*: An applet for inspecting macOS including temperature, fan speed and disk utilization.
- *zQuote*: A digital card maker based on Cairo with refined typography and support for Chinese.
- *VideoTrans*: A multimedia transmission solution based on Pragmatic General Multicast (PGM).

Skills

- **Programming:** C, C++, Java, Haskell.
- **Speaking:** English (CET6: 501)
- **Computing:** Python, R.
- **Hacking:** Emacs(-Lisp), Vim, *NIX, L^AT_EX.

Publications

- First-author: *Walls Have Ears: Traffic-based Side-channel Attack in Video Streaming*
Conference (19.2%): *IEEE International Conference on Computer Communications 2018*
- First-author: *NASR: NonAuditory Speech Recognition with Motion Sensors in Head-mounted Displays*
Conference: *International Conference on Wireless Algorithms, Systems and Applications 2018*
- First-author: *Spotlight: Hot Target Discovery and Localization with Crowdsourced Photos*
SCI journal (under review): *Tsinghua Science and Technology*
- First-author: *Alohomora: Motion-based Hotword Detection in Head-Mounted Displays*
SCI journal (under review): *IEEE Internet of Things Journal*
- Co-author: *PIC: Enable Large-Scale Privacy Preserving Content-Based Image Search on Cloud*
SCI journal: *IEEE Transactions on Parallel and Distributed Systems*