Jiaxi Gu

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Education

Northwestern Polytechnical University ..... *Sep. 2014 – Jun. 2019*
Ph.D. — Computer Science and Technology — GPA: 3.43/4.00
Research interests: Mobile computing and video streaming **Supervisor**: Yunhao Liu
Institution: Institute of Trustworthy Networks and Systems of Tsinghua University

Northwestern Polytechnical University ..... *Sep. 2010 – Jun. 2014*
B.E. — Computer Science and Technology — GPA: 3.38/4.00
Major courses: Linear algebra, Discrete mathematics, Stochastic processes, Data structures and algorithms, Object-oriented programming, Principles of compiler design, Computer graphics

Academic Projects

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.

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%.

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.

Industrial Projects

Video surveillance of Halfaya oilfield in Iraq

- Introduction: A solution of video surveillance in network-constrained conditions and it especially requires low bandwidth occupancy and low delay.
- Contribution: I am in charge of protocol design, application development and testing.

RFID-based baggage-handling for Hainan Airlines

- Introduction: A solution of baggage-handling requiring high accuracy and quick response in airports.
- Contribution: I am in charge of narrowing the range of radio-frequency signals in order to increase sort accuracy and reduce errors of the Baggage-Handling System (BHS).

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.

Magnetic sensor based parking management system

- Introduction: A magnetic sensor based parking management system using MSP430 MCUs developed for a parking lot of Wuhan government.
- Contribution: I am in charge of protocol design and application development. The functions of the system contain node awakening, magnetic induction and data collection.

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).

Social Activities

- *2018 May.* In charge of the conference registration of the 2nd ACM Turing Celebration Conference.
- *2017 May.* In charge of the conference registration of the 1st ACM Turing Celebration Conference.
- *2015 May.* As a teaching assistant of *High-level Language Programming* course.
- *2013 Jul.* As a software engineer for developing an OA system in Neuedu.
- *2012 Sep.* As an exchange student in Tunghai University of Taiwan.
- *2012 Jun.* As a volunteer of CCTV "Star of Outlook" English talent competition.

Awards & Honors

- *2013 Nov.* The second prize scholarship of Northwestern Polytechnical University.
- *2012 Jun.* The second prize of the 13rd "NPU Cup" mathematical modeling contest.
- *2011 Nov.* The second prize scholarship of Northwestern Polytechnical University.
- *2011 Jun.* The third prize of the 12nd "NPU Cup" mathematical modeling contest.

Professional Skills

- **Programming Languages**: Python (proficient); C (proficient); C++ (proficient) Java (proficient); R (competent); Haskell (beginner).
- **Frameworks**: Scikit-learn (proficient); TensorFlow (competent); OpenCV (competent); FFmpeg (competent); Caffe (beginner).
- **Languages**: English (CET-6, full professional proficiency); Chinese (Native language)
- **Others**: Linux; Emacs; Vim; Git; LaTeX.

Publications

- 1st-Author: *Traffic-based Side-channel Attack in Video Streaming*
  SCI-Journal: *IEEE/ACM Transactions on Networking*, 2019
- 1st-Author: *Walls Have Ears: Traffic-based Side-channel Attack in Video Streaming*
  Conference (AR=19.2%): *IEEE International Conference on Computer Communications*, 2018

- 1st-Author: *NASR: NonAuditory Speech Recognition with Motion Sensors in Head-mounted Displays*
  Conference: *International Conference on Wireless Algorithms, Systems and Applications*, 2018
- 1st-Author: *Spotlight: Multiple-object Localization by Mobile Photo Fusion*
  Conference: *International Conference on Big Data Computing and Communications*, 2018
- 1st-Author: *Spotlight: Hot Target Discovery and Localization with Crowdsourced Photos*
  SCI-Journal (under review): *Tsinghua Science and Technology*
- 1st-Author: *Alohomora: Motion-based Hotword Detection in Head-Mounted Displays*
  SCI-Journal (under review): *IEICE Transactions on Communications*
- Co-Author: *PIC: Enable Large-Scale Privacy Preserving Content-Based Image Search on Cloud*
  SCI-Journal: *IEEE Transactions on Parallel and Distributed Systems*, 2017

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