Song Yang

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Education

Ph.D. Student, Electrical and Computer Engineering. GPA: 4.0/4.0 *09/2019 – 07/2020*
Rutgers, The State University of New Jersey, New Brunswick, NJ
Area of Research: IoT, Security Engineering, Radar Sensing

M.S., Electrical and Computer Engineering. GPA: 3.8/4.0 *08/2017 – 05/2019*
Rutgers, The State University of New Jersey, New Brunswick, NJ
Thesis: Hand-gesture Sensing Leveraging Radio and Vibration Signals

B.S., Information and Software Engineering. *08/2014 – 05/2018*
University of Electronic Science and Technology of China (UESTC), Chengdu, China.
Thesis: Virtual Sound Assistant

Experience

Graduate Assistant, Rutgers University, New Brunswick, NJ *04/2020 – 07/2020*
Undergraduate Capstone Mentor, Rutgers University, New Brunswick, NJ *09/2019 – 04/2020*
Teaching Assistant, Rutgers University, New Brunswick, NJ *09/2019 – 01/2020*
Course taught: Robotics & Computer Vision (14:332:472) / Machine Vision (16:332:561)
Instructor: Prof. Kristin Dana
[Course Feedbacks]
WINLAB Summer Internship Mentor, WINLAB, Rutgers University, New Brunswick, NJ *06/2019 – 09/2020*
Front End Software Developer, DBAPP Security, Hangzhou, China *04/2017 – 07/2017*

Research Projects

mPose: Reconstructing Fullbody 3D Skeleton Postures Leveraging a Single Millimeter Wave Sensor *09/2019 – 07/2020*

Goal: Use a COTS **mmWave radar sensor** to reconstruct millimeter-level human skeletons with 14 joints.
- Analyzing the millimeter radar chirp configs to capture human motion in the sensing area. Designed spatial features on top of the raw radar signals and use a **recurrent neural network (RNN)** to predict skeleton joints.
- Achieved a **34mm** average joint error among 14 joints in a single domain.
- Poster Demos on IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN'19) and 2019 Rutgers ECE Research Day

Hybrid Hidden Voice Command *09/2019 – 07/2020*

Goal: Design a hybrid **hidden voice command** that is unintelligible to humans but recognizable for the Google speech recognition system. The attack command can also bypass the hidden voice command defense classifier.
- Implemented audio-related processing tools using **Python** and **Matlab**, including audio fusing, speed tuning, pitch tuning, etc.
- Built an open-source tool for recording and parsing a lot of short audio files and conduct speech recognition.

Enabling Finger-touch-based Mobile User Authentication via Physical Vibrations on IoT Devices *06/2019 – 05/2020*

Goal: Achieve a **user authentication system** on ubiquitous surfaces leveraging the physical vibration and deep neural network (DNN).
- Developed a signal sequence match approach based on **dynamic time wrapping (DTW)** and **earth mover's distance (EMD)** to authenticate legitimate gestures.
- Built a prototype on Android and different table materials as a proof-of-concept demo.

Exploring PIP-tag Sensor *06/2019 – 07/2019*

Goal: Explore the usage of PIP-tag sensors in capturing light strength, humidity, and temperature. Developed tutorial which is further used in advising an undergrad Capstone team.

Publication

Kwon, S. M., **Yang, S.**, Liu, J., Yang, X., Saleh, W., Patel, S., ... & Chen, Y. (2019, November). Hands-Free Human Activity Recognition Using Millimeter-Wave Sensors. In 2019 IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN) (pp. 1-2). IEEE.

Awards

- Second-class scholarship, UESTC, China *2014 - 2015*
- Second-class scholarship, UESTC, China *2015 - 2016*
- First-class scholarship, UESTC, China *2016 - 2017*