Zhenzhe Lin

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RESEARCH INTEREST

Mobile Computing and Sensing, Internet of Things, Smart Healthcare

EDUCATION

Rutgers University, New Brunswick, NJ **09/2019 - Present**
Research Assistant, Electrical and Computer Engineering

New Jersey Institute of Technology, Newark, NJ **09/2016 - 07/2018**
M.S., Electrical Engineering

Dalian Maritime University, Dalian, China **09/2012 - 07/2016**
B.E., Electrical Engineering

PUBLICATIONS

- **Zhenzhe Lin**, Yucheng Xie, Xiaonan Guo, Chen Wang, Yanzhi Ren, Yingying Chen, "WiFi-enabled Automatic Eating Moment Monitoring Using Smartphones", in Proceedings of the 6th EAI International Conference on IoT Technologies for HealthCare **(HealthyIoT 2019)**, Braga, Portugal, Dec 2019. **Best Paper Award.**
- **Zhenzhe Lin**, Yucheng Xie, Xiaonan Guo, Yanzhi Ren, Yingying Chen, Chen Wang, "WiEat: Fine-grained Device-free Eating Monitoring Leveraging Wi-Fi Signals", in Proceedings of the 29th International Conference on Computer Communications and Networks **(ICCCN 2020)**, Honolulu, Hawaii, USA, Aug 2020.
- mPose: Environment-independent 3D Skeleton Posture Reconstruction Leveraging a Single mmWave Device. (In Submission)

RESEARCH EXPERIENCE

Wireless Information Network Laboratory (WINLAB), Rutgers University, NJ
Research Assistant **09/2019 - Present**

Project: Environment-invariant Suspicious Object Detection Using WiFi **09/2019 - Present**

- Implement a system to detect human carried suspicious objects concealed in baggage using channel state information (CSI) obtained from commodity WiFi devices
- Propose an environment-invariant model that uses adversarial learning to extract environment-independent features from WiFi signals collected at different times and environments
- Exploit CSI dynamic patterns to differentiate static and dynamic components to identify material types of the sensing targets under moving scenarios (e.g., objects carried with a conveyor belt)

Project: RFID-based Heart Rate Variability Measurement **03/2020 - Present**

- Leverage RFID tag array attached to chest of subjects to continuously sense human heartbeats and estimate heart rate variability (HRV)
- Model reflection and moving effects to capture the relationship between the RF-signals extracted from RFID tag array and corresponding movements from the heartbeats or respiration
- Utilize wavelet-based signal denoising and signal fusion approaches to remove interference of the RF signals and extract Inter-beat Interval (IBI) for HRV assessment

Project: mmWave-based 3D Skeleton Posture Reconstruction **01/2020 - 07/2020**

- Implemented a 3D skeleton posture reconstruction system to extract spatial features from joint-related mmWave signals and localize skeletal joints in 3D space
- Designed a domain discriminator to remove user- and environment-specific characteristics entangled in mmWave signals to achieve skeleton reconstruction across different domains
- Built a convectional neural network with domain discriminator for 3D skeletal reconstruction that can achieve better performance than existing work with an average joint error of around 30mm

Research Intern **08/2018 - 08/2019**

Project: WiFi-based Eating Activity Monitoring **01/2019 - 08/2019**

- Developed a device-free eating monitoring system based on channel state information (CSI) to automatically track people's eating activity
- Proposed a soft decision-based approach and adopted machine learning methods to identify eating motions associated with different utensils
- Designed a minute motion reconstruction method to capture movements of facial muscles and developed a power spectral density method to derive the chewing and swallowing statistics

Project: Deep Neural Network Aided BCH Decoder **08/2018 - 12/2018**

- Leveraged deep neural network to obtain individual scaling parameters for normalized min-sum algorithms
- Compressed the DNN-aided channel decoders by weight sharing to avoid the major disadvantage of computation and storage overhead
- Implemented the RTL design and reduced 2.59 times of memory saving compared with conventional BCH decoders, improved convergence rate by 6 times with similar decoding performance

TEACHING EXPERIENCE

- 16:332:583 Semiconductor Device I, Teaching Assistant, Rutgers University Fall 2020
- 14:332:465 Physical Electronics, Teaching Assistant, Rutgers University Fall 2020
- WINLAB Summer Internship Program, Mentor, Rutgers University Summer 2020
- ECE Senior Design Capstone Projects, Mentor, Rutgers University Spring 2020

TECHNICAL SKILLS

Programming Languages: MATLAB, Python, C++, Verilog, VHDL, Java, LaTeX
Frameworks: TensorFlow, PyTorch, Arduino

HONORS & AWARDS

- **Best Paper Award**, HealthyIoT - 6th EAI International Conference on IoT Technologies for HealthCare 2019
- **Second Prize**, 8th Annual National Conference on Undergraduate Innovation and Entrepreneurship 2015