RUXIN (DAISY) WANG

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EDUCATION

Louisiana State University, Baton Rouge, LA, USA *Aug. 2020 - Present*
PhD. in Computer Science (CS)

Syracuse University, Syracuse, NY, USA *Aug. 2017 – May. 2019*
M.S. in Computer Engineering (CE)

Northeast Forestry University, Harbin, China *Aug. 2013 – May. 2017*
B.S. in Electrical Engineering (EE)

WORK EXPERIENCE

HSBC Bank (China) Company Limited, Guangzhou, China *Aug. 2019 - Jul. 2020*
Software Engineer

RESEARCH INTERESTS

Mobile Sensing and Computing, Human-Computer Interaction (HCI), Deep Learning, Cybersecurity, and AI in Healthcare.

HONORS AND AWARDS

Travel Grant at the 44th IEEE Symposium on Security and Privacy (S&P23) *04/2023*

Third Place Award at the 1st LSU's Graduate Research Conference *04/2023*

Symposium Meritorious Awards at LSU's 4th EECS Graduate Student Research *05/2022*

N2Women Fellowship & Travel Grant at the 27th Annual International Conference On Mobile Computing And Networking (ACM MobiCom21) *11/2021*

Student Graduated with Honors at Northeast Forestry University *05/2017*

PUBLICATIONS

Louisiana State University, Baton Rouge, LA, USA

- **R. Wang**, L. Huang, and C. Wang, "Low-effort VR Headset User Authentication Using Head-reverberated Sounds with Replay Resistance." in *Proceedings of the 44th IEEE Symposium on Security and Privacy (IEEE S&P)*, 2023.
- GV. Gonzalez, C. Wang, **R. Wang** and TT. Tseng, "Extended reality and binge eating behaviors among minorities." in *Proceeding of the 16th Health Disparities Conference (XULA)*, 2023
- **R. Wang**, K. Madden, C. Wang, "Low-effort User Authentication for Kiosk Systems based on Smartphone User's Gripping Hand Geometry." *Late Breaking Work of the 2022 CHI Conference on Human Factors in Computing Systems*, 2022.
- **R. Wang**, L. Huang, and C. Wang, "Preventing handheld phone distraction for drivers by sensing the gripping hand," in *Proceedings of the 18th IEEE International Conference on Mobile Ad-hoc and Sensor Systems (IEEE MASS)*, 2021.

- **R. Wang**, L. Huang, and C. Wang, "Poster: Distracted Driving Detection By Sensing The Hand Gripping Of The Phone," in *Proceedings of The 27th Annual International Conference On Mobile Computing And Networking (ACM MobiCom)*, 2021.

RESEARCH PROJECTS

AR-enabled Dietary Health Monitoring and Intervention *11/2022 - Present*
Description: We propose a fine-grained eating monitoring system using off-the-shelf AR glasses, which unobtrusively detects eating episodes and provides detailed measurements of food intake.

- The system utilizes multimodal sensing to track users' dietary habits in real-life situations. This includes detecting eating episodes, identifying chewing and swallowing actions, recognizing food types, and estimating food amount and calorie intake.
- We extract a series of cross-domain features (e.g., Optical Flow from video, MFCCs from audio) and leverage multiple learning-based algorithms for fine-grained eating monitoring.

Low-effort Vision-based Security Enhancement for QR Code System *08/2022 – Present*
Description: We propose a low-effort, vision-based authentication system to protect the QR code provider in two scenarios: phone-kiosk and phone-phone. This system integrates traditional security tokens and image-based gripping hand biometrics to provide enhanced security.

- We leverage the existing hand tracking interface, *MediaPipe*, to localize the hand in the image, obtain the hand skeleton, and apply a series of image processing schemes to extract four gripping hand geometry features (i.e., hand skeleton, hand contour, hand color, and skin patterns).
- We develop a CNN-based classifier to distinguish users' identities based on how they grip a smartphone. We further design a liveness validation algorithm using hand-joint motions to defend against 2D image spoofing and 3D replay attacks.

VR Headset User Authentication Using Skull-reverberated Sounds *08/2021 – Present*
Description: we propose a low-effort VR user authentication system based on extracting the acoustic-domain head biometrics that are naturally born with head-mounted devices.

- We initiate the authentication session with a millisecond-level ultrasonic signal emitted by the VR device, extracting head biometric information from the received signal for authentication.
- We develop a CAE-CNN algorithm to encode the head biometric for each individual from acoustic signals, counteract the built-in echo cancellation effect, reduce noise impacts to serve long-term use, and increase difficulties for replay attacks.

Preventing Handheld Phone Distraction for Drivers *08/2020 – Present*
Description: we propose a continuous phone-use monitoring system to eliminate the driver's handheld device distraction by sensing the gripping hand.

- We derive the short-time Fourier transform from the microphone data to describe such impacts and develop a CNN-based binary classifier to discriminate the phone use between the handheld and the handsfree status.
- We design an adaptive window-based filter to correct the classification errors and identify each handheld phone distraction instance, including its start, end, and duration.

WORK PROJECT

Maintaining and Enhancing Financial Transaction Platform, HSBC *08/2019 – 07/2020*
Description: Software Developing and Testing.

- Developed a tool in JAVA that automatically scans a stream of zip files and picks out the useful ones at five-second intervals. The tool significantly improves efficiency, as these tasks were traditionally performed manually.
- Maintained and enhanced the internal financial transaction platform in SQL. The upgraded system now offers businesses the ability to instantly generate customizable reports and export them in multiple formats, including PDF, Excel, and Word.
- Conducted comprehensive functional testing to validate end-to-end user workflows. Authored detailed test plans and cases and documented bug reports to provide a transparent and reproducible testing process.

SELECTED OTHER PROJECTS

Travel Experiences Management Website, LSU *08/2022 – 11/2022*
Description: To provide an easy way to store and manage users' travel experiences (e.g., files, photos).

- Designed a 3-tier web application architecture using Amazon Web Services (AWS). The first tier consisted of static content created with HTML5, CSS, and JavaScript, which was stored on an Amazon EC2 instance running an Apache web server. The second tier featured seven Java servlets deployed on another EC2 instance that ran a Tomcat server. The third tier housed a MySQL database deployed on a separate EC2 instance.
- The Apache server handled user requests and routed them to Tomcat, which connected to MySQL via Java Database Connectivity (JDBC).

Reinforcement Learning in Car Racing Games for Self-Driving, LSU *08/2021 – 05/2021*
Description: To develop a race car AI using reinforcement learning algorithms.

- Developed a car racing game in Unity, designed Performance, Environment, Actuators, Sensors (PEAS) problem specifications, and created a bridge to facilitate communication between reinforcement learning models in Python and the game environment in C#.
- Implemented four types of reinforcement learning algorithms such as Proximal Policy Optimization (PPO), NeuroEvolution of Augmenting Topologies (NEAT), Deep Deterministic Policy Gradient (DDPG), and Deep Q-Learning Network (DQN).

Remote Code Repository in C++, Syracuse University *01/2018– 05/2018*
Description: To develop a remote code repository responsible for managing source code resources (e.g. files and documents) and access the repository's functionality over a communication channel.

- Developed client-side using GUI and WPF framework enables the client to upload and download files and developed server-side using WCF framework to provide functionality like check-in, check-out, and browse files.
- Designed and implemented a NoSQL database that could support CRUD operations by using the unordered map in C++. Implemented an HTTP-style message protocol and socket-based asynchronous message-passing communication channel.

TECHNICAL STRENGTHS

Programming Language: Python, JAVA, C++, C#, MATLAB, SQL.
Deep Learning Framework: Tensorflow, Keras, Pytorch.
Deep Learning Model: CNN, RNN, LSTM, Reinforcement Learning, Generative Models.
Machine Learning Algorithm: SVM, K-means, KNN.
Database: MySQL, NoSQL, MongoDB.
Software Development: Amazon Web Services (AWS), Unity, Android Application, Spring Boot, Tomcat, AngularJS, WCF/WPF, CSS, JavaScript, HTML.