YILI REN

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EDUCATION

Florida State University, Ph.D. *August 2017 – August 2023*
Computer Science
Advisor: Dr. Jie Yang

Beihang University, M.S. *September 2014 – March 2017*
Transportation Information Engineering and Control
Advisor: Dr. Xiling Luo

Zhengzhou University, B.E. *September 2010 – June 2014*
Electronic and Information Engineering

RESEARCH INTERESTS

Mobile Computing: Wireless Sensing Systems, Human-Computer Interaction (HCI) Applications, Smart Home and IoT Applications.
Cybersecurity: Mobile Authentication, Novel Biometrics, Smart Home and IoT Security.

AWARDS

Graduate Student Research Award, Department of Computer Science, Florida State University, 2022.
— 1 out of 85 Ph.D. students in the CS department.
Merit Scholarship, Beihang University, 2015-2016.
— Top 10% of 330 graduate students in the department.
Outstanding Graduate Award, Henan Province, 2014.
— Top 3% of undergraduate students in Henan Province.
Merit Scholarship, Zhengzhou University, 2011-2014.
— Top 4% of 120 undergraduate students in the department.

EMPLOYMENT HISTORY

University of South Florida, Tampa, FL *2023 – present*
Assistant Professor
— Mobile Computing and Cybersecurity

Florida State University, Tallahassee, FL *2017 – 2023*
Research Assistant
— *Smart Home Monitoring:* Person Re-identification Based on WiFi Vision.

- Proposed to leverage the deep learning models to digitize two-dimensional angle of arrival (2D AoA) images of the human into a 3D human body representation.
- Extracted intrinsic features of a person including both the static body shape and dynamic walking patterns for person re-identification (Re-ID).
- Evaluated our system in various environments and the results showed that our Re-ID system is highly accurate across time and space.

— *HCI Application:* 3D Human Mesh Estimation Using A WiFi Vision-based Approach.

- Demonstrated that the commodity WiFi can be utilized to construct 3D human mesh.
- Utilized WiFi devices to visualize a person by leveraging multiple antennas and 2D AoA estimation.
- Increased the spatial resolution of the 2D AoA estimation using the frequency diversity of the OFDM subcarriers and the spatial diversity of antennas at the transmitter.

— *Smart Home Application:* Liquid Level Sensing in Smart Home Environments Using Commodity WiFi.
- Presented that the resonance frequency of the container that was filled with the liquid can be used to indicate the liquid level.
- Proposed to leverage the home WiFi networks to sense container micro-vibrations and capture the resonance frequency of the container for liquid level sensing.
- Built and evaluated the liquid sensing system that leverages WiFi signals to sense the liquid level for smart home applications.

— *HCI Application:* 3D Human Pose Estimation for Moving Users Using WiFi.
- Explored the WiFi signals bounced off the human body for 3D pose estimation for moving users and unseen activities by leveraging WiFi devices.
- Investigated the 2D AoA spectrum of the signals reflected from the human body to provide spatial information of the human body as well as enable environment-independent sensing.
- Utilized deep learning to model the complex relationship between the 2D AoA spectrums and the 3D skeletons of the human body for 3D pose tracking.

— *HCI Application:* Tracking 3D Human Poses for Free-form Activities Using Commodity WiFi.
- Explored the separation of the entangled signals from multiple limbs of the human body based on a blind source separation formulation.
- Investigated the decomposition of the movements of limbs to the joints by leveraging the kinematic model of limb joints.
- Proposed and evaluated the 3D human pose tracking system that works for free-form activity by using commodity WiFi.

— *Mobile Authentication:* Ear Wearables-based Authentication via Acoustic Toothprint.
- Investigated the tooth gesture-induced sonic waves generated by teeth gestures for user authentication.
- Explored representative teeth gestures that generate sonic waves containing toothprint information.
- Validated the proposed authentication system through both experiments and user surveys.

— *Mobile Authentication:* Ear Canal Deformation-based User Authentication.
- Demonstrated the dynamic deformation information of the ear canal is unique for each individual and can be utilized for user authentication.
- Categorized ear canal dynamic motions into various groups based on the phoneme pronunciation.
- Designed a continuous and user-transparent authentication system with in-ear wearable devices.

— *Smart Home Security:* Bone-conducted Vibrations-based Continuous Liveness Detection.
- Designed a liveness detection system with continuous user authentication for the voice user interface.
- Developed an acoustic sensing approach to sense the bone-conducted or loudspeaker vibrations.

— A Survey of WiFi Sensing Systems.
- Surveyed the evolution of WiFi sensing systems utilizing commodity devices over the past decade.
- Reviewed in the technical evolutions; analyzed current challenges; explored potential future directions.

REFERRED FULL PAPERS

1. **Yili Ren**, Yichao Wang, Sheng Tan, Yingying Chen, Jie Yang. "Person Re-identification in 3D Space: A WiFi Vision-based Approach", *The 32nd USENIX Security Symposium* **(USENIX Security 2023)** , full paper, 18 pages. **top-tier csrankings.org conference.**

2. Yichao Wang*, **Yili Ren***, Yingying Chen, Jie Yang. "Wi-Mesh: A WiFi Vision-based Approach for 3D Human Mesh Construction", *The 20th ACM Conference on Embedded Networked Sensor Systems* **(SenSys 2022)**, full paper, 15 pages. **top-tier csrankings.org conference.**
(*co-first authors)

3. **Yili Ren**, Zi Wang, Yichao Wang, Sheng Tan, Yingying Chen, Jie Yang. "GoPose: 3D Human Pose Estimation Using WiFi", *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(UbiComp 2022)**, full paper, 25 pages. **top-tier csrankings.org conference.**

4. **Yili Ren**, Zi Wang, Sheng Tan, Yingying Chen Jie Yang. "Winect: 3D Human Pose Tracking for Free-form Activity Using Commodity WiFi", *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(UbiComp 2021)**, full paper, 29 pages. **top-tier csrankings.org conference.**

5. **Yili Ren**, Sheng Tan, Linghan Zhang, Zi Wang, Zhi Wang, Jie Yang. "Liquid Level Sensing Using Commodity WiFi in a Smart Home Environment", *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(UbiComp 2020)**, full paper, 30 pages. **top-tier csrankings.org conference.**

6. **Yili Ren**, Xiling Luo, Qianhong Wu, Joseph K. Liu, Peng Zhang. "Towards Certificate-based Group Encryption", *The 10th International Conference on Provable Security* (ProvSec 2016), full paper, 10 pages.

7. Zi Wang, **Yili Ren**, Yingying Chen, Jie Yang. "ToothSonic: Earable Authentication via Acoustic Tooth-print", *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(UbiComp 2022)**, full paper, 24 pages. **top-tier csrankings.org conference.**

8. Zi Wang, Sheng Tan, Linghan Zhang, **Yili Ren**, Zhi Wang, Jie Yang. "EarDynamic: An Ear Canal Deformation Based Continuous User Authentication Using In-Ear Wearables", *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(UbiComp 2021)**, full paper, 27 pages. **top-tier csrankings.org conference.**

9. Sheng Tan, **Yili Ren**, Yingying Chen, Jie Yang. "Commodity WiFi Sensing in 10 Years: Status, Challenges, and Opportunities", *IEEE Internet of Things Journal* (2022), full paper, 12 pages.

10. Linghan Zhang, Sheng Tan, Zi Wang, **Yili Ren**, Zhi Wang, Jie Yang. "VibLive: A Continuous Liveness Detection for Secure Voice User Interface in IoT Environment", *The 36th Annual Computer Security Applications Conference* **(ACSAC 2020)**, full paper, 13 pages.

11. Xiling Luo, **Yili Ren**, Jiankun Hu, Qianhong Wu, Jungang Lou. "Privacy-preserving Identity-based File Sharing in Smart City", *Personal and Ubiquitous Computing* (2017), full paper, 14 pages.

12. Xiling Luo, **Yili Ren**, Jingwen Liu, Jiankun Hu, Weiran Liu, Zhen Wang, Wei Xu, Qianhong Wu. "Identity-based Group Encryption", *The 21st Australasian Conference on Information Security and Privacy* (ACISP 2016), full paper, 16 pages.

REFERRED PAPER ABSTRACTS

1. **Yili Ren**, Yichao Wang, Yingying Chen, Jie Yang. "A Vision-based Approach for Commodity WiFi Sensing", *The 20th ACM Conference on Embedded Networked Sensor Systems* **(SenSys 2022)**, paper abstract, 2 pages.
2. **Yili Ren**, Yichao Wang, Sheng Tan, Yingying Chen, Jie Yang. "A WiFi Vision-based Approach to Person Re-identification", *The ACM Conference on Computer and Communications Security* **(CCS 2022)**, paper abstract, 3 pages.
3. **Yili Ren**, Zi Wang, Beiyu Wang, Sheng Tan, Jie Yang. "Liquid Level Detection Using Wireless Signals", *The 20th ACM International Conference on Mobile Systems, Applications, and Services* **(MobiSys 2022)**, paper abstract, 2 pages.
4. **Yili Ren**, Yichao Wang, Sheng Tan, Yingying Chen, Jie Yang. "Person Re-Identification Using WiFi Signals", *The 28th Annual International Conference on Mobile Computing and Networking* **(MobiCom 2022)**, paper abstract, 3 pages.
5. **Yili Ren**, Zi Wang, Sheng Tan, Yingying Chen, Jie Yang. "Tracking Free-form Activity Using WiFi Signals", *The 27th Annual International Conference on Mobile Computing and Networking* **(MobiCom 2021)**, paper abstract, 3 pages.
6. **Yili Ren**, Zi Wang, Yichao Wang, Sheng Tan, Yingying Chen, Jie Yang. "3D Human Pose Estimation Using WiFi Signals", *The 19th ACM Conference on Embedded Networked Sensor Systems* **(SenSys 2021)**, paper abstract, 2 pages.
7. Zi Wang, **Yili Ren**, Yingying Chen, Jie Yang. "Excerpt of ToothSonic: Earable Authentication via Acoustic Toothprint", *Adjunct Proceedings of the 2022 ACM International Joint Conference on Pervasive and Ubiquitous Computing and the 2022 ACM International Symposium on Wearable Computers* **(UbiComp/ISWC 2022)**, paper abstract, 2 pages.
8. Yichao Wang, **Yili Ren**, Yingying Chen, Jie Yang. "A WiFi Vision-based 3D Human Mesh Reconstruction", *The 28th Annual International Conference on Mobile Computing and Networking* **(MobiCom 2022)**, paper abstract, 3 pages.
9. Zi Wang, **Yili Ren**, Yingying Chen, Jie Yang. "Earable Authentication via Acoustic Toothprint", *ACM Conference on Computer and Communications Security* **(CCS 2021)**, paper abstract, 3 pages.
10. Zi Wang, **Yili Ren**, Yingying Chen, Jie Yang. "An Ear Canal Deformation Based Continuous User Authentication Using Earables", *The 27th Annual International Conference on Mobile Computing and Networking* **(Mobicom 2021)**, paper abstract, 3 pages.

MEDIA COVERAGE

WiFi-based 3D human pose sensing was covered by: Tech Xplore, News Break, Opera News, phy.org, NH News, etc.
— For example: *Winect: A System That Tracks 3D Human Poses During Free-form Motion*.

Ear wearable authentication was covered by: Unite.Ai, Gigazine, au Web, Intertechnews, livedoor News, etc.
— For example: *Biometric Authentication by Grinding Your Teeth*.

WiFi-based 3D Human Mesh Construction was covered by: Tech Xplore, News8Plus, etc.
— For example: *A Wi-Fi Sensing System That Creates 3D Human Meshes*.

TEACHING AND MENTORING EXPERIENCES

CIS4930 / CIS6930 Wireless and Mobile Computing *Spring 2024*
Instructor

CIS4219 / CIS6218 Human Aspects of Cybersecurity *Fall 2023*
Instructor

CEN5526 Wireless and Mobile Computing *Spring 2022*
Teaching Assistant & Guest Lecturer
— Held the presentation class; discussed term project design with students, graded presentations and paper summaries of students; held weekly office hours to answer students' questions.

CNT5412 Network Security, Active and Passive Defenses *Fall 2021*
Teaching Assistant
— Discussed term project design with students, graded assignments, quizzes, and exams; held weekly office hours to answer students' questions.

COP4531 Complexity and Analysis of Data Structures and Algorithms *Fall 2018, Spring 2020*
Teaching Assistant & Guest Lecturer
— Conducted recitation on term project, lectured on selected topics of algorithm complexity and data structures; discussed term project design with students, graded assignments, projects, and exams; held weekly office hours to answer students' questions.

CNT4406 Network Security and Cryptography *Fall 2019*
Teaching Assistant
— Discussed term project design with students, graded assignments, quizzes, projects, and exams; held weekly office hours to answer students' questions.

COP4020 Programming Languages *Fall 2019*
Teaching Assistant & Guest Lecturer
— Conducted recitation on term project, lectured on selected topics of principles of programming languages; discussed term project design with students, graded assignments, projects, and exams; held weekly office hours to answer students' questions.

CGS2930 Computer Security Basics *Fall 2018, Spring 2020*
Teaching Assistant
— Discussed term project design with students, graded assignments, projects, quizzes, and exams; held weekly office hours to answer students' questions.

COP3014 Programming I *Fall 2018, Spring 2019*
Teaching Assistant & Guest Lecturer
— Conducted recitation on term project, lectured on selected topics of C++; discussed term project design with students, graded assignments, projects, and exams; held weekly office hours to answer students' questions.

CIS4403 Introduction to Computer Security *Spring 2021*
Teaching Assistant
— Discussed term project design with students, graded assignments, quizzes, projects, and exams; held weekly office hours to answer students' questions.

CGS2060 Computer Fluency *Fall 2018*

Teaching Assistant
— Held help desk for non-computer science major students weekly, graded assignments.

PROFESSIONAL SERVICES

Technical Program Committee (TPC) Membership: IEEE INFOCOM 2024 Poster

Reviewer for journals: IEEE Journal on Selected Areas in Communications - Positioning and Sensing Over Wireless Networks, ACM Transactions on Sensor Networks, IEEE Transactions on Information Forensics and Security, Journal of Computational Design and Engineering, IMWUT/UbiComp, IEEE Sensors Journal, IEEE Transactions on Artificial Intelligence, IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Transactions on Dependable and Secure Computing, IEEE Internet of Things Journal; also helped in reviewing papers of journals, such as IEEE Transactions on Information Forensics and Security, IEEE Communications Letters.

Reviewer for conferences: MobileHCI 2023, CSAE 2023; also helped in reviewing papers of conferences, such as MobiSys 2023, USENIX Security 2023, ICDCS 2022, ESORICS 2022/2021, ASIACSS 2023/2022/2021, INFOCOM 2022/2021, ACSAC 2021, CNS 2022/2021, DCOSS 2021/2020, WiSec 2021/2020, IWQoS 2021/2020, ICCCN 2021, MSN 2019.