
RESEARCH INTERESTS

- **Trustworthy & Explainable AI:** designing context-aware mobile systems to bridge CPS and AI for reliable and adaptive interactions.
- **Cybersecurity:** fingerprinting and human biometric security, with a focus on safeguarding privacy and authentication through embedded sensors in digital devices.
- **Mobile Computing/Sensing Systems:** sensing with ubiquitous modalities, such as WiFi, camera, IMU, and sound in intelligent transportation and smart homes.
- **LLM and NLP:** speech privacy, speech translation, and LLM applications.

EDUCATION

- | | |
|--|------|
| North Carolina State University (NCSU), Raleigh, NC | 2023 |
| • Ph.D. Computer Science | |
| South Dakota State University (SDSU), Brookings, SD | 2017 |
| • MS. Computer Science (non-degree) | |
| • MS. Civil Engineering | |
| Shanghai Maritime University (SMU), Shanghai, China | 2012 |
| • MS. Transportation Planning and Management (Supply Chain Management) | |
| Zhejiang Ocean University (ZJOU), Zhoushan, China | 2010 |
| • B.A. Marine Fishery Science and Technology | |

WORK EXPERIENCE

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|--|-------------------|
| Assistant Professor in Computer Science and Cybersecurity, University of North Carolina at Pembroke | 08/2023-Present |
| Wolfpack Security and Privacy Research (WSPR) Lab, NCSU, Raleigh, NC | 01/2020–05/2023 |
| Graduate Research/Teaching Assistant (worked on digital security and privacy with my advisor Prof. Anupam Das) | |
| Wolfpack Interactive, Sensing and Networking Lab (WiSN) Lab, NCSU, Raleigh, NC | 08/2017–12/2019 |
| Graduate Research/Teaching Assistant (worked on WiFi sensing with Prof. Muhammad Shahzad) | |
| Department of Civil and Environmental Engineering, SDSU, Brookings, SD | 08/2015–07/2017 |
| Graduate Research Assistant (worked transportation safety with Prof. Xiao Qin and Prof. Jonathan Wood) | |
| Department of Computer Science and Electrical Engineering, SDSU, Brookings, SD | 08/2015–12/2016 |
| Graduate Research Assistant (worked on mobile systems with Prof. Wei Wang and Prof. Myounggyu Won) | |
| Logistics Engineer, China Railway Materials Commercial Corp, Shanghai, China | 06/2012 – 08/2013 |
| Research Intern, SITC Logistics, Shanghai, China | 04/2012 – 05/2012 |
| Instructor, Shanghai Maritime University, Shanghai, China | 09/2011 – 07/2012 |

PROPOSAL/AWARDED FUNDING

- **Collaborative Research: CISE-MSI: RDP: CPS: Digital Twin-Assisted 3D Resilient UAV Systems through Sensing, Communication, Control Co-design (Co-PI, collaborated with University of Miami and NCSU)**
Total: \$600,000
Sponsor: NSF 24-536
Under Review

- **CC* Strategy-Campus: Enhancing Research and Educational Infrastructure by Establishing an HPC at UNCP (PI).**
Total: \$100,000
Sponsor: NSF CC*.
Under Review
 - **Cyber Escape Rooms: Fostering Student Engagement and Boosting Student Prospects Enrollment in Cybersecurity and Computer Science Programs (Co-PI).**
Total Award: \$10,000
Sponsor: UNCP.
Duration: 01/01/2024 – 05/31/2024
 - **Neighborhood Microscope: Leveraging Big Data Sources to Examine Health and Well-being in Urban and Rural NC Neighborhoods (PI).**
Total Award: \$86,000
Sponsor: North Carolina Collaboratory.
Duration: 01/01/2024 – 06/30/2025
- Previous proposal with my advisor as the main student contributor.
- **Physical Context-aware Voice Assistant for Smart Homes.**
Lead PI: Dr. Anupam Das (NCSU)
Total Award: \$75,000
Sponsor: Proposals for 2022 Towards Trustworthy Products in AR, VR, and Smart Devices, Meta Company

PUBLICATIONS

J Journal, C Conference, * indicates the first author was my advisor. _ indicates the students I advise.

1. **(J)** Ruoyu Zhao, Xiantao Jiang, F. Richard Yu, Victor C.M. Leung, Tao Wang, and **Shaohu Zhang**. Leveraging Cross-Attention Transformer and Multi-Feature Fusion for Cross-Linguistic Speech Emotion Recognition. *IEEE Internet of Things Journal* (Under Review)
2. **(J)** Chunsheng Zhang, Tao Wang, **Shaohu Zhang**, et al. From Cascade to LLM: Speech-to-speech Translation Advances in Thirty Years. *ACM Transactions on Interactive Intelligent Systems* (Under Submission)
3. **(C)** Aafaq Sabir, Anupam Das, **Shaohu Zhang** et al.. Analyzing the Efficacy of the Vetting Process and Prevalence of Ads in Emerging Voice Applications. *PopETs 2025* (Under Review)
4. **(C)** Zhouyu Li, Ruozhou Yu, Anupam Das, **Shaohu Zhang**, Huayue Gu, Xiaojian Wang, Fangtong Zhou, Aafaq Sabir, Dilawer Ahmed, and Ahsan Zafar. INSPIRE: Instance-level Privacy-preserving Transformation for Vehicular Camera Videos. *Proceedings of the 32nd International Conference on Computer Communications and Networks*. **IEEE ICCCN'23** (CORE ranking: B, acceptance rate: 55/181=30%).
5. **(C)** **Shaohu Zhang**, Zhouyu Li, Anupam Das. VoicePM: A Robust Privacy Measurement on Voice Anonymity, *16th ACM Conference on Security and Privacy in Wireless and Mobile Networks*. **ACM WiSec 2023** (CORE ranking: B, acceptance rate: 34/134 =25%).
6. **(C)** **Shaohu Zhang**, Aafaq Sabir, Anupam Das. Speaker Orientation-Aware Privacy Control to Thwart Misactivation of Voice Assistants, *The 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Network*. **IEEE DSN 2023** (CORE ranking: A, acceptance rate: 47/235=20%).
7. **(C)** **Shaohu Zhang**, Anupam Das. Enabling 2-FA for Smart Home Voice Assistants using Inaudible Acoustic Signal, *In 24th International Symposium on Research in Attacks, Intrusions and Defenses*, pp. 251-265. 2021. **RAID'21** (CORE ranking: A, acceptance rate: 33/138=23.9%).
8. **(J)** Jonathan Wood *, **Shaohu Zhang**. Evaluating Relationships Between Perception-Reaction Times, Emergency Deceleration Rates, and Crash Outcomes using Naturalistic Driving Data. *Journal of Transportation research record* 2675, no. 1 (2021): 213-223. **TRR'21** (acceptance rate: 20%).
9. **(C)** **Shaohu Zhang**, Raghav Venkatnarayan, Muhammad Shahzad. A WiFi-based Home Security System. *In 2020 IEEE 17th International Conference on Mobile Ad Hoc and Sensor Systems (MASS)*, pp. 129-137. **IEEE MASS'20** (CORE rank-

ing: B, acceptance rate:28%).

10. **(J)** Jonathan Wood *, **Shaohu Zhang**. Identification and Calculation of Horizontal Curves for Low-Volume Roadways using Smartphone Sensors. *Journal of Transportation Research Record*, 2672(39), 1-10. 2018. **TRR'18** (acceptance rate: 20%).
11. **(C+J)** Muhammad Shahzad *, **Shaohu Zhang**. Augmenting User Identification with WiFi Based Gesture Recognition. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 2(3), pp.1-27, 2018. **IMWUT/Ubi-comp'18** (CORE ranking: A*, acceptance rate:18%).
12. **(C)** **Shaohu Zhang**, Myounggyu Won, Sang H. Son. Low-cost and Non-intrusive Traffic Monitoring System Using WiFi. In *2017 26th International Conference on Computer Communication and Networks (ICCCN)*, pp. 1-9. IEEE, 2017. **ICCCN'17** (CORE ranking: B, acceptance rate:28.6%).
13. **(C)** Myounggyu Won *, **Shaohu Zhang**, Appala Chekuri, Sang H. Son. Enabling Energy-Efficient Driving Route Detection Using a Built-in Smartphone Barometer Sensor, In *2016 IEEE 19th International Conference on Intelligent Transportation Systems (ITSC)*, pp. 2378-2385. IEEE, 2016.
14. **(C)** **Shaohu Zhang**, Myounggyu Won, Sang H. Son. Low-cost Realtime Horizontal Curve Detection Using Inertial Sensors of a Smartphone. In *2016 IEEE 84th Vehicular Technology Conference (VTC-Fall)*, pp. 1-5. IEEE, 2016. (CORE ranking: B).
15. **(C)** Xiao Qin *, **Shaohu Zhang**, Wei Wang. Advanced Curve-speed Warning System Using an In-Vehicle Head-Up Display. *Proceedings of 94th Transportation Research Board Meeting, Washington, D.C, 2015*.

POSTER ABSTRACT/SHORT PAPER

1. **Shaohu Zhang**, Zhouyu Li, Anupam Das. Privacy Measurement of Physical Attributes on Voice Anonymity, *The 30th Annual International Conference on Mobile Computing and Networking Nov. 18-22, 2024, Washington, D.C., USA. MobiCom'24*.
2. **Shaohu Zhang**, Aafaq Sabir, Anupam Das. POSTER: Enhancing Security and Privacy Control for Voice Assistants Using Speaker Orientation, *16th ACM Conference on Security and Privacy in Wireless and Mobile Networks. ACM WiSec 2023*.
3. **Shaohu Zhang**, Anupam Das. A 2-FA for home voice assistants using inaudible acoustic signal. In *Proceedings of the 27th Annual International Conference on Mobile Computing and Networking*, pp. 834-836. 2021. **MobiCom'21**.
4. **Shaohu Zhang**, Myounggyu Won, Sang H. Son. WiTraffic: Non-intrusive Vehicle Classification Using WiFi. In *Proceedings of the 14th ACM Conference on Embedded Network Sensor Systems*, pp. 358-359. 2016. **SenSys'16**

TECHNICAL REPORT

1. Jonathan Wood *, **Shaohu Zhang**. Evaluating Relationships Between Perception-Reaction Times, Emergency Deceleration Rates, and Crash Outcomes Using Naturalistic Driving Data. *MPC-17-338, North Dakota State University - Upper Great Plains Transportation Institute, Fargo: Mountain-Plains Consortium, 2017*.

THESIS

1. Towards Context-aware and Trustworthy Voice Assistants. *Committee members: Prof. Anupam Das (Chair), Prof. William Enck, Prof. Muhammad Shahzad, Prof. Chau-Wai Wong. North Carolina State University, 2023*.
2. Identification, Calculation and Warning of Horizontal Curves for Low-volume Two-lane Roadways Using Smartphone Sensors. *Committee members: Prof. Jonathan Wood (Chair), Prof. Suzette Burckhard, Prof. Rouzbeh Ghabchi. South Dakota State University, 2017*.

INVITED TALKS/PRESENTATION

1. Towards Context-aware and Trustworthy Voice Assistants, Thomas College of Business and Economics at UNCP, October 2024.

2. Speaker Orientation-Aware Privacy Control to Thwart Misactivation of Voice Assistants, The 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Network, IEEE DSN 2023.
3. VoicePM: A Robust Privacy Measurement on Voice Anonymity, *16th ACM Conference on Security and Privacy in Wireless and Mobile Networks*. WiSec 2023 virtual.
4. Web Privacy in the Digital World. University of North Carolina, Pembroke, March 2023.
5. Enabling 2-FA for Smart Home Voice Assistants using Inaudible Acoustic Signal. *The 24th International Symposium on Research in Attacks, Intrusions and Defenses*. (RAID'21 virtual).
6. 2-FA for Smart Home Voice Assistants using Inaudible Acoustic Signal. *In Proceedings of the 27th Annual International Conference on Mobile Computing and Networking*. (Mobicom'21 virtual).
7. Security on Android Devices. *NCSU Data Privacy Month 2021*.
8. A WiFi-based Home Security System. *The 17th IEEE International Conference on Mobile Ad Hoc and Sensor Systems*. (MASS'20 virtual).
9. Identification and Calculation of Horizontal Curves for Low-Volume Roadways using Smartphone Sensors. *In the 97th Transportation Research Board Annual Meeting (TRB'18), Washington D.C.*
10. WiTraffic: Non-intrusive Vehicle Classification Using WiFi. *In the 14th ACM Conference on Embedded Networked Sensor Systems (SenSys'16), Stanford University*.
11. Horizontal Curve Detection Using Inertial Sensors of a Smartphone. *Sigma Xi Chapter, South Dakota State University, 2016*
12. Avoiding Roadway Departure Crashes with an In-Vehicle Head-Up Display. *In the TRB 94th Transportation Research Board Annual Meeting (TRB'15) Washington D.C.*

TEACHING EXPERIENCE

University of North Carolina at Pembroke, Pembroke, NC

- CSC 2920 Software Engineering (in-person & online) Spring 2024, Fall 2024, Spring 2025
- CYB 4030 Introduction to Digital Forensics, Spring 2024, Spring 2025
- CYB 4020 Network Security, Fall 2024
- CSC 1750 Introduction to Algorithms, Fall 2023
- CSC 1760 Introduction to Programming, Fall 2023
- CSC 1850 Object-oriented Programming, Fall 2023

Teaching Assistant / Lab Instructor, North Carolina State University, Raleigh, NC

- CSC/ECE 773 Advanced Internet Protocol (14 graduates), Spring 2023, co-instructor with Prof. Khaled Harfoush
- CSC/ECE 573/591 Internet Protocol, Fall 2022, Instructor: Prof. Khaled Harfoush
- CSC 433 Privacy in the Digital Age, Spring 2021, Instructor: Prof. Anupam Das
- CSC 533 Privacy in the Digital Age, Fall 2020, Instructor: Prof. Anupam Das
- CSC/ECE 591/791, Internet of Things, Spring 2020, Instructor: Prof. Muhammad Shahzad
- CSC/ECE 573/591 Internet Protocol, Spring 2020, Instructor: Prof. Muhammad Shahzad
- CSC 453 Internet of Things, Spring 2019, Instructor: Prof. Muhammad Shahzad

Lecturer, Shanghai Maritime University, Institute of Advanced Technology, Shanghai, China

- International Multimodal Transportation, Spring 2012
- Customs Declaration, Fall 2011

STUDENTS/MENTORING

- **Current PhD student:** Zhouyu Li (NCSU, speech privacy)
- **Current master student:** Ruoyu Zhao (SMU, speech emotion)
- **Current undergraduate student:** Coraline Song (LLM privacy), Najmul Hasan (digital forensics, UNCP Spring 2024 Semester Long Undergraduate Research Fellowship) , Andrew Cart (Computer Vision), Mohammad Kawsar (VR privacy, Mobicom'24 Travel Grant Award and Dr. Charles Humphrey Undergraduate Conference Travel Award).
- **Past undergraduate student:** Samuel Moore (CS, 09/2024-12/2024), Mushfique Rahman (CS, 01/2024-05/2024), Kay Anderson (Sociology, 01/2024-08/2024).

HONORS & AWARDS

- **Mentored Teaching Fellowship**, College of Engineering, North Carolina State University, 2023.
- **2022 Summer Graduate Fellowship**, College of Engineering, North Carolina State University, 2022.
- **Enhancement Fee Travel Award**, College of Engineering, North Carolina State University, 2020, 2023.
- **Graduate Research Award**, College of Engineering, North Carolina State University, 2018.
- **Student Travel Grant**: HotMobile'23, RAID'21, CCS'21, MobiCom'21, MobiCom'17, and SenSys'16.
- **Sigma Xi Graduate Research Award**, South Dakota State University, 2016.
- **Undergraduate Thesis Award**, Zhejiang Ocean University, China, 2010.

PROFESSIONAL ACTIVITIES

Co-Chair

- Co-chair, Privacy Check-up Sessions, NCSU Data Privacy Month 2021. North Carolina State University. Feb 2021

Technical Program Committee

- 8th Dependable and Secure Machine Learning Workshop (DSML 2025, co-hosted with DSN 2025), Naples, Italy, June 23-26, 2025.
- 2025 International Conference on Computing, Networking and Communications (ICNC 2025, Honolulu, Hawaii).
- The 25th Privacy Enhancing Technologies Symposium (PETS 2025 Washington DC).
- The First International Workshop on IoT Datasets for Multi-modal Large Model (IoT-MMLM 2024) In Conjunction with SenSys 2024, November 4-7 2024, Hangzhou, China
- The 2024 IEEE 100th Vehicular Technology Conference (VTC2024-Fall Washington DC).
- The 2nd ACM Workshop on Smart Wearable Systems and Applications (SmartWear2023) In Conjunction with MobiCom 2023. October 6, 2023, Madrid, Spain
- The 2023 IEEE 98th Vehicular Technology Conference (VTC2023-Fall Hong Kong).
- PhD Forum, The 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'23).

Artifact Review Program Committee

- USENIX Security Symposium: 2023
- Privacy Enhancing Technologies Symposium (PoPETS): 2023
- ACM ASIA Conference on Computer and Communications Security (AsiaCCS): 2023
- Annual Computer Security Applications Conference (ACSAC): 2023
- ACM Conference on Security and Privacy in Wireless and Mobile Networks (ACM WiSec): 2022-2023

Conference Reviewer

- Privacy Enhancing Technologies Symposium (PETS): 2023-2025.
- ACM Conference on Computer and Communications Security (CCS): 2021-2023.
- Symposium on Security and Privacy (IEEE S&P): 2021, 2024.
- ISOC Networked and Distributed System Security Symposium (NDSS): 2021-2023.
- Annual Computer Security Applications Conference (ACSAC): 2022-2023.
- Security and Privacy in Wireless and Mobile Networks (WiSec): 2021-2024.
- ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys): 2019.
- Proceedings of Transportation Research Board Meeting: 2023-2025.

Journal Reviewer

- International Journal of Human-Computer Interaction (IJHCI): 2023, 2024
- ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT): 2019, 2021, 2022.
- IEEE Internet of Things Journal: 2021-2025.
- ACM Transactions on Interactive Intelligent Systems: 2021.
- IEEE Transactions on Mobile Computing: 2021-2025.