

STEPHEN XIA

email: stephexia@gmail.com • website: <http://www.columbia.edu/~sx2194/>

EDUCATION

Columbia University

Ph.D. Electrical Engineering

M.S. Electrical Engineering

Research Advisor: Dr. Xiaofan (Fred) Jiang

New York, NY, USA

09/2016 - 10/2022 (Expected)

09/2016 - 02/2018

Rice University

B.S. Electrical Engineering

University Honors, Eta Kappa Nu

Houston, TX, USA

09/2013 - 05/2016

EXPERIENCE

IBM Research

Research Intern

Summer 2020, Summer 2021

- Designed a graph neural network and deep reinforcement learning-based system for dynamic and efficient network slicing in 5G networks.
- Formulated, designed, and evaluated physics-informed neural networks for acoustics to improve the performance of models in scenarios with scarce training data.

Apple Inc.

CoreMotion Data Engineering Intern

Summer 2019

- Developed big data pipelines for machine learning and deep learning applications using Spark and TensorFlow.

Intelligent and Connected Systems Lab, Columbia University

Graduate Research Assistant

09/2016 - Present

- *Smart Home Edge AI*: Project Lead. We seek to create an intelligent “plug-and-play” system that easily integrates into home wireless ecosystems that automatically discovers + localizes smart resources (i.e. smart sensors, drones, smart TV, etc.) and jointly utilizes them to provide more complex and high level services.
- *Acoustic Wearables for Urban Safety*: Project Lead on the urban safety projects, creating wearables that leverage novel, robust, and low-latency algorithms (signal processing, adaptive filtering + beamforming, and machine learning) on microphone arrays to reliably detect, localize, and warn users in advance of oncoming vehicles, even in noisy environments. Created a general platform for audio filtering and enhancement for resource-constrained mobile and embedded platforms.
- *Smart Health*: Project Lead. Developed a leg shaking detection platform for mobile devices that uses accelerometer data and novel signal processing and machine learning techniques to detect and learn the characteristics of a user’s leg shaking habit. Developed a novel conductive thread-based textile sensor, capable of being embedded comfortably into everyday clothing, that accurately measures a person’s perspiration level for smart health, fitness, comfort, and building applications.

Rice University

Undergraduate Researcher

Spring 2015, Spring 2016

- Spring 2016, *Best ECE Senior Design Project and Best ECE Undergraduate Demo* - For the wireless neural recorder, a 1cm^3 wireless transmitter that records and transmits electrocorticography data.
- Spring 2016, *IEEE Region V Student Paper Competition Third Place* - Analysis and evaluation of defense mechanisms for denial-of-service attacks on WiFi LANs on the Wireless Open Access Research Platform (WARP).
- Spring 2015, *IEEE Region V Student Paper Competition First Place* - For the work titled: *Selective Transparent Headphones*; a system that utilizes neural networks to separate and propagate a single sound source to the user.

National Instruments

Software Engineer Intern

Summer 2015

- Wrote driver-level code for generating and testing corrective filters for NI Vector Signal Transceiver function generators.

**Hewlett-Packard
Technical Software Intern**

Summer 2014

- Wrote firmware for HP Smart Array RAID controllers and developed automation for testing firmware.
- Developed automated services for searching and sorting customer case issues to resolve Smart Array controller failures.

AWARDS

- EE Collaborative Research Award - Columbia University 2022
- Best Demo Award - ACM SenSys 2021
- Best Demo Award - ACM/IEEE IPSN 2020
- Best Demo Award - ACM/IEEE IoTDI 2018
- Best Presentation Award - IEEE VNC 2018
- Second Place, App Contest - IEEE VNC 2018
- Best Demo Runner Up - ACM SenSys 2016
- Best ECE Senior Design Project - Rice University ECE Corporate Affiliates Day 2016
- Best ECE Undergraduate Demo - Rice University ECE Corporate Affiliates Day 2016
- Third Place - IEEE Region V Student Paper Competition - 2016
- Third Place - K21 Prize, Rice University Research Symposium 2015
- First Place - IEEE Region V Student Paper Competition 2015

NEWS AND MEDIA HIGHLIGHTS

EurekAlert! 2022 - [Cheaper, faster, safer way to screen temperatures](#)

New York Post 2019 - [Smart headphones could save pedestrians from being hit by cars](#)

IEEE Spectrum 2019 - [AI System Warns Pedestrians Wearing Headphones About Passing Cars](#)

Fast Company 2019 - [These headphones aren't pretty, but they just might save your life](#)

Mashable 2019 - [Headphones designed to save your life from reckless drivers](#)

Gizmodo 2019 - [These Noise-Canceling Headphones Will Alert You to All the Dangers You Can't Hear](#)

The Telegraph 2019 - [‘Smart’ headphones designed to save pedestrian lives](#)

Engineering.com 2019 - [This Intelligent Headphone System Could Potentially Minimize Pedestrian Deaths](#)

India Times 2019 - [Researchers Build Headphones That Alerts You While Walking, May Save You From Deadly Accidents](#)

IEEE Signal Processing Magazine 2018 - [Signal Processing Supports a New Wave of Audio Research](#)

INVITED TALKS

- State University of New York at Buffalo (SUNY-Buffalo) 2022
Embedded Intelligence and Sensing for Safer, Healthier, and Smarter Environments
- Columbia University School of Engineering and Applied Sciences 2022
Lecture: Embedded Acoustic Intelligence Towards Smarter and Healthier Environments
- University of Michigan, Ann Arbor 2022
Embedded Intelligence Towards Smarter and Healthier Environments
- University of Notre Dame, South Bend 2022
Embedded Intelligence Towards Smarter and Healthier Environments
- IBM T.J. Watson Research Center, Yorktown 2019
Intelligent Acoustic Wearables for Urban Safety
- Columbia University Business School, New York 2018
Lecture: Conductive Thread-based Textile Sensor

PROFESSIONAL SERVICE

Organizing Committee

- TPC Co-Chair, ACM IASA Workshop 2022
- General Co-Chair, CML-IOT Workshop 2022
- Publicity Chair, ACM EWSN 2022
- Publicity Chair, ACM BuildSys 2021
- Web Chair, IEEE/ACM CHASE 2020
- Web Chair, ACM SenSys 2019

Technical Program Committee/External Reviewer

- Shadow TPC Member, ACM SenSys 2022
- TPC Member, IEEE/ACM CHASE 2020, 2021
- ACM IMWUT 2022
- ACM SIGEnergy EIR Newsletter 2021, 2022
- ACM MobiSys 2020, 2021
- AIChallengeIoT Workshop 2020
- IEEE SMARTCOMP 2019
- ACM e-Energy 2019
- ACM/IEEE IoTDI 2018, 2019
- ACM/IEEE IPSN 2018
- IEEE Internet of Things Journal 2018
- ACM SenSys 2017, 2018
- ACM BuildSys 2017, 2020

TEACHING AND OUTREACH

Columbia University

Teaching Assistant

- | | |
|--|--------------------------|
| · EECS E6765: Internet of Things - Systems and Physical Data Analytics | Spring 2017, Spring 2018 |
| · EECS E4764: IoT - Intelligent and Connected Systems | Fall 2016, Fall 2017 |

Rice University

Course Assistant

- | | |
|---|-------------|
| · ELEC 327 - Digital Systems Laboratory | Spring 2016 |
| · Discrete Time Signals and Systems on edX | Spring 2015 |
| · Fundamentals of Electrical Engineering on edX | Spring 2014 |

Students Mentored

- | | |
|--|-------------------------|
| · Alfonso Rivas
project: Thermal Camera-based Fever Screening | Summer 2022 - Present |
| · Nia Cole
project: AI Stethoscope | Summer 2022 - Present |
| · Yifan Shao
project: AI Stethoscope | Summer 2022 - Present |
| · Junyi Wu
project: AI Stethoscope | Summer 2022 - Present |
| · Tianyue Zheng
project: AI for Smart Homes | Summer 2021 - Fall 2021 |
| · Yifan Zhong
project: AI for Smart Homes | Summer 2021 - Fall 2021 |
| · Zihao Luo
project: AI for Smart Homes | Summer 2021 - Fall 2021 |
| · Zhan Shu
project: AI for Smart Homes | Summer 2021 - Fall 2021 |

- Chenye Yang (Now PhD student at UC Davis) Summer 2021 - Fall 2021
project: AI for Smart Homes
- Asmita Goyanka (Now at Apple Inc.) Fall 2018 - Spring 2019
project: ML and Embedded Systems for Acoustics
- Ao Liang (Now MS student at UC Berkeley) Summer 2018
project: Wireless Localization in Urban Environments
- Laixi Shi (Now PhD student at CMU) Summer 2017
project: ML and Embedded Systems for Acoustics
- Rishikanth Chandrasekaran (Now PhD student at UC San Diego) Fall 2016 - Spring 2017
project: ML and Embedded Systems for Acoustics
- Jordan Misael Vega (Now at Goldman Sachs) Spring 2017
project: Activity Recognition on Mobile Devices
- Yan Lu (Now at Facebook) Fall 2016
project: Activity Recognition on Mobile Devices

Outreach and Other Activities

- Graduate Student Electrical Engineering at Columbia (GEEC) 07/2018 - 01/2020
Secretary and Founding Member
GEEC is the graduate student government for Electrical Engineering at Columbia University dedicated to helping EE/CE graduate students academically, socially, and professionally.
- Girls Science Day - Women in Science at Columbia 2019
Topic: Properties of Wave Signals
Hosted two workshops for female middle school students teaching them the physics of acoustic and wireless signals.
- Society of Women Engineers Workshop 2017, 2018
Assisted in hosting two workshops teaching female high school students about the properties of acoustic signals.

PUBLICATIONS

Xia, S. & Jiang, X., (2022). **AvA: An Adaptive Audio Filtering Architecture for Enhancing Mobile, Embedded, and Cyber-Physical Systems**. In *Proceedings of the 21st International Conference on Information Processing in Sensor Networks (IPSN 2022)*. ACM/IEEE.

Hou, K., Liu, Y., Wei, P., Yang, C., Kang, H., Xia, S., Spada, T., Rundle, A., & Jiang, X., (2022). **A Low-Cost In-situ System for Continuous Multi-Person Fever Screening**. In *Proceedings of the 21st International Conference on Information Processing in Sensor Networks (IPSN 2022)*. ACM/IEEE.

Liu, Y., Nie, J., Xia, S., Sun, J., Wei, P., & Jiang, X., (2022). **SoFIT: Self-Orienting Camera Network for Floor Mapping and Indoor Tracking**. In *18th International Conference on Distributed Computing in Sensor Systems (DCOSS 2022)*. IEEE.

Hou, K., Xia, S., & Jiang, X., (2022). **BuMA: Non-Intrusive Breathing Detection using Microphone Array**. In *Proceedings of the 1st ACM International Workshop on Intelligent Acoustic Systems and Applications (IASA 2022)*. ACM.

Nie, J., Shao, H., Zhao, M., Xia, S., Preindl, M., & Jiang, X., (2022). **Conversational AI Therapist for Daily Function Screening in Home Environments**. In *Proceedings of the 1st ACM International Workshop on Intelligent Acoustic Systems and Applications (IASA 2022)*. ACM.

Liu, Y., Xia, S., Nie, J., Wei, P., Shu, Z., Chang, J. A., & Jiang, X., (2022). **aiMSE: Toward an AI-Based Online Mental Status Examination**. In *IEEE Pervasive Computing*. IEEE.

Zhang S., Li Y., Zhang S., Shahabi F., Xia, S., Deng, Y., & Alshurafa, N., (2022). **Deep Learning in Human Activity Recognition with Wearable Sensors: A Review on Advances**. In *Sensors*. MDPI.

Liu, Y., Zhao, M., Xia, S., Wu, E., & Jiang, X., (2022). **A Sensorless Drone-based System for Mapping Indoor 3D Airflow Gradients: Demo Abstract**. In *Proceedings of the 20th Annual International Conference on Mobile Systems, Applications and Services (MobiSys 2022)*. ACM.

Zhao, M., Liu, Y., Dhupar, A., Hou, K., Xia, S., & Jiang, X., (2022). **A Modular and Reconfigurable Sensing and Actuation Platform for Smarter Environments and Drones: Demo Abstract.** In *Proceedings of the 20th Annual International Conference on Mobile Systems, Applications and Services (MobiSys 2022)*. ACM.

Xia, S., Chandrasekaran, R., Liu Y., Yang C., Rosing T. S., & Jiang, X., (2021). **Demo Abstract: A Drone-based System for Intelligent and Autonomous Homes.** In *Proceedings of the 19th ACM Conference on Embedded Networked Sensor Systems (SenSys 2021)*. ACM.

[Best Demo Award]

Nie, J., Liu, Y., Hu, Y., Wang, Y., Xia, S., Preindl, M., & Jiang, X., (2021). **SPIDERS+: A light-weight, wireless, and low-cost glasses-based wearable platform for emotion sensing and bio-signal acquisition.** In *Pervasive and Mobile Computing*. Elsevier.

Xia, S., Nie, J., & Jiang, X., (2021). **CSafe: An Intelligent Audio Wearable Platform for Improving Construction Worker Safety in Urban Environments.** In *Proceedings of the 20th International Conference on Information Processing in Sensor Networks (IPSN 2021)*. ACM/IEEE.

Xia, S. & Jiang, X., (2021). **Improving Acoustic Detection and Classification in Mobile and Embedded Platforms: Poster Abstract.** In *Proceedings of the 20th International Conference on Information Processing in Sensor Networks (IPSN 2021)*. ACM/IEEE.

Xia, S. & Jiang, X., (2020). **PAMS: Improving Privacy in Audio-Based Mobile Systems.** In *Proceedings of the 2nd International Workshop on Challenges in Artificial Intelligence and Machine Learning for Internet of Things (AIChallengeIoT 2020)*. ACM.

Hu, Y., Nie, J., Wang, Y., Xia, S., & Jiang, X., (2020). **Demo Abstract: Wireless Glasses for Non-contact Facial Expression Monitoring.** In *2020 19th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2020)*. ACM/IEEE.

[Best Demo Award]

Nie, J., Hu, Y., Wang, Y., Xia, S., & Jiang, X., (2020). **SPIDERS: Low-Cost Wireless Glasses for Continuous In-Situ Bio-Signal Acquisition and Emotion Recognition.** In *2020 IEEE/ACM Fifth International Conference on Internet-of-Things Design and Implementation (IoTDI 2020)*. ACM/IEEE.

Wei, P., Xia, S., Chen, R., Qian, J., Li, C., & Jiang, X., (2020). **A Deep-Reinforcement-Learning-Based Recommender System for Occupant-Driven Energy Optimization in Commercial Buildings.** In *Internet of Things Journal*. IEEE.

Xia, S., Godoy, D. d., Islam, B., Islam, M. T., Nirjon, S., Kinget, P. R., & Jiang, X., (2019). **Improving Pedestrian Safety in Cities Using Intelligent Wearable Systems.** In *Internet of Things Journal*. IEEE.

Xia, S., Godoy, D. d., Islam, B., Islam, M. T., Nirjon, S., Kinget, P. R., & Jiang, X., (2018). **A Smartphone-Based System for Improving Pedestrian Safety.** In *2018 IEEE Vehicular Networking Conference (VNC 2018)*. IEEE.

[Best Presentation Award][Runner-Up Best App]

Jia, J., Yu, J., Hanumesh, R. S., Xia, S., Wei, P., Choi, H., & Jiang, X., (2018). **Intelligent and privacy-preserving medication adherence system.** In *Smart Health*. Elsevier.

Xia, S., Wei, P., Vega, J. M., & Jiang, X., (2018). **SPINDLES+: An adaptive and personalized system for leg shake detection.** In *SmartHealth*. Elsevier.

Wei, P., Chen, X., Vega, J. M., Xia, S., Chandrasekaran, R., & Jiang, X., (2018). **A Scalable System for Apportionment and Tracking of Energy Footprints in Commercial Buildings.** In *Transactions on Sensor Networks*. ACM.

Jia, J., Xu, C., Pan, S., Xia, S., Wei, P., Noh, H. Y., Zhang, P., & Jiang, X., (2018). **Conductive Thread-Based Textile Sensor for Continuous Perspiration Level Monitoring.** In *Sensors*. MDPI.

Jia, J., Xu, C., Pan, S., Xia, S., Wei, P., Noh, H. Y., Zhang, P., & Jiang, X., (2018). **Moisture Based Perspiration Level Estimation.** In *Proceedings of the 2018 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2018 ACM International Symposium on Wearable Computers (UbiComp 2018)*. ACM.

Wei, P., Xia, S., & Jiang, X., (2018). **Energy Saving Recommendations and User Location Modeling in Commercial Buildings**. In *Proceedings of the 26th Conference on User Modeling, Adaptation and Personalization (UMAP 2018)*. ACM.

Godoy, D. d., Islam, B., Xia, S., Islam, M. T., Chandrasekaran, R., Chen, Y., Nirjon, S., Kinget, P. R., & Jiang, X., (2018). **PAWS: A Wearable Acoustic System for Pedestrian Safety**. In *2018 IEEE/ACM Third International Conference on Internet-of-Things Design and Implementation (IoTDI 2018)*. ACM/IEEE.

Godoy, D. d., Xia, S., Fernandez, W. P., Jiang, X., & Kinget, P. R., (2018). **Demo Abstract: An Ultra-Low-Power Custom Integrated Circuit based Sound-Source Localization System**. In *2018 IEEE/ACM Third International Conference on Internet-of-Things Design and Implementation (IoTDI 2018)*. ACM/IEEE.
[Best Demo Award]

Wei, P., Chen, X., Vega, J., Xia, S., Chandrasekaran, R., & Jiang, X., (2017). **ePrints: A Real-Time and Scalable System for Fair Apportionment and Tracking of Personal Energy Footprints in Commercial Buildings**. In *Proceedings of the 4th ACM International Conference on Systems for Energy-Efficient Built Environments (BuildSys 2017)*. ACM.
[Best Paper - Runner Up Award]

Xia, S., Lu, Y., Wei, P., & Jiang, X., (2017). **SPINDLES: A Smartphone Platform for Intelligent Detection and Notification of Leg Shaking**. In *Proceedings of the 2017 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2017 ACM International Symposium on Wearable Computers (UbiComp 2017)*. ACM.

Chandrasekaran, R., Godoy, D. d., Xia, S., Islam, M. T., Islam, B., Nirjon, S., Kinget, P., & Jiang, X., (2016). **SEUS: A Wearable Multi-Channel Acoustic Headset Platform to Improve Pedestrian Safety: Demo Abstract**. In *Proceedings of the 14th ACM Conference on Embedded Network Sensor Systems CD-ROM (SenSys 2016)*. ACM.
[Best Demo - Runner Up Award]