

OLIVER SHIH

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RESEARCH AND PROFESSIONAL EXPERIENCE

Apple Inc.

Cupertino, CA, USA

DSP Firmware Engineer/Applied Scientist

Jan. 2019 – Current

- Designed deep learning models (CNN, LSTM, VAE) for communication and sensing challenges from MIMO detection, anomaly detection to gesture recognition.
- Designed Radar signal processing algorithms, super-resolution algorithm, and ML models for proximity sensing and identification. Demonstrated end-to-end system on real-time embedded sensing platform.
- Developed 5G modem PHY firmware algorithm with optimized scalar and vector processing.
- Cross-function collaboration with hardware teams and product teams to shape future products.

CMU Wireless Sensing and Embedded Systems (WiSE) Lab

Pittsburgh, PA, USA

PhD Researcher

Sep. 2013 – Aug. 2018

- Developed various machine learning techniques and signal processing workflows for ultrasonic smart speaker systems that can perform tasks ranging from 3D room reconstruction to people counting and indoor localization.
- Implemented learning algorithms on designed embedded platform and evaluated it in real-world environments.
- Contributed to the development of real-time operating systems.

DARPA Grand Challenge - Spectrum Collaboration Challenge (SC2)

Pittsburgh, PA, USA

Lead of Team CMU

Sep. 2016 – Sep. 2017

- Implemented a real-time cognitive radio system using software-defined radio (SDR).
- Developed deep learning algorithms for classifying signal modulations and encoding.
- Developed behavior/pattern recognition algorithm for intelligent signal transmission using deep Q-learning.

Texas Instruments

Dallas, TX, USA

R & D Intern, LPRF Systems Team

Jun. 2015 – Aug. 2015

- Invented and patented a light-weight authentication protocol for resource-limited IoT devices.
- Implemented and demonstrated the proposed solution on the latest TI products and empirically reduced the memory footprint by 96%.

NTU Mobile and Vehicular Network Lab (MVNL)

Taipei, Taiwan

Research Assistant

Sep. 2011 – Jun. 2013

- Developed models and simulators in collaboration with Intel lab to evaluate vehicular ad-hoc network (VANET) and applications in vehicle safety.
- Conducted research in vehicular networking, visible light communication (VLC) and related implementations.

EDUCATION

Carnegie Mellon University (CMU)

Pittsburgh, USA

PhD and M.S. in Electrical and Computer Engineering

Sep. 2013 – Aug. 2018

Advisor: Anthony Rowe

Dissertation: *Learning to Listen: An Active Acoustic Approach to Sensing Spaces*

National Taiwan University (NTU)

Taipei, Taiwan

B.S. in Computer Science and Information Engineering

Sep. 2008 – Jun. 2012

PUBLICATIONS

O. Shih and A. Rowe. "Can a Phone Hear the Shape of the Room?". In: *Proceedings of the 18th International Conference on Information Processing in Sensor Networks (IPSN)*. Montreal, Canada, Apr. 2019.

O. Shih, P. Lazik, and A. Rowe. "AURES: A Wide-Band Ultrasonic Occupancy Sensing Platform". In: *Proceedings of the 3rd ACM International Conference on Systems for Energy-Efficient Built Environments (BuildSys)*. Palo Alto, USA, Nov. 2016.

M. Buevich, X. Zhang, O. Shih, D. Schnitzer, T. Escalada, A. Jacquiau-Chamski, J. Thacker, and A. Rowe. "Microgrid Losses: When the Whole is Greater Than the Sum of Its Parts". In: *Proceedings of the ACM/IEEE 7th International Conference on Cyber-Physical Systems (ICCP)*. Vienna, Austria, Apr. 2016.

P. Lazik, N. Rajagopal, O. Shih, B. Sinopoli, and A. Rowe. "ALPS: A Bluetooth and Ultrasound Platform for Mapping and Localization". In: *Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems (SenSys)*. Seoul, South Korea, Nov. 2015.

O. Shih and A. Rowe. "Occupancy Estimation Using Ultrasonic Chirps". In: *Proceedings of the ACM/IEEE 6th International Conference on Cyber-Physical Systems (ICCPS)*. Seattle, USA, Apr. 2015.

S. Yu, O. Shih, H. Tsai, N. Wisitpongphan, and R. D. Roberts. "Smart Automotive Lighting for Vehicle Safety". In: *IEEE Communications Magazine*. Dec. 2013.

O. Shih, H. Tsai, H. Lin, and A. Pang. "A Rule-Based Mixed Mobility Model for Cars and Scooters". In: *IEEE Vehicular Networking Conference (VNC)*. Amsterdam, Netherlands, Nov. 2011.

HONORS & AWARDS

2017	Finalist , DARPA Grand Challenge, Spectrum Collaboration Challenge (SC2), 1st-year Preliminary Competition	Baltimore, USA
2015	1st Place , Microsoft Indoor Localization Competition, Infrastructure-based	Seattle, USA
2013	Recipient , Dean Tuition Fellowship, Carnegie Institute of Technology, CMU	Pittsburgh, USA

PATENTS

Method and Apparatus for Locating a Mobile Device US 2017/0350958 A1
Patrick Lazik, Niranjini Rajagopal, Oliver Shih, Anthony Rowe, and Bruno Sinopoli Dec. 7, 2017

Method and Apparatus for Locating a Mobile Device Within an Indoor Environment US 9,766,320 B2
Patrick Lazik, Niranjini Rajagopal, Oliver Shih, Anthony Rowe, and Bruno Sinopoli Sep. 19, 2017

Authentication of Networked Devices Having Low Computational Capacity US 2017/0063843 A1
Kumaran Vijayasankar, Oliver Shih, Arvind K. Raghu, Ramanuja Vedantham, and Xiaolin Lu Mar. 2, 2017

TECHNICAL SKILLS

Programming Languages C, C++, MATLAB, Python, Bash, CUDA, Java

Tools Vim, VSCode, Keras/TensorFlow, Scikit-learn, Pandas, Version control (Git, SVN), GNU Radio, \LaTeX

Relevant Coursework Graduate Machine Learning, Graduate Artificial Intelligence, Real-time Embedded System, Wireless Sensor Network, Stochastic Processing, Wireless Communication, Special Topics in Wireless Networks and Mobile Computing, How to Write Fast Code, Machine Learning for Signal Processing (audit), and Deep Reinforcement Learning (audit)