

Biyi Fang

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Research Interests

Deep Learning, Ubiquitous Computing, Mobile Sensing, Applied Machine Learning and Human Computer Interface (HCI).

Research Statement

My research interest focuses on designing, developing, and evaluating mobile and deep learning powered technologies. My work roughly involves building hardware sensing platform, designing intelligent modelling algorithms, and conduct extensive evaluation. Recently, I am particularly interested in mobilizing deep learning – bring deep learning to mobile devices.

Education

Michigan State University, 3.9/4.0 , East Lansing, MI Ph.D., Electrical and Computer Engineering	Aug 2014 - Present
University of Southern California, 3.8/4.0 , Los Angeles, CA M.S., Electrical Engineering	May 2014
Beijing Institute of Technology, 3.8/4.0 , Beijing, China B.S., Electrical Engineering, with Best Thesis Award	May 2012

Experience

Graduate Research Assistant Michigan State University, East Lansing, MI Advisor: Mi Zhang	Aug 2014 - Present
Research Intern Intel Laboratories, Santa Clara, CA Mentor: Lama Nachman	June 2016 - Aug 2016
Research Intern Bell Laboratories, Dublin, IE Mentor: Nicholas Lane	Oct 2015 - Dec 2015
Visiting Researcher University of Cambridge, Cambridge, UK Host: Cecilia Mascolo	July 2015 - Oct 2015

Selected Publications

- [4] **Biyi Fang**, Jillian Co, and Mi Zhang. “DeepASL: Enabling Ubiquitous and Non-Intrusive Word and Sentence-Level Sign Language Translation”. *ACM Conference on Embedded Networked Sensor Systems (SenSys’17)*, November 2017. [Rate: 26/151 = 17%]

- [3] **Biyi Fang**, Nicholas Lane, Mi Zhang, Aidan Boran, and Fahim Kawsar. “BodyScan: Enabling Radio-based Sensing on Wearable Devices for Contactless Activity and Vital Sign Monitoring”. *The International Conference on Mobile Systems, Applications, and Services (MobiSys '16)*, June 2016. [Rate: 31/197 = 15%]
- [2] **Biyi Fang**, Nicholas Lane, Mi Zhang, and Fahim Kawsar. “HeadScan: A Wearable System for Radio-based Sensing of Head and Mouth-related Activities”. *ACM International Joint Conference on Information Processing in Sensor Networks (IPSN '16)*, April 2016. [Rate: 23/117 = 19%]
- [1] **Biyi Fang**, Qiumin Xu, Taiwoo Park and Mi Zhang. “AirSense: An Intelligent Home-Based Sensing System for Indoor Air Pollution Profiling”. *ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp '16)*, September 2016. [Rate: 114/481 = 23%]

Patents

- [2] Mi Zhang, **Biyi Fang**, Nicholas D. Lane, and Fahim Kawsar. “Wearable System for Sensing Head and Mouth Movement using Radio”. U.S. Provisional Application 62\378,757
- [1] Mi Zhang, **Biyi Fang**, and Taiwoo Park. ”An Intelligent Sensing System for Indoor Air Quality Analytics”. U.S. Provisional Application 62\393,713.

Selected Projects

DeepASL: Sign Language Translator that Lets Deaf People “Hear” and “Speak” Dec 2016 - Apr 2017

- Proposed using infra-red cameras to perform hand/forearm shape/movement information extraction
- Designed and implemented a eight-layer hierarchical RNN to organically combine low-level information to high-level ASL representations
- Implemented Connectionist Temporal Classification (CTC) on ASL high-level representations to eliminate the necessity of word alignment and segmentation within a sentence
- Achieved a surprisingly high accuracy (95%) on 56 ASL-word recognition across 11 users
- Achieved low word-error-rate (8.6%) on ASL-sentence translation on unseen sentence across 11 users

Age-Gender Identification and DCGANs on Face Generation and Completion Sep 2016 - Dec 2016

- Designed and implemented a Multi-Task Learning CNN framework to recognize age and gender of faces
- Proved superiority of multi-task learning on age and gender over single-task learning
- Designed and applied a Multi-Task Learning DCGANs (Deep Convolutional GANs) on face regeneration and completion

BodyScan: Daily Activity and Vital Sign Monitoring All-in-One Wearable Solution Oct 2015 - Dec 2015

- Designed and developed a Humming Board-based hip-mounted dual directional antenna wearable which is capable of CSI logging
- Became the first to combine WiFi sensing with wearable daily activity detection.
- Designed and implemented lightweight processing pipeline.
- Enabled the system to recognize up to 20 daily activities, and to monitor breathing rate at a 97% accuracy

HeadScan: Radio-based Shoulder-Mounted Head and Mouth Activity Tracker July 2015 - Oct 2015

- Proposed a brand-new wearable system utilizing commercial WiFi signal (Channel State Information), which is capable of constantly monitoring head movement involved activities
- Designed a computational pipeline capable of: 1) noise removal; 2) key dimension information extraction; 3) feature extraction and 4) unsupervised feature learning classification (Sparse Coding).
- Developed a wearable prototype (Humming Board) that is capable of providing constant and reliable Channel State Information.
- Designed and implemented a comprehensive performance evaluation as well as quantitative comparisons with audio sensing modality (duplicated from published work).

AirSense: Smart Device that Detects Your Indoor Air Pollution Events

Oct 2014 - Mar 2016

- Designed a computational pipeline capable of: 1) noise removal; 2) segmentation; 3) classification; 4) pollutant concentration trend prediction based on histories
- Designed Android based mobile application utilizing persuasive technology
- Conduct user interview study and human performance evaluation (HCI)

Technical Skills

Programming Languages: C/C++, C#, Assembly Language, Java, MATLAB, Python, \LaTeX

Mobile Computing Essentials: Tensorflow, Arduino, Xilinx FPGA, Android, Linux

Reference

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Nicholas D. Lane, Principal Scientist, Bell Laboratories
Associate Professor, University of Oxford

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