

# Peng Zan

7562 Eliaok Ter, Gaithersburg, MD 20879  
zanpeng.pz@gmail.com (240)755-2606

## EDUCATION

<b>Ph.D.</b> , Electrical and Computer Engineering University of Maryland, College Park, MD	12/2019 GPA 3.6
<b>M.Sc.</b> , Electrical and Computer Engineering University of Maryland, College Park, MD	08/2019 GPA 3.8
<b>B.Sc.</b> , Electrical Engineering Xi'an Jiaotong University, Xi'an, China	07/2014 GPA 90/100
<b>Exchange</b> , Electronic Engineering Chinese University of Hong Kong, Hong Kong, China	05/2013 GPA 3.7

## WORK EXPERIENCE

<b>Sr. Software Engineer - AI Framework</b> Black Sesame Technologies, San Jose	08/2021-present CA
<b>Principal Scientist</b> Origin Wireless AI, Greenbelt	02/2021-06/2021 MD
<b>Principal Data Scientist</b> Origin Wireless AI, Greenbelt	02/2020-02/2021 MD
<b>DSP Research Intern</b> Starkey Hearing Technologies, Eden Prairie	05/2019-08/2019 MN
<b>Graduate Research Assistant</b> University of Maryland, College Park	08/2015-05/2019 MD
<b>Graduate Teaching Assistant</b> University of Maryland, College Park	08/2014-05/2015 MD

## INTEREST

Signal Processing, Mathematical Optimization, Auditory & Acoustics, Autonomous Driving AI Framework

## PROJECTS

<b>ADAS Chip Compiler Optimization</b> AI Framework Research, Black Sesame Tech.	08/2021 - present AI Framework Tool Team
<ul style="list-style-type: none"><li>Identified factors affecting quantization accuracy and improved quantization accuracy by about 20%.</li><li>Designed and optimized neural network quantization processes on autonomous driving chip using mathematical modeling and convex optimization, boosting mass production of next-generation chip.</li><li>Designed graph partition and memory allocation algorithms to improve SoC performance.</li></ul>	
<b>WiFi Sensing and Internet of Things (IoT)</b> WiFi-Sensing for Home Security and Indoor Activity Monitoring	02/2020 - 06/2021 Algorithm Team, Origin Wireless AI
<ul style="list-style-type: none"><li>Researched and developed real-time algorithm for indoor motion and breathing localization using WiFi sensing based on <i>statistical electromagnetic field models</i>.</li><li>Designed and optimized indoor activity monitoring algorithms for HEX Home, our home security and activity monitoring system (CES 2021 Innovation Award), based on a <i>sequential decision model</i>.</li><li>Collaborated with companies such as Verizon, Alarm.com and Belkin to turn research into commercialized products.</li></ul>	
<b>WiFi-Sensing Production Automation</b>	Hardware Team, Origin Wireless AI
<ul style="list-style-type: none"><li>Designed and automated manufacture workflow for WiFi-sensing products by Python.</li><li>Boosted production rate from one per hour to 10-12 per hour.</li><li>Supported Verizon Communications Inc. with quality products and visualization tools built by Python.</li></ul>	
<b>Real-Time Tracking with IMU Sensors on Mobile Devices</b>	Algorithm Team, Origin Wireless AI
<ul style="list-style-type: none"><li>Developed a real-time tracking system with sub-meter accuracy based on a <i>Bayesian dynamic model on graph</i>.</li><li>Developed Android and iOS App for Origin Tracking product - work without WiFi.</li></ul>	
<b>DNN-based Speech Enhancement</b> Signal Processing Research, Starkey	06/2019 - 08/2019 Internship research
<ul style="list-style-type: none"><li>Designed and conducted subjective listening experiment to test DNN-based speech enhancement algorithms.</li><li>Analyzed experimental data and compared DNN algorithms.</li></ul>	
<b>Joint Approach of Auditory Attention Decoding and Speech Enhancement ??</b> Signal Processing Research, Starkey	05/2019 - 08/2019 Internship research
<ul style="list-style-type: none"><li>Designed and conducted electroencephalography (EEG) experiment to simulate a cocktail party scenario.</li><li>Collected auditory responses while subjects switch attention from one speaker to another.</li><li>Developed an <i>EEG guided Beamforming model</i> for joint approach of attention decoding and speech enhancement.</li></ul>	
<b>Mutual Information Analysis of Auditory Brain Responses and Effects of Aging ????</b> Computational Sensorimotor Systems Lab, UMD	01/2018 - 05/2019 Thesis research
<ul style="list-style-type: none"><li>Developed a novel approach based on information theory to decode phase-locked response from M/EEG recording.</li><li>Revealed speech over-representation in the aging midbrain ?? and cortical ?? marker of behaviors.</li><li>Algorithm programmed in Matlab, source-space analysis done in Python and statistics conducted in R.</li></ul>	
<b>Machine Learning Applications in Auditory Research ????</b> Computational Sensorimotor Systems Lab, UMD	06/2017 - 12/2017 Independent research

- Implemented KNN and CNN for schizophrenia detection based on auditory steady-state response features (code).
- Designed and compared neural decoders based on maximum likelihood estimation, linear regression and neural network to study adaptive efficient coding of correlated acoustic properties in auditory cortex of ferret ??.
- Developed object and edge detection approach to extract pupillometry information from video recordings to study implicit memory for complex sounds in auditory cortex of ferret ??.

## SKILLS

**Programming:** Python (expert), C/C++, R

**Software Tools:** Matlab (expert), SPSS, MNE-Python, Eelbrain, Tensorflow, Pytorch, L<sup>A</sup>T<sub>E</sub>X, Git (Github), Linux/Unix

**Software Engineering:** Algorithms and Data Structure (Certificate), App Development, System Automation

**Data Science:** Statistics, Machine Learning (Certificate), Deep Learning (Certificate)

**Data Engineering:** Database, SQL

**Research:** Auditory Neuroscience Experiment Design, Electroencephalography (EEG), Magnetoencephalography (MEG)

## JOURNAL PUBLICATIONS

- [J1] **Peng Zan**, Alessandro Presacco, Samira Anderson, and Jonathan Z. Simon. Exaggerated cortical representation of speech in older listeners: mutual information analysis. *Journal of Neurophysiology*, 124(4):1152-1164, Oct. 7, 2020.
- [J2] **Peng Zan**, Alessandro Presacco, Samira Anderson, and Jonathan Z. Simon. Mutual information analysis of neural representations of speech in noise in the aging midbrain. *Journal of Neurophysiology Innovative Methodology*, 122(6): 2372-2387, Dec. 4, 2019.
- [J3] Kai Lu, Wanyi Liu, Kelsey Dutta, **Peng Zan**, Jonathan B Fritz, and Shihab A. Shamma. Adaptive efficient coding of correlated acoustic properties. *The Journal of Neuroscience*, 39(44):8664-8678, Oct. 30, 2019.
- [J4] Kai Lu, Wanyi Liu, **Peng Zan**, Stephen V. David, Jonathan B Fritz, and Shihab A. Shamma. Implicit memory for complex sounds in higher auditory cortex of the ferret. *The Journal of Neuroscience*, 38(46):9955-9966, Nov. 14, 2018.
- [J5] Junmin Liu, Yongchang Hui, and **Peng Zan**. Locally linear detail injection for pansharpening. *IEEE Access*, 5:9728-9738, June 7, 2017.
- [J6] Dai Wang, Xiaohong Guan, Jiang Wu, Pan Li, **Peng Zan**, and Hui Xu. Integrated energy exchange scheduling for microgrids with electric vehicles. *IEEE Transaction on Smart Grid*, 7(4):17621774, July 10, 2016.
- [J7] Xiaoming Du, Stephanie Hare, Ann Summerfelt, Bhim Adhikari, Laura Garcia, Wyatt Marshall, **Peng Zan**, Mark Kvarta, Eric Goldwaser, Heather Bruce, Si Gao, Hemalatha Sampath, Peter Kochunov, Jonathan Z. Simon, Elliot Hong. Cortical Connectomic Mediations on Gamma Band Synchronization in Schizophrenia. *Translational Psychiatry*, Nature Publishing Group, Jan. 19, 2023.

## CONFERENCE PAPERS & POSTERS

- [C1] Wenqiang Pu, **Peng Zan**, Jinjun Xiao, Tao Zhang, Zhi-Quan Luo. Evaluation of joint auditory attention decoding and adaptive binaural beamforming approach for hearing devices with attention switching. 2020 *IEEE International Conference on Acoustics, Speech, and Signal Processing*, May 08, 2020.
- [C2] **Peng Zan**, Alessandro Presacco, Samira Anderson, and Jonathan Z. Simon. Mutual information analysis of neural representations of speech in noise in the aging midbrain. *ARO 2019*, Feb. 2019.
- [C3] **Peng Zan**, Alessandro Presacco, Samira Anderson, and Jonathan Z. Simon. Cortical over-representation of speech in older listeners correlates with a reduction in both behavioral inhibition and speech intelligibility. *ARO*, Feb. 2019.
- [C4] **Peng Zan**, Alessandro Presacco, Samira Anderson, and Jonathan Z. Simon. Mutual information analysis of neural representations of speech in noise in the aging midbrain. *Auditory SPLASH*, Sep. 8, 2018.
- [C5] **Peng Zan**, Alessandro Presacco, Samira Anderson, and Jonathan Z. Simon. Mutual information analysis of neural representations of speech in noise in the aging midbrain. *EAR*, June 15, 2018.

## PATENTS

- [P1] Chenshu WU, Beibei WANG, **Peng ZAN**, Sai Deepika REGANI, Xiaolu ZENG, Hung-Quoc LAI, KJ Ray LIU, Oscar AU. Method, Apparatus, and System for Wireless Micro Motion Monitoring. *US20210311166A1*, 10/7/2021.
- [P2] Chenshu WU; Beibei WANG; Oscar Chi-Lim AU; K.J. Ray LIU; Chao-Lun MAI; Dan BUGOS; Hung-Quoc Duc LAI; Spencer MAID; Yuqian HU; Sai Deepika REGANI; Muhammed Zahid OZTURK; Xiaolu ZENG; Fengyu WANG; Jeng-Feng LEE and **Peng ZAN**. METHOD, APPARATUS, AND SYSTEM FOR WIRELESS MONITORING TO ENSURE SECURITY. EP Patent Application No. 21200823.9, filed October 4, 2021.
- [P3] Yuqian HU, Beibei WANG, Sai Deepika REGANI, **Peng ZAN**, Chenshu WU, Dan BUGOS, Xiaolu ZENG, Hung-Quoc Duc LAI, K. J. Ray LIU, Oscar Chi-Lim AU. METHOD, APPARATUS, AND SYSTEM FOR WIRELESS SENSING BASED ON LINKWISE MOTION STATISTICS, U.S. Patent Application No. 17/838,244, filed June 12, 2022.
- [P4] Beibei WANG, Muhammed Zahid OZTURK, Chenshu WU, Xiaolu ZENG, Sai Deepika REGANI, Yuqian HU, K. J. Ray LIU, Oscar Chi-Lim AU, Yi HAN, Hung-Quoc Duc LAI, David N. CLAFFEY, Chun-I CHEN, Dan BUGOS and **Peng ZAN**. METHOD, APPARATUS, AND SYSTEM FOR SOUND SENSING AND WIRELESS SENSING, EP Patent Application No. 22178761.7, filed June 13, 2022.
- [P5] Beibei WANG, Muhammed Zahid OZTURK, Chenshu WU, Xiaolu ZENG, Sai Deepika REGANI, Yuqian HU, K. J. Ray LIU, Oscar Chi-Lim AU, Yi HAN, Hung-Quoc Duc LAI, David N. CLAFFEY, Chun-I CHEN, Dan BUGOS and **Peng ZAN**. METHOD, APPARATUS, AND SYSTEM FOR SOUND SENSING AND WIRELESS SENSING. Japan Patent Application No. 2022-095307, filed June 13, 2022.
- [P6] **Peng ZAN**. Methods for Mathematical Modeling of Hardware Quantization Process, *pending for attorney review*, June 30, 2022.

[P7] **Peng ZAN**. Neural Network Structure-based Quantization Optimization, *pending for attorney review*, June 30, 2022.

#### PEER REVIEWS

[R1]	IEEE Access	07/2019
[R2]	IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing	01/2020
[R3]	IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing	03/2020
[R4]	Neuroscience Letters	04/2021
[R5]	IEEE Signal Processing Letters	05/2021
[R6]	IEEE Signal Processing Letters	06/2021
[R7]	Neuroscience Letters	07/2021
[R8]	IEEE Signal Processing Letters	08/2021

#### SELECTED AWARDS & HONORS

Starkey Recognition Award	Starkey, 08/2019
COMBINE Traveling Award	UMD, 12/2018
NSF-Funded COMBINE Fellowship (Computational Biological Network Program)	UMD, 09/2017
Jimmy H. C. Lin Graduate Scholarship for Entrepreneurship	UMD, 09/2014
ECE Ph.D. Fellowship Award	UMD, 09/2014
National Scholarship, Ministry of Education of the P.R.C.	XJTU, 11/2011