

Peng Zan

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EDUCATION

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

WORK EXPERIENCE

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

EXPERTISE

Mathematical Optimization for Signal Processing, AI Compiler & Quantization Framework

PROJECTS

ADAS Chip Quantization & Compiler Optimization [P1][P2] AI Framework R&D	08/2021 - present AI Framework Team, Black Sesame Technologies, Inc.
<ul style="list-style-type: none">Identified factors affecting quantization accuracy and improved quantization accuracy by about 20%.Designed and optimized neural network quantization processes on autonomous driving chip using mathematical modeling and optimization theory, boosting mass production of next-generation chip [P1][P2].Designed graph partition and memory allocation algorithms to improve SoC performance.	
WiFi Sensing and Internet of Things (IoT) [P3]-[P7] WiFi-Sensing for Home Security and Indoor Activity Monitoring	02/2020 - 06/2021 Algorithm Team, Origin Wireless AI
<ul style="list-style-type: none">Researched and developed real-time algorithm for indoor motion and breathing localization using WiFi sensing based on <i>statistical electromagnetic field models</i>.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>.Collaborated with companies such as Verizon, Alarm.com and Belkin to turn research into commercialized products.	
WiFi-Sensing Production Automation	Hardware Team, Origin Wireless AI
<ul style="list-style-type: none">Designed and automated manufacture workflow for WiFi-sensing products by Python.Boosted production rate from one per hour to 10-12 per hour.Supported Verizon Communications Inc. with quality products and visualization tools built by Python.	
Real-Time Tracking with IMU Sensors on Mobile Devices	Algorithm Team, Origin Wireless AI
<ul style="list-style-type: none">Developed a real-time tracking system with sub-meter accuracy based on a <i>Bayesian dynamic model on graph</i>.Developed Android and iOS App for Origin Tracking product - work without WiFi.	
Joint Approach of Auditory Attention Decoding and Speech Enhancement [C1] Signal Processing Research, Starkey	05/2019 - 08/2019 Internship research
<ul style="list-style-type: none">Designed and conducted electroencephalography (EEG) experiment to simulate a cocktail party scenario.Collected auditory responses while subjects switch attention from one speaker to another.Developed an <i>EEG guided Beamforming model</i> for joint approach of attention decoding and speech enhancement.	
Mutual Information Analysis of Auditory Brain Responses and Effects of Aging [J1][J2] Computational Sensorimotor Systems Lab, UMD	01/2018 - 05/2019 Thesis research
<ul style="list-style-type: none">Developed a novel approach based on information theory to decode phase-locked response from M/EEG recording.Revealed speech over-representation in the aging midbrain [J2] and cortical [J1] marker of behaviors.Algorithm programmed in Matlab, source-space analysis done in Python and statistics conducted in R.	
Machine Learning Applications in Auditory Research [J3][J4] Computational Sensorimotor Systems Lab, UMD	06/2017 - 12/2017 Independent research
<ul style="list-style-type: none">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 [J3].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 [J4].	

SKILLS

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

Software Tools: Matlab (expert), SPSS, Tensorflow, Pytorch, Git (Github), Linux/Unix, L^AT_EX

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

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

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] **Peng Zan**. System and method for neural network structure-level quantization optimization. Application No. 18209932, filed to USPTO, June 14, 2023.
- [P2] **Peng Zan**. System and method for mathematical modeling of hardware quantization process. Application No. 18081515, filed to USPTO, Dec 14, 2022.
- [P3] 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.
- [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. Japan Patent Application No. 2022-095307, 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. EP Patent Application No. 22178761.7, filed June 13, 2022.
- [P6] 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.
- [P7] 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.

PEER REVIEWS

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

SELECTED AWARDS & HONORS

Starkey Recognition Award	Starkey, 08/2019
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