

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	08/2021-09/2023 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

AI Quantization & Compiler Framework, Mathematical Optimization for Signal Processing

SKILLS

Programming: Python, C/C++

Software Tools: onnx-mlir, LLVM/MLIR, Pytorch, Tensorflow, Git/Github, Linux/Unix, Matlab, R, L^AT_EX

Software Engineering: Neural Network Quantization, Algorithms and Data Structure, System Automation

Data Science: Statistics, Machine Learning, Deep Learning

PROJECTS

ADAS Chip Quantization & Compiler Optimization [P1][P2] AI Framework R&D	08/2021 - 09/2023 AI Framework Team, Black Sesame Technologies, Inc.
- 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 and implemented quantization-related framework for next-generation BST NPU compiler based on onnx-mlir and LLVM/MLIR.	
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
- 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
- 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
- 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
- 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
- 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
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].

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