Haolin He

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EDUCATION

The Chinese University of Hong Kong, Department of Electrical Engineering
Degree: *Doctor of Philosophy* (Major: Electrical Engineering) 08/2024-07/2028
Supervisor: Qiuqiang Kong
Research topic: Signal Processing and Artificial Intelligence

University of Electronic Science and Technology of China, School of Information and Communication Engineering
Degree: *Bachelor of Engineering* (Honors, Major: Communication Engineering) 09/2020-07/2024
GPA: 3.95/4.0
Core Courses: Principle of Communication (99/100), Digital Signal Processing (96/100), Digital Logic Circuit and System (95/100), Stochastic Signal Analysis (94/100), Signals and Systems (93/100), Computer Communication Network (90/100), High-Level Language Programming (89/100), etc.
Scholarships: National Scholarship (2022-2023 Academic Year; Rank 2/217)
Scholarship for Outstanding Students (2022-2023 Academic Year)
Scholarship for Outstanding Students (2021-2022 Academic Year)
Scholarship for Outstanding Students (2020-2021 Academic Year)

National University of Singapore 05/2021-01/2022
Online Study Project
Major: Computer Science
Subject: Structure and Interpretation of Computer Programs (90/100)

Nanyang Technological University, Singapore 01/2022-02/2023
Online Research Project
Department: Business AI Lab

PROJECT EXPERIENCES

The Application of Deep Learning in Amygdala Parcellation Based on Diffusion Weighted Imaging (DWI) 06/2023-07/2024
Research Project | Supervisor: Fan ZHANG

- Purely used DWI to avoid T1-assisted segmentation and manual segmentation
- Re-clustered fiber of interest and used fiber dilation convolution and Gaussian smoothing filters to improve data quality
- Designed a K-means-friendly dense autoencoder with a tailored training framework to divide the amygdala into nine subregions
- Completed the paper "A Novel Deep Clustering Framework for Fine-scale Parcellation of Amygdala Using dMRI Tractography" which has been accpeted by the *2024 International Symposium on Biomedical Imaging (ISBI2024)*
- Selected as one of the 50 *Student Travel Grant Winners* worldwide in *ISBI2024*

Scalable Diffusion Weighted Imaging (DWI) Dataset for Autism Spectrum Disorder (ASD) Research 03/2023-07/2024
Research Project | Supervisor: Fan ZHANG

- Collect DWI data from multiple institutions and websites, organize them in a unified format, and then use data harmonization methods to create a large autism DWI dataset
- Designed a pipeline for DWI preprocessing which allows for detailed and automated preprocessing of DWI data
- Designed a pipeline for DWI preprocessing which automatically extracted the amygdala and its associated fiber bundles from the brain and constructed the dataset
- Cooperated with organizations, such as Chinese PLA General Hospital, Harvard Medical School, etc., to use the dataset and co-authored the abstract of "A dMRI-based brain connectivity study of the amygdala in ASD children with multi-tensor UKF tractography", which has been under review by the *2024 International Society for Magnetic Resonance in Medicine (ISMRM2024)*

Unsupervised Neural Network with Cooperative-Competitive Learning Mechanism: A Novel Approach for Reducing Peak-to-Average Power Ratio (PAPR) of Orthogonal Frequency-Division Multiplexing (OFDM) Signals 03/2023-07/2023

Research Project & Coursework Project | Supervisor: Xiaodong ZHU

- Designed a neural network ensemble to be placed at the transmitter and receiver of a transmission system, aiming to generate and reconstruct signals while minimizing the peak-to-average power ratio (PAPR) of the intermediate signal
- Used unsupervised learning methods to reduce the need for manual annotation and enable the network to potentially surpass the constraints of traditional approaches
- Proposed methods to rotate and merge convolutional neural networks to better grasp the relationship of each sample point in the 1D signal and incorporate the 2D convolution into the 1D signal processing
- Developed a cooperative-competitive training mechanism (inspired by GAN) to facilitate synchronized learning between the transmitter and receiver, enabling mutual understanding and achieving tradeoffs among multiple objectives

Developing a New Discrete-Time Zeroing Neural Network (ZNN) Model 06/2022-05/2023

Research Project | Supervisor: Yang SHI

- Started from the optimization problem of time-varying functions (signals), derived Continuous-Time Zeroing Neural Networks (CTZNN) and Discrete-Time Zeroing Neural Networks (DTZNN) to solve time-varying challenges in the field of automation
- The ZNN was brought greater flexibility through the introduction of the fourth-moment discretization formula in the Second-Order Derivative Elimination (SODE) method
- Completed the paper "A Zeroing Neural Network for Solving Discrete Time-Varying Minimization with Different Adjustable Parameter", which was accepted by the *7th International Conference on Mechatronics and Intelligent Robotics (ICMIR2023)*

A Real-Time Gesture Recognition System Based on CNN and OpenCV 01/2022-03/2022

Group Project | NTU Business AI Lab; Supervisor: Teik Toe TEOH

- Used SkinMask for preprocessing gesture images and significantly reduces the interference from the background environment
- Optimized the network using MobileNet and ensured its deployment on mobile devices
- Received an Outstanding evaluation at the end of the project

EXTRACURRICULAR ACTIVITIES

The Mathematical Contest in Modeling / The Interdisciplinary Contest in Modeling (MCM/ICM) 02/2023

- Collaborated with a group to develop a novel index for assessing and preventing the risks of light pollution
- Innovatively integrated the EM algorithm from machine learning with the Gaussian mixture model (GMM) and optical flow estimation algorithm from computer vision, achieving impressive results in light pollution assessment during the competition
- Achieved the finalist designation (F award, top 2% approximately) in the competition with over 25,000 teams worldwide

The First Class of the School of Information and Communication Engineering 04/2021-07/2024

- Undertook various challenging courses and small seminars classes as required
- Completed a course on *Communication Principles,* explored the characteristics of acoustic channels, built an OFDM (Orthogonal Frequency Division Multiplexing) transmission system based on sound waves using speakers and microphones; designed a dynamic threshold decision-making method that significantly reduces the bit error rate, and produced a video that explains how to use the EM algorithm and GMM (Gaussian Mixture Model) for flexible partitioning of constellation maps
- Completed a course on *Digital Signal Processing,* and built an AI-powered smart speaker using a Raspberry Pi for real-time question-answering and furniture control; the project was awarded the second prize at the National University Students Competition- Five Minute Research Presentation

ADDITIONAL INFORMATION

Software and Tools:	MATLAB, Python, Verilog, C, Latex
Language Proficiency:	Chinese (Native), English (IELTS: Overall 7.5)
Awards:	F Award in the MCM/ICM (Top 2%; International-Level)
	2nd Place in the 2022 University Students Competition- Five-Minute Research Presentation (State-Level)
	3rd Place in the 2021 National English Competition for College Students (State-Level)
	Outstanding Graduate of Sichuan Province (Provincial-Level)
	Outstanding Graduate of the University of Electronic Science and Technology of China (University-Level)
	Honors Bachelor, Honors Courses, Honors Research (University-level)
	Outstanding Individual in Social Practices (University-level)