

# Yimin Zhao

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## PERSONAL SUMMARY

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Interested in applying machine learning in autonomous systems. Strong project experience in neural network design, robot simulation, and robotic system development. Conducting PhD research of robotics at the National University of Singapore, supervised by Dr. Yeoh Ker-Wei, Justin.

*Strength:* Have strong execution and sense of responsibility, passionate to explore and learn.

## EDUCATION

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### National University of Singapore, Singapore

Feb. 2025 — Present

*Doctor of Philosophy*

*Supervisor:* Dr. Yeoh Ker-Wei, Justin

*Interests:* Machine Learning in Robotics; Neural Network; Autonomous Systems

### National University of Singapore, Singapore

Aug. 2023 — Feb. 2025

*Master of Science in Robotics*

GPA: 4.35/5.0

*Supervisor:* Prof. Marcelo H. Ang Jr.

*Representative Modules:* Robot Vision and AI; Autonomous Mobile Robotics; Machine Learning in Robotics; Autonomous Robot Navigation; Robot Kinematics; Robot Dynamics and Control

### University of Leeds, Chengdu, China

Sept. 2019 — Jun. 2023

*Bachelor of Science in Computer Science (2:1)*

Average Score: 72.2/100

*Affiliation:* SWJTU-Leeds Joint School, Southwest Jiaotong University

*Representative Modules:* Machine Learning; Algorithms and Data Structures; Artificial Intelligence; Data Mining; Object Oriented Programming; Software Engineering; Web Application Development

## PUBLICATIONS

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- [1] **Yimin, Zhao** and J. Gu. Feature fusion based on mutual-cross-attention mechanism for eeg emotion recognition. In *Medical Image Computing and Computer Assisted Intervention – MICCAI 2024*, pages 276–285. Springer Nature Switzerland, 2024.
- [2] H. Wang, S. Gao, **Yimin, Zhao**, M. Song, H. Wang, and D. C. Rompapas. The mind commands you: Combining brain-computer interactions with augmented reality to control internet of things (IoT) tools, and robotic platforms. In *2022 IEEE 5th International Conference on Electronics Technology (ICET)*, pages 1026–1031, May 2022.

## ACADEMIC EXPERIENCE

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### Feature Fusion Based on Mutual-Cross-Attention Mechanism for EEG Emotion Recognition

*National Natural Science Foundation of China, Singapore*

Dec. 2023 — Mar. 2024

- Proposed a purely mathematical MCA which fuse two features more effectively; developed a unique Channel-Frequency-Time 3D feature structure, which presents spectral and temporal information simultaneously.
- Published to Medical Image Computing and Computer Assisted Intervention – MICCAI 2024.

### Motion Planning Simulation for Autonomous Driving

*Master Thesis: Final Project Report, Singapore*

Oct. 2023 — Apr. 2024

- Simulated and visualized four advanced planners using the unified dataset and simulator provided by nuplan-devkit; created an evaluation score benchmark for comparison and analysis.
- Designed a novel learning-based planner based on diffusion model; simulated and evaluated the new planner for comparing with the benchmark.

### Emotion Judgment System Based on Deep Learning and EEG Analysis

*National Student Research Training Program, China*

May. 2021 — May. 2022

- Pre-processed DEAP dataset through band-pass filter and Independent Component Analysis (ICA) by using Python MNE package library.
- Extracted wavelet coefficients using the db4 wavelet of the continuous wavelet decomposition; generate 'scale' (64) dimension from frequency (128 Hz) dimension (Nyquist rate); calculated average energy to Shannon entropy ratio (EER) for each scale; selected appropriate ranges of scale to calculate.

- Built a novel four-classifier by merging bi-classifier; experimented and filtered the eight dominate channels with the most prominent emotional response to enhance model performance.

### Design and fabrication of a brain-controlled rolling robot based on OpenBCI-Python-Arduino

Provincial Student Research Training Program, China

Jun. 2020 — May. 2021

- Designed and programmed a simple 'admissible heuristic' by utilizing RNN in TensorFlow.
- Pre-processed EEG data using NeuroPy to remove noise; extracted feature through the Common Spatial Pattern (CSP); employed Linear Discriminant Analysis (LDA) as classifier.
- Designed and developed a novel 'Disk' human-computer interaction interface by PyQt of Python. The output of the classifier indirectly controlled the robot by switching 'gears' on the 'Disk' that represent different motion states.
- Published to International Conference on Electronics Technology (ICET), 2022.

## WORK EXPERIENCES

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### Xi'an ZhenTec Co., Ltd

Software Engineer, Technical Department

Jul. 2021 — Sept. 2021

- *EEG-based emotion classification*: Created video experimental paradigm; built a experimental platform utilizing marking box, EEG collector, amplifier, and paradigm; programmed data collection script.
- *EEG-based sleep stages monitor*: Implemented OSC port listening to achieve the overall data transmission; developed sleep stages display interface using PyQt.

## EXTRACURRICULAR EXPERIENCES

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### School of Mechanical Engineering

President, Model Aircraft Association

Sept. 2020 — Jun. 2022

- *Competition organization*: Planned and organised 12th and 13th Mechanics Innovation Competitions; responsible for the topics review, material and site preparation, publicity, and result review.
- *Vertical take-off and landing (VTOL) project*: Initiated the VTOL project sponsored by Leeds Life Foundation; designed structure and completed the deployment of the control devices.
- *Administrative work*: Took charge of the financial management, staff recruitment and documents writing.

## HONOUR

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- National Second Prize, China-US Young Maker Competition (CUYMC)
- Successful Participant, 2021 Mathematical Contest in Modeling

## SKILLS

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- **Programming**: Python, C++, MATLAB, C, HTML5, CSS3, JavaScript, Java
- **Libraries**: PyTorch, nuplan-devkit, TensorFlow, Numpy, Flask, Django, PyQt, Qt, OpenCV
- **Software**:  $\LaTeX$ , Git, Linux, Anaconda, ROS Noetic, ROS Humble, Docker, OpenBCI, Eprime
- **Language**: Mandarin (native), English (proficient), Japanese (basic)