Yanzhe Zhao

Neuro-AI

School of Future Technology, Tianjin University
Tianjin, China
+86 17765119079
justinzhaoyz@outlook.com
https://justinzhao-05.github.io/
JustinZHAO-05
B.Eng. Automation | Overall 8/100 | Junior Specialization 1/8



Research Direction

Core Computational neuroscience, cognitive neuroscience, and Neuro-AI. I am interested in predictive processing, world models, cognitive maps, neural mechanisms of natural language acquisition, and learning systems that connect neural computation with behavior.

Path My academic path started from robotics, control, and reinforcement learning. Work on embodied navigation and full-stack robot systems led me toward questions about how brains build representations, predict future states, and learn robustly from limited data.

Education

2023–present **B.Eng. in Automation**, ***School of Future Technology, Tianjin University***, Tianjin, China

- **Elite college and honors track**: the School of Future Technology is Tianjin University's elite undergraduate college; the Intelligent Machine Platform admits students through Gaokao-based selection and internal university selection.
- **Training model**: first two years of shared training in mathematics, physics, and engineering fundamentals; after sophomore-year major selection, I chose Automation.
- **Academic standing**: **Overall**: rank **8/100**, weighted score **91.54**, GPA **3.85/4.0**; **Junior specialization**: rank **1/8**, weighted score **96.55**, GPA **3.98/4.0**.
- Current direction: computational and cognitive neuroscience, supported by signal processing, optimization, machine learning, and robotics/control training.

Publication

CSAI 2025 Denghan Xiong, **Yanzhe Zhao**, Yutong Chen, and Zichun Wang. *Nonholonomic Narrow Dead-End Escape with Deep Reinforcement Learning*. In *Proceedings of the 2025 9th International Conference on Computer Science and Artificial Intelligence*, ACM, pp. 126–131, 2025. DOI: 10.1145/3788149.3788204.
Role: contributed to problem formulation, deep reinforcement learning training/evaluation workflow, simulation engineering, and experimental analysis.

Research and Training

2026.07–09 **Summer Research Visit**, *Shanshan Qin Lab, Shanghai Jiao Tong University*, Undergraduate Research Assistant
Upcoming visiting undergraduate research assistant for summer research.

2026.07 **Computational Neuroscience Online Summer School**, *Neuromatch Academy*
Upcoming training in computational neuroscience, neural data analysis, dynamical systems, learning, decision making, and cognition.

2025.07–08 **In-person Summer Research**, *NeoScholar and Imperial College London*, Supervisor: Prof. Sen Wang
Developed and evaluated deep reinforcement learning methods for nonholonomic narrow dead-end escape, leading to the CSAI 2025 publication. Evaluation: A.

2025.03–06 **Robot Perception, Localization and Navigation (audit)**, *NeoScholar and Imperial College London*
Studied SLAM, localization, navigation, and implementation-oriented robotics methods.

2024.10–2025.01 **Robotic Manipulation (high score; CIEI certified)**, *NeoScholar and Imperial College London*
Completed kinematics, dynamics, grasping, custom gripper design, and simulation assignments.

2024.07 **Computing Applications in Science and Engineering**, *University of Bristol Summer School*
Used Java and Go for scientific computing; built satellite-control simulation and Arduino/networked sensing projects.

Selected Coursework

Junior spring Brain and Cognition; Intelligent Medical Signal Processing; Optimization-based Machine Learning; Deep Learning; Pattern Recognition and Brain-like Intelligence.

Junior fall Equations of Mathematical Physics; Theory of Motor; Numerical Computational Method.

Foundations Mathematical Analysis, Advanced Linear Algebra, Probability and Mathematical Statistics, Fundamental Physics, Circuit Principles, Analog Circuits, Digital Circuits, Signals and Systems, Automatic Control, Robot Kinematics and Dynamics, Principles of Programming, C++ Programming, Discrete Mathematics, Computer Organization and Architecture.

Selected grades Numerical Computational Method **99**; Fundamental Physics **99**; Equations of Mathematical Physics **98**; Mathematical Analysis **95**; Principles of Programming **95**; Probability and Mathematical Statistics **94**; Circuit Principles **94**; Advanced Linear Algebra **93**; Analog Circuits **93**; Automatic Control **92**; Discrete Mathematics **92**.

Selected Projects

EEG Time-Frequency Analysis with OpenBMI, *Medical signal processing and motor imagery EEG project*
Reproducible Python workflow for Fourier analysis, STFT parameter studies, CWT, wavelet multiresolution, and OpenBMI motor imagery EEG ERD/lateralization analysis.
Code: `https://github.com/JustinZHAO-05/time-frequency-analysis-eeg-openbmi`

EEG Feature Enhancement and Single-Trial Classification, *Medical signal processing course project*
Reproducible Python implementation of ERP ICA/PCA/LDA target detection and SSVEP TRCA single-trial recognition, with strict train/test isolation and regression tests for split logic, PCA/LDA isolation, and TRCA behavior.
Code: `https://github.com/JustinZHAO-05/medical-signal-experiment4`

EEG Spectral Estimation, *Medical signal processing and neuroscience-readiness project*
Reproducible Python analysis comparing FFT, Hamming periodogram, autocorrelation PSD, Welch PSD, and Yule-Walker AR spectra on synthetic signals and LEMON closed-eye EEG.
Code: `https://github.com/JustinZHAO-05/medical-signal-spectral-estimation-eeg`

ERP Filtering and EEG Preprocessing, *Medical signal processing project*
Implemented IIR/FIR filter comparisons, zero-phase filtering, baseline-drift analysis, delay interpretation, and ERP waveform comparisons with full English and Chinese reports.
Code: `https://github.com/JustinZHAO-05/medical-signal-filtering-erp-analysis`

Brunel Balance Network, *Computational neuroscience microproject*
Used Brian2 to reproduce and analyze sparse excitatory/inhibitory spiking network regimes, including raster plots, population-rate panels, phase diagrams, and acceptance checks.
Code: `https://github.com/JustinZHAO-05/brunel-balance-network`

Nonholonomic Dead-End Escape with Deep RL, *Neuro-AI / reinforcement learning*
Built and evaluated a SAC-based navigation stack for Ackermann-style robot escape in narrow dead-end environments, connecting policy learning with constrained spatial planning.
Code: `https://github.com/JustinZHAO-05/cisDRL-RobotNav`

Deep Learning Exp2: MNIST Noise Robustness, *Deep learning coursework project*
Reproducible PyTorch study of LeNet-style MNIST recognition, feature-map/kernel visualization, self-collected handwriting samples, Gaussian-noise robustness, and ablation analysis.
Code: `https://github.com/JustinZHAO-05/dl-exp2-english-report`

SAGIN ML: Satellite Link Optimization, *Applied ML / communication systems*
Combined PCA-based satellite image transmission analysis with logistic-regression link reliability prediction and cost-aware UAV link switching in a Space-Air-Ground-Sea network scenario.
Code: `https://github.com/JustinZHAO-05/sagin-ml-satellite-link-optimization`

Q-RIS-UAV Secure Energy Optimization, *Secure communication and optimization systems*
Public academic report and reproducible simulation for QKD-protected RIS-UAV offshore monitoring, using Dinkelbach transformation, alternating optimization, CVXPY resource allocation, RIS phase quantization, and UAV trajectory updates.
Code: `https://github.com/JustinZHAO-05/qris-uav-public-report`

MNIST MLP Experiment Diagnosis, *Deep learning experiment debugging*
Built a NumPy MLP experiment pipeline for MNIST, diagnosed tiny learning rate, overfitting, and gradient explosion cases, and tested generalization on photographed handwritten digits.
Code: `https://github.com/JustinZHAO-05/mnist-mlp-experiment-diagnosis`

Eight-Cable-Driven Parallel Robot, *Robotics and control foundation*
Designed and built a desktop-scale 6-DOF cable-driven parallel robot, covering SolidWorks CAD, inverse kinematics, Jacobian analysis, tension reasoning, motor control, and demos.
Code: `https://github.com/JustinZHAO-05/Eight-Cable-Driven-Parallel-Robot`

VeriRotate, *Digital systems / hardware implementation*
Implemented a Verilog streaming pipeline for 24-bit BMP image rotation, including SRAM model, address mapping, testbench, and Python pre/post-processing.
Code: `https://github.com/JustinZHAO-05/VeriRotate`

Skills

Programming	Python, C++, MATLAB/Simulink, Verilog, Java; comfortable with scientific prototyping and low-level implementation.
Scientific computing	NumPy, SciPy, scikit-learn, pandas, Matplotlib, Brian2, PyTorch-style deep learning workflows, EEG/ERP signal processing, statistical analysis, reproducible reporting.
ML and robotics	Deep reinforcement learning, optimization-based machine learning, ROS2/ROS1, Gazebo, SLAM/navigation concepts, control, embedded systems.
Tools	Linux, Docker, Git, LaTeX, SolidWorks, technical writing, bilingual documentation.
Languages	Chinese (native); English (proficient; IELTS Reading 8.5, Writing 6.5).

References

Available upon request.