Ziyu (Victor) Zhao

ziyuzhao2027@163.com | +86-184-3947-1396 | github.com/12sqawdwq | 12sqawdwq.github.io

Interests: AI infrastructure, HW/SW co-design, high-performance computing, embedded systems, biomedical sensing front ends

Education

Xi'an Jiaotong-Liverpool University (XJTLU) & Univ. of Liverpool (dual degree) Sep 2023 – Jul 2027 (exp.)

BEng Microelectronic Science and Engineering with Contemporary Entrepreneurialism

- **UK-classified average (University of Liverpool): Year 1: 73/100, Year 2: 78/100 — both First Class**. **Ranked 9/91 in programme cohort (top 10%)**. **University Academic Achievement Award**, 2025/26.
- Core modules: Microprocessor Systems (94), Electromagnetism & Electromechanics (90), C/C++ Programming (87), CMOS Digital Integrated Circuits (86), Electrical Circuits (86), Analogue & Digital Electronic Circuits (86), Digital Electronics II (84).
- Current (2026/27): Quantum Physics; Micro/Nano Integrated Circuits; Final Year Project (multi-channel wireless electrochemical sensing platform).

Publications & Patents

- **Z. Zhao**, "PAD-Former: A Two-Stage PI-RADS Classification Framework with Multi-Modal Anomaly Diffusion and Cross-Attention," *IEEE BIBM 2025*, pp. 6162–6169, doi: 10.1109/BIBM66473.2025.11356522. [**First author; CCF-B**]
- **Z. Zhao**, "ReFER: Learned Soft-Region Priors for Clinically Significant Prostate Cancer Detection and Diagnosis in Biparametric MRI," *IEEE BIBM 2026*. [**First author; CCF-B; accepted, to appear**]
- "EDRF: Evidence-Decoupled Reliability Fusion for Case-Level csPCa Risk Assessment," *IEEE BIBM 2026*. [**Second author; CCF-B; accepted, to appear**]
- "Clinically Significant Prostate Cancer Detection at Biparametric MRI with Residual-Guided Deep Learning: Multicenter Development, External Evaluation, and Reader-Support Analysis," *Radiology: Artificial Intelligence* [**Under review; 2025 JCR IF 20.1, Q1 (ranked 1/217 in Radiology & Medical Imaging); CAS Zone 1 Top**]
- Finite-element modeling of eyelid–eyeball biomechanics for transpalpebral intraocular-pressure measurement. [**Journal manuscript in submission**]
- **3 Chinese invention patent applications** (applicant: LanZhi Medical; technical solutions and specifications drafted by me): two on probe-advancement control algorithms for tonometry, one on an alignment-aperture calibration method for probe positioning.

Research Experience

AI for Prostate MRI: csPCa Detection, Segmentation & Multimodal Fusion 2024 – Present

XJTLU Academy of Artificial Intelligence (AIAT, formerly AIAC) | Advisor: Assoc. Prof. Hong-Seng Gan

- Deep-learning methods for detecting and grading clinically significant prostate cancer (csPCa) on biparametric MRI to support radiologists.
- Designed **ReFER**, a lightweight detection–diagnosis model (12.14M parameters) that reached a **case-level AUROC of 0.843** on PI-CAI (800 patients, 5-fold CV), the best case-level result among compared methods. Also designed the **PAD-Former** PI-RADS grading framework and benchmarked nnU-Net, MedNeXt and SwinUNETR on a Slurm HPC cluster. Outputs: **two first-author IEEE BIBM papers** and a multicentre study under review at *Radiology: Artificial Intelligence*.
- Administer the group's GPU infrastructure (**16× NVIDIA A800** cluster and two 8-GPU **RTX PRO 6000 Blackwell** servers, 10+ users), managing accounts, containerised environments and job scheduling. Audited the two RTX PRO 6000 servers, wrote a unified **Slurm** scheduling proposal (GPU gres, cgroup v2 isolation) and built the open-source monitor pixel_probetop.

FYP: Multi-Channel Miniaturised Wireless Electrochemical Sensing Platform Sep 2026 – May 2027

XJTLU School of CHIPS | Supervisor: Assoc. Prof. Qifeng Lu

- Multi-channel, multi-protocol electrochemical acquisition platform for sensors developed in Dr Lu's group. Responsible for system design, firmware and host software.
- Extended the single-channel open-source NanoStat potentiostat (TI LMP91000 analog front end) to **4 electrochemical channels** through asynchronous acquisition, and added a TI ADS1292 front end for **skin-impedance** measurement; channel isolation, digital filtering and resampling reduced measured noise by **∼30%**.
- Outputs: a redesigned 4-layer board and web-based host software, with planned integration into a wearable system for dynamic acquisition.

ROS2 Autonomous Vehicle Control System Jun 2024 – Aug 2024

Fudan University, Intelligent Perception & Autonomous Systems Lab | Supervisor: Dr. Ruijiao Li

- Autonomous navigation for a small vehicle on NVIDIA Jetson NX. Developed LiDAR perception, SLAM localisation, A* path planning and PID motion control, and integrated them into a single ROS2 navigation stack running on the vehicle.

Medical Electronics: Electrical Stimulation & Pressure-Sensing Systems Nov 2023 – May 2024

East China Normal University, Intelligent Ultrasound Research Center | Supervisor: Jiangang Chen

- Medical electronics for stimulation and body sensing. Core developer of a multi-channel electrical-stimulation system: STM32/ESP32 firmware, I^2C/CAN/BLE links, a Flutter control app and closed-loop bio-impedance output control.
- Built a pressure-array seat cushion that recognises abnormal sitting postures with KNN classification. Earlier built a

wearable ECG/SpO_2 monitor at the Shanghai Key Lab of Multi-Dimensional Information Processing.

Industry & Entrepreneurship

Shenzhen InnoX Academy – LanZhi Medical Jul 2025 – Present

Embedded & Algorithm Development Intern

- A home-use transpalpebral tonometer for glaucoma-related monitoring that measures eye pressure through the closed eyelid.
- Built the Bluetooth link and closed-loop motor control for probe advancement, and implemented embedded signal filtering and zero-point calibration, keeping measurement error within **±2.5 mmHg** of the reference standard. Built eyelid–eyeball finite-element models in ANSYS and ABAQUS.
- Outputs: the ocular-hypertension detection rate rose from ∼60% to **85%**; delivered embedded software modules, a finite-element simulation workflow and **3 invention patent applications**; won **Second Prize at the National Medical Insurance Innovation Competition**.

Finkey – Open-Source Hardware Security Key | Shuangfu Technology (Suzhou) Co., Ltd. Aug 2025 – Present

Co-founder & Embedded Software Lead

- Open-source hardware security key for **FIDO2** and one-time-password (HOTP/TOTP) authentication. Wrote the firmware in Rust on Tock OS for the Nordic nRF52840, building on Google OpenSK.
- Shipped **100+ units** in small batches to developers, presented the project at hackathons and developer forums, and incubated the company at XJTLU's entrepreneurship hub.

ByteDance – Volcano Engine, Data Department Dec 2025 – May 2026

Technical Operations Intern

- Evaluated large models on reasoning, coding, tool use and instruction following, and reviewed LLM-agent products and AI-coding workflows. Delivered evaluation reports and triaged community issues for the product and engineering teams.

DeepBlue Technology (Shanghai) Apr 2024 – Jun 2025

Embedded Software Engineer Intern

- Embedded control software for a wheeled-biped robot. Developed gait control and motor-control interfaces in a master–slave design (Raspberry Pi 5 for planning and SLAM, CAN-linked motor controllers with IMU fusion and PID stabilisation), and gave public technical talks on DeepBlue's AI and robotics products.

Sanyi 3D Technology (Qingdao) Jan 2024 – Mar 2024

Embedded Full-Stack Engineer Intern

- Large-format FDM 3D printers. Designed and assembled machines, simulated delta-printer kinematics in SolidWorks, and configured Marlin firmware for motor and sensor control.

Selected Projects

Embodied AI & Robotic Systems

FlyHead: Fly Connectome Driving a Wheel-Legged Robot | GitHub | flyhead.live Sep 2026 – Present

Sole developer

- Connects a GPU-simulated whole-brain fruit-fly connectome (FlyWire v783: **138,639** LIF neurons, **15.09M** connection records) to a real wheel-legged robot as a testbed for connectome-driven control.
- Took the LIF brain model unmodified from the upstream eonsystemspbc/fly-brain and built everything around it: sensor encoders, a descending-neuron decoder, event-driven GPU acceleration with CUDA Graphs, a safety layer, LiDAR SLAM navigation, and a web console with a 3D site.
- Published the public repository and an interactive site, and demonstrated the system on the real robot.

OpenMV High-Speed Target Detection for RoboMaster Dart Guidance | GitHub Jun 2025 – Aug 2025

- Target detection for competition dart guidance. Built multi-colour tracking on STM32H7 + OpenMV at **120–200 FPS**, with calibrated visual ranging and an SPI link to the guidance controller.

Systems & Developer Tools

code-with-pi: Shared Persistent Terminal for Coding Agents | GitHub Aug 2026 – Present

- Lets an AI coding agent and its user watch or take over the same live shell. Wrote a C11 broker over Windows ConPTY and POSIX PTY with authenticated local IPC, a read-only monitor mode and transcript logging; CI-tested on Windows 11 and Linux.

pixel_probetop: Multi-Server GPU Monitor | GitHub Aug 2026

- Monitoring tool for the research group's GPU servers: a Python hub with Linux agents, a web dashboard and an Android viewer.

STM32 CLI Toolkit for Headless Embedded Development | GitHub Dec 2025

- Command-line toolkit for STM32 development without an IDE. Wrote shell automation around CMake, ARM GCC and OpenOCD to build, flash and recover boards.

Embedded & Digital Design

YOLOv8 Object Detection on a Zynq SoC with the AMD DPU

- Real-time object detection on an FPGA SoC (ACZ7015 Zynq). Deployed YOLOv8 with the AMD DPU / Vitis AI toolchain, integrating 720p camera input, ARM-side processing and DPU inference; increased end-to-end frame rate from ∼30 to ∼**60 FPS**.

STM32F446 Character-LCD Graphics Engine | **GitHub** Dec 2025

- Graphics engine for a 20×4 character LCD. Wrote a parallel HD44780 driver with drawing primitives, wireframe 3D rendering, particle effects and character-video playback.

STM32 LCD1602 Real-Time Game | **GitHub** Nov 2025

- Real-time T-Rex runner game for Microprocessor Systems (mark 94), built on timer and button interrupts, custom character sprites and a non-blocking state machine.

AXI-Stream Header-Insertion RTL Module | **GitHub** Jan 2025

- Verilog block that inserts packet headers into an AXI-Stream, with valid/ready handshaking, byte alignment and configurable data width, verified with a testbench.

AI & Engineering Software

ForgeSpec Studio: AI-Assisted Parametric CAD Generator | **GitHub** May 2026 – Aug 2026

- Turns natural-language requirements into reviewable parametric CAD. Built a FastAPI service that generates CadQuery source, draws on a standard-parts library and exports STEP and STL files with a browser preview.

ANSYS_skill: CAE Workflow Validation | **GitHub** May 2026 – Aug 2026

- Validation layer for automated ANSYS Mechanical runs. Checks each stage, from geometry to evaluated results, against result evidence; a cantilever-beam benchmark matched Euler–Bernoulli theory within **0.223%**.

Sky Atlas: Location-Aware Star Map | **GitHub** | **sky.eunoia.top** May 2026 – Present

- Deployed astronomy web service that computes the visible sky for any position and time. Built a FastAPI backend on the HYG catalogue and JPL ephemerides and a three.js front end with tonight's sky and a multi-scale 3D atlas, with API docs, health monitoring and automated tests.

Leadership & Outreach

- **President, XJTLU Science Innovation Association** (2023–2025, two terms, 200+ members): co-organised the **NVIDIA China Developer Day** at XJTLU (Oct 17–18, 2024; ∼200 attendees); led development of the X-SIA member/content platform (Cloudflare Workers, D1/R2, Expo); organised company visits to iFLYTEK, SenseTime and Baidu PaddlePaddle.
- **Campus Ambassador – Zhipu AI**: talks on LLM inference infrastructure (vLLM, SGLang, LangChain); launched a Dify campus partnership and hosted a Dify-based agent hackathon. **JetBrains**: on-site technical support at Apsara Conference 2024 & 2025. **MathWorks**: MATLAB/Simulink ecosystem and outreach at XJTLU.
- Regular technical speaker to audiences of 50–200 (NVIDIA Developer Day, DeepBlue forums, freshman taster lecture on Finkey, Sep 2026).

Honours & Awards

- **Second Prize**, National Medical Insurance Innovation Competition (LanZhi home tonometry service) [National] 2026
- **National 3rd Prize**, RoboMaster University Championship [National] 2024
- **1st Prize**, RoboMaster University Championship, Eastern Region [Regional] 2024
- **Successful Participant**, Mathematical Contest in Modeling (MCM, COMAP), Team 2601772 [International] 2026
- **Excellent Award**, China–U.S. Young Maker Competition [National] 2025
- **University Academic Achievement Award**, XJTLU [University] 2025/26

Skills

- **Languages & HDL:** C/C++, Rust, Python, Verilog, MATLAB, Bash, JavaScript/TypeScript
- **Hardware & Embedded:** STM32, ESP32, nRF52840, Raspberry Pi, Jetson; RTOS (Tock OS); CAN, SPI, I^2C, BLE; analog front ends (potentiostat/TIA, biopotential, bio-impedance); PCB design (Altium Designer); FPGA/SoC (Vivado, Zynq, Vitis AI DPU); RTL (Verilog, AXI-Stream)
- **AI Infrastructure & HPC:** multi-GPU cluster administration (A800, RTX PRO 6000), Slurm (GPU gres, cgroup v2), CUDA / CUDA Graphs, LLM serving (vLLM, SGLang), LLM evaluation, agent platforms (Dify, LangChain)
- **Systems:** Linux, Docker, PTY/ConPTY, ROS 2, LiDAR SLAM, Cloudflare Workers
- **AI & Simulation:** PyTorch, nnU-Net, MONAI, OpenCV, YOLOv8; finite-element analysis (ANSYS, ABAQUS), SolidWorks, CadQuery