Zeyu Lai

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Education

University of California, San Diego 2025 – 2029
Undergraduate in Data Science & Electrical Engineering; Minor in Mathematics

BASIS International School Park Lane Harbour 2022 – 2025
High School Diploma | GPA: 3.79/4.0

Experiences

Hao Su's Lab Mar 2026 – Present
Research Assistant (Embodied AI research group) | UC San Diego
Developing scalable RL pipelines for robotic manipulation while leading hardware-in-the-loop integration and sim-to-real verification to facilitate high-fidelity data collection for complex dexterous tasks.

MURO Lab Oct 2025 – May 2026
Research Assistant (Distributed Robotics and Multi-Agent Coordination) | UC San Diego
Researched distributed robotics and multi-agent coordination; Developing multi-robot map-merging infrastructure to enable autonomous navigation for robot fleet (TurtleBot4 platforms) and unified it into a global representation.

TRITON-AI Oct 2025 – May 2026
Path Planning Team Member (Autonomous Vehicles) | UC San Diego
Worked on LiDAR–camera sensor fusion for F1TENTH and contributed to the path planning team for Triton-AI's autonomous go-kart.

Publications

DexSeed: Scalable Physics-Grounded Demonstration Generation for Sim-to-Real Dexterous Manipulation [coming]
Weikang Wan, Jinqiu Wang, Jianyu Hou, **Zeyu Lai**, Henrik I Christensen, Hao Su
Under Review

DexFLEX: Contact-Aware Foundation Controller for Command-Guided Dexterity [coming]
Weikang Wan, **Zeyu Lai**, Jianyu Hou, Yuchen Zhou, Jiawei Fu, Henrik I Christensen, Hao Su
Under Review

Diving into the virtual realm: Exploring the mechanics of virtual reality [ResearchGate]
Zeyu Lai
Proc of the 2023 International Conference on Machine Learning and Automation

Projects

DPPO for Dexterous Manipulation 2026
Implemented Diffusion Policy Policy Optimization (DPPO) for high-dimensional, state-based dexterous manipulation tasks (Shadow Hand). Developed a modular pipeline featuring SAC-based expert data generation, action-chunking, state normalization, and bridged generative diffusion models with RL by fine-tuning a pre-trained diffusion policy to maximize task rewards using PPO.

RL Gymnasium 2026
Developed a clean, extensible reinforcement learning repository for training and evaluating classic Gymnasium control tasks, utilizing Python, PyTorch, and reinforcement learning principles for algorithmic implementation.

Uniq: Intelligent Browser Automation System 2026
Engineered an autonomous browser agent using Node.js, Playwright, and Gemini 3.0 Flash for task planning and decision making. Developed a resilient Agent Loop featuring semantic auto-scroll, graduated failure recovery, and DOM-based interactive region detection using TypeScript and WebSockets.

Hybrid Crawler-Drone Robot System 2025
Designed and built a multi-modal vehicle with a detachable drone basket and retractable arms. Integrated ESP32-S3 with I2S microphone, SPIFFS file system, and motor drivers for ground motion, offering unique flexibility for real-world navigation and reducing costs compared to separate robots.

English–Chinese NMT with Transformer 2024
Built a Transformer-based neural machine translation (NMT) model from scratch in PyTorch. Used Hugging Face's opus-100 dataset for English–Chinese parallel sentence training, gaining hands-on experience with tokenizers, transformer architecture, model training, and debugging.

Gesture-Based Brightness Adjuster 2024
Created a webcam-controlled brightness tool using OpenCV and MediaPipe. Mapped thumb–index finger distance to screen brightness and used a pinky curl as a trigger for fixed levels. Won 1st out of 36 participants at the BASIS national hackathon. Served as a low-cost alternative to hardware controls, useful in environments where hygiene and contactless interaction are key.

Monte Carlo Ising Simulation 2024
Simulated 2D Ising spin-lattice models using Monte Carlo methods to study phase transitions and equilibrium states under Prof. Erik Luijten at Northwestern University (Cetus Research), utilizing Python, NumPy, and Matplotlib.

Technical Skills

Languages: Python, C, Java, JavaScript, Typescript
Libraries & Tools: NumPy, OpenCV, MediaPipe, ROS2, micro-ROS, SLAM Toolbox, Pytorch, Scikit-Learn, Isaac Gym, Isaac Lab, Isaac Sim, Gymnasium
Hardware: X-ARM7, LEAP HAND, ESP32, Arduino, Turtlebot4, Jetson Nano, Sensor integration (LiDAR, IMU, etc.)
Machine Learning & AI: Deep learning architectures, Reinforcement learning, Imitation Learning
Design & Dev Tools: PCB Design, Fusion 360, Jupyter notebook, Google Colab, Conda, GitHub Actions, Linux

Honors & Certifications

Honors:

- 2024 USACO Gold Division
- 2024 Invention Convention China National Finalist
- BASIS China Hackathon 1st Place (1/36)
- Euclid Math Contest Distinction (top 20%)
- IMMC 2024 Greater China Region Finalist

Certifications (Stanford University):

- Supervised ML: Regression & Classification

- Advanced Learning Algorithms
- Unsupervised Learning, Recommenders, RL