

Hongshao Lin (Kalman)

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GitHub: <https://github.com/klmn-opp> | Portfolio: <https://klmn-opp.github.io>

EDUCATION

Hong Kong University of Science and Technology (Guangzhou) | Aug 2025 - Present

- **B.Eng. in Robotics and Autonomous Systems (ROAS)**
- Honors & Award: - University Excellent Scholarship (**200,000 RMB**); **Top 0.5%** in National College Entrance Exam (Ranked 1,900 out of 440,000 in Guangdong Province)
- Relevant Coursework: C++ Programming, Intro to Computer Science, Honors Calculus, Honors General Physics.

Shimen High School | Sept 2022 – June 2025 | Foshan, Guangdong

- Member of the "Youwei" Elite Class (top tier physics track)

TECHNICAL SKILLS

- **Robotics & Perception:** ROS2, EKF, SLAM, PnP Pose Estimation, OpenCV.
- **Artificial Intelligence:** LLM Integration, Multi-modal Interaction, Action Primitives, VLA Models, Prompt Engineering.
- **Full-Stack & Systems:** Python, C++, Redis + Lua, Godot 4.x, Docker/CI-CD, MQTT, WebSocket, Protobuf.

EXPERIENCE

- **University Robotics Team | Core Algorithm Developer** | Sept 2025 – Present
 - **High-Performance Perception:** Developed a vision-based **tracking** and **auto-aiming** system using **ROS2**. Optimized **QoS** configurations for sub-millisecond image stream transmission
 - **Pose Estimation:** Implemented 3D spatial coordinate acquisition using **OpenCV** and **PNP** based on camera calibration.
 - **Trajectory Prediction:** Developed an **EKF**-based tracking module with **Ceres Solver** for non-linear motion modeling, achieving smooth prediction of high-speed dynamic targets under complex occlusions
- **Embodied AI Interaction System | Core Developer (First Prize, National Competition)** | Nov 2025 – Present
 - **Navigation & SLAM:** Integrated **Mid360 Lidar** and **stereo vision** for 3D environment mapping and high-precision localization.
 - **Heterogeneous Data Fusion:** Developed **multi-source** data fusion algorithms for real-time obstacle avoidance and **path planning** in complex indoor scenarios.
 - **Semantic Interaction:** Integrated **DeepSeek** + **GPT Embedding** for high-dimensional intent recognition, mapping natural language instructions to Action Primitives.
- **Huawei Spatial Intelligence Project | Research Assistant (Data Engineering)** | Dec 2025 – Jan 2026
 - **Stress Testing:** Conducted rigorous evaluations of spatial perception logic and 3D reconstruction consistency under extreme edge cases, including rapid viewpoint shifts and heavy occlusions.
 - **Bottleneck Analysis:** Identified technical bottlenecks in stable spatial graph construction within dynamic environments, providing critical data-driven insights for VIO optimization.
- **Tencent Cloud Open-Source Community | Core Member / Excellence Award** | Oct 2025
 - **Cloud-Native Engineering:** Successfully implemented containerized deployment for **multiple distributed applications** on the **cnb.cool** platform. Optimized image sizes

using multi-stage builds, significantly improving distribution and deployment efficiency.

- **Infrastructure Mastery:** Proficient in Docker network orchestration and volume persistence. Successfully applied these skills to the Docker Compose deployment scheme for the "Campus All-in-One Platform," ensuring high system availability and scalability.
- **Robot Cross-platform Interaction Terminal | Lead Frontend Developer | Sept 2025 – Present**
 - **Distributed Communication:** Architected a low-latency control link based on **MQTT**. Implemented a **custom heartbeat mechanism** and **QoS strategies** to ensure reliable bi-directional data transmission in complex network environments.
 - **Decoupled System Design:** Leveraged Godot's signal-slot system and custom objects to build a highly decoupled, component-based architecture. Achieved **millisecond-level** response times between server messages and user commands across multiple nodes.
- **High-Precision Semantic Segmentation Dataset Construction | Research Assistant | Jan 2026 – Feb 2026**
 - **High-Efficiency Delivery:** Independently completed nearly **20,000** pixel-level semantic masks within a strict three-day window, demonstrating exceptional **engineering stamina** and **high-precision execution**.
 - **Edge Case Annotation:** Specialized in annotating challenging samples involving low-contrast backgrounds, intricate object boundaries, and translucent occlusions, significantly enhancing dataset **robustness** for frontier CV research.

PERSONAL PROJECTS

- **Campus All-in-One Service & Social Governance Platform | Project Lead | Feb 2026 - Present**
 - **System Architecture:** Designed a centralized service hub using **FastAPI**, implementing **SSO** and **automated data synchronization** with the Canvas LMS API.

- **Social Governance:** Developed a **high-concurrency real-time** social system based on security standards, implementing an **innovative community governance mechanism** grounded in social engineering principles to ensure an efficient and orderly digital environment.
- **High-Concurrency Resource Reservation System** | Core Developer | Apr 2026 | 3rd Place in HKUST(GZ) Website Development Competition
 - **Concurrency Control:** Optimized reservation logic using **Redis + Lua** scripts to ensure **atomic operations**. Effectively resolved over-selling and race conditions in high-demand scenarios, supporting thousands of instantaneous concurrent requests.
 - **Backend Optimization:** Architected an **asynchronous task queue** using **Celery** with Redis/RabbitMQ to decouple heavy processing tasks. Implemented a containerized deployment scheme via **Docker Compose** for high scalability and environment consistency.
- **Empathy Training & Educational Robot** | Project Lead & Core Developer | Sept 2025 – Oct 2025
 - **Affective Computing Engine:** Integrated the **DeepSeek model** with advanced **Prompt Engineering** to build a closed-loop dialogue system capable of emotion recognition, empathy assessment, and consoling response generation.
 - **Multi-modal Interaction:** Developed a **perception pipeline** using ml5.js for body **gesture recognition** combined with Web Audio processing, creating an immersive teaching experience through dual-modal interaction.
 - **Cross-platform Deployment:** Built a **responsive interactive terminal** using p5.js, with reserved **Serial I/O interfaces** for low-level hardware communication, enabling rapid prototyping from web-based logic to physical devices.
- **Smart Elderly Care Service Robot** | Core Developer | Jan 2026 - Present
 - **Intent Recognition & Memory:** Leveraged **LLMs** to achieve complex intent recognition in multi-turn dialogues. Developed a specialized knowledge base using **GPT Embedding** to provide personalized health advice and medication reminders.

- **Real-time Interaction Pipeline:** Established low-latency communication links via **WebSocket**, achieving millisecond-level streaming responses for automated speech recognition, natural language processing, and TTS.
- **Perception & Monitoring:** Integrated vision sensor data to implement real-time monitoring of daily activities and anomaly detection, translating AI perception capabilities into practical assistive power for home-based elderly care.

PERSONAL SUMMARY

- **Robotics Full-Stack Mindset:** Comprehensive expertise spanning from low-level communication protocols (MQTT/rclcpp) to high-level cognitive logic (LLM/VLA).
- **Exceptional Learning & Delivery:** Demonstrated ability to master new technology stacks and deliver high-quality code under tight deadlines (e.g., generating 20k+ high-precision semantic masks within one week)