

Lin Xinxiang

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Male

Tech stack

Languages & Frameworks: C++, Python, Linux (RT-Preempt), ROS/ROS2, PyTorch

Robotics & Control: MoveIt, URDF/MJCF, EtherCAT, MuJoCo, OpenCV, SAM

Engineering Tools: SolidWorks, CREO, MATLAB, Prompt Engineering

Main research experience

VLM-LGP: Vision-Language Geometric Programming for Long-Horizon Robotic Assembly Aug 2025 - Present

- Algorithmic Innovation: Proposed a "Perception-Reasoning-Execution-Verification" closed-loop framework unifying task and action geometry. Utilized VLMs as semantic "Rule Pruners" to reduce the logical search space for long-horizon assembly by 90%.
- Engineering Refactoring: Refactored the underlying C++ KOMO geometric solver, optimizing motion constraints to bridge the Sim-to-Real gap for complex physical interactions.
- Real-world Validation: Achieved a 90%+ success rate in complex multi-step assembly tasks in unstructured environments.
- Outcome: Paper submitted to IEEE Robotics and Automation Letters (RA-L; Under Review).

End-to-End Reasoning for Long-Horizon Autonomous Manipulation Dec 2025 - Present

Joint Industry-University Project with Linkerbot

- System Architecture: Developed a vision-centric closed-loop agent to **autonomously execute multi-step manipulation tasks** in unstructured environments.
- Adaptive Grasping Strategy**: Engineered geometric-based grasp primitives for the Linkerhand O6 Dexterous Hand. Implemented dynamic 3-finger/5-finger mode switching and approach pose optimization, significantly enhancing grasp stability.
- Spatial Grounding: Achieved zero-shot multi-modal spatial grounding, enabling the VLM to directly map high-level semantic logic into physical space coordinates.
- Mechatronic Integration: Led full-stack integration and Eye-to-Hand calibration on a RealSense D435 and 6-DOF JAKA Zu3 platform, utilizing MoveIt for robust trajectory planning.
- Error Recovery: Designed a **CV-based state verification mechanism** with autonomous fault detection, triggering secondary replanning upon grasp failures to ensure task completion.

Mechatronic Design & Locomotion for Bipedal Humanoid Oct 2025 - Present

Collaboration with Leaderdrive

- Mechatronic Integration: Led the mechanical design and full-system integration of humanoid joint modules utilizing high-torque harmonic drives, optimizing transmission chain stiffness and sensor alignment.
- HIL Testing: Conducted hardware-in-the-loop (HIL) testing and **built a 1kHz high-frequency control feedback loop** via EtherCAT communication.
- Locomotion Deployment: Deployed bipedal locomotion algorithms and **resolved control gain divergence** by mitigating Mechanical Resonance through physical structural tuning and low-level notch filtering.

Major Project Experience

MOVA 1000&600 Mowing Robot Jul 2024 - Jul 2025

Mechanical and structural engineer Shenzhen

- Actuator Design: Led the precision mechanical design and dynamic balance optimization of the blade actuator module.
- Product Lifecycle: Managed the full hardware lifecycle from prototyping and DFM (Design for Manufacturing)

to mass production tracking.

- Key Contribution: **Resolved IPX-rated waterproofing and vibration compensation challenges** for harsh outdoor environments.
- Impact: **Contributed to a global series sales volume of 250,000+ units**, leading the market category.

Constant Force Lifting Mechanism

Nov 2023 - Mar 2024

Mechanical Engineer Leifen

Shenzhen

- Core Mechanism: Engineered a gravity-compensation structure using a scotch yoke and cam mechanism, converting non-linear elastic potential energy to provide a zero-effort, hovering-like height adjustment experience.
- Forward Design: Conducted competitive benchmarking and led the mathematical calculation of cam profiles and coil spring selection.
- Impact: **Successfully standardized and deployed this generalized mechanism across multiple R&D product lines.**

BLADE Robotic Lawn Mower

Feb 2022 - Jul 2023

Mechanical and Structural engineer

- Module Development: Led the structural design, tooling, and mass-production scaling of the mowing deck and leaf collection module.
Cross-functional Integration: Designed the grass overflow detection scheme, driving sensor selection and software/hardware integration.
- Reliability Optimization: Optimized the gearbox turbine worm material, extending the reducer's service life by 40%.
Impact & Patents: Product won the 2023 CES Innovation Award and achieved 109% of its \$4M+ sales target in the launch month.

Work Experience

Dreame technology Co., ltd	Jul 2024 - Jul 2025
Structural Engineer	Shenzhen
Laifen Technology Co., ltd	Sep 2023 - Jul 2024
Mechanical and structural engineers	Shenzhen
Ecoflow Innovation Technology Co., Ltd	Feb 2022 - Jul 2023
Mechanical and structural engineers	Shenzhen

EDUCATION

University of Macau	Aug 2025 - Aug 2027
Robots and autonomous systems Master	Macau
Zhuhai College Of Jilin University	Sep 2018 - Jul 2022
Mechanical design and manufacturing and its automation Bachelor	Zhuhai
The 20th China University Robot Competition (ROBOCON)	

- Mechanical Design: Led the overall structural design of the projectile launching mechanism.
- Actuation & Sizing: Guided the calculation and selection of driving motors and steering servos.
- Project Management: Deconstructed system requirements, coordinated a 10-member cross-functional team, and allocated engineering tasks effectively.
- System Integration: Acted as the technical liaison between mechanical, electrical, and control sub-teams, ensuring seamless hardware-software alignment.
- Result: Won the National 3rd Prize.