MYBOTSHOP

ROBOTICS

ALOHA 2

User Manual

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Contents

1 Attention

Attention: Read this document carefully before operating ALOHA 2. In case of doubt, consult the manufacturer/integrator (MYBOTSHOP / QUADRUPED Robotics) before putting the system into operation. Contact information is available in Chapter 9, Getting Help & RMA.

Do not allow persons who are not familiar with the hardware or these instructions to operate the leader/follower arms. Powered manipulator arms are dangerous in the hands of untrained users.

ALOHA 2 is a stationary bimanual teleoperation rig: two operator-held leader arms (WidowX 250s) mechanically/electrically paired to two robot-mounted follower arms (ViperX 300s). Keep hands, hair and loose clothing clear of joints, gripper rails and the follower-arm workspace during power-up and operation. The follower arms move whenever the corresponding leader arm moves — treat the follower workspace as live any time the system is powered and the teleoperation node is running.

Caution: The gripper motors must have their current limited via Dynamixel Wizard before first use to avoid overload/overheating. Always verify udev serial-port rules are correctly mapped before launch — a wrong mapping can send leader-arm motion to the wrong follower arm.

2 Disclaimer

The ALOHA 2 platform documented here is distributed and supported by *MYBOTSHOP / QUADRUPED Robotics*. Basic ROS (Noetic) understanding is required to operate the software stack covered in this manual — if you are not familiar with ROS, we recommend checking the ROS documentation first.

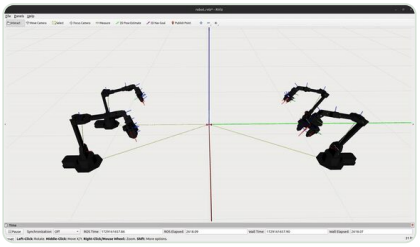
The client acknowledges and agrees that any information or materials provided by MYBOTSHOP / QUADRUPED Robotics are for R&D and development purposes only. Any services are provided "AS IS" and without any representation or warranty of any kind, express or implied, including but not limited to any warranty of merchantability, fitness for a particular purpose, non-infringement, or any other warranty.

This product is intended for civilian research and development use only. Users should avoid making dangerous modifications or using the robot in hazardous ways beyond its documented research scope. ALOHA 2 hardware and much of its software stack are open-source (see the MYBOTSHOP/mbs_aloha repository and the original ALOHA project) — users adapting or extending the platform do so at their own risk.

MYBOTSHOP / QUADRUPED Robotics shall not be liable for any damages, including but not limited to direct, indirect, special, incidental, or consequential damages, arising out of or in connection with the use or inability to use the information or materials in this document. This limitation on liability shall apply regardless of the form of action, whether in contract, tort, or otherwise.

3 About ALOHA 2

Aloha Research


ALOHA 2 builds on the original ALOHA system and addresses many of its limitations through redesigned hardware and upgraded software.

Key intentions behind the redesign:

- Extend and improve large-scale data collection
- Provide a robust and flexible platform for complex manipulation tasks
- Improve ergonomics and long-term usability for operators

The hardware design is published as open-source, allowing research groups worldwide to:

- Rebuild the platform
- Modify components
- Contribute improvements back to the community

This modular, customizable architecture supports a wide range of research in robotic learning, teleoperation and human–robot collaboration.

Key Features

- Enhanced grippers - Mounted on low-friction rails for smooth and accurate motion - Designed for both delicate handling and higher-force operations - Optimized for low latency and high responsiveness during teleoperation
- Advanced gravity compensation - Passive mechanical gravity compensation replaces earlier rubber-band solutions - Reduces physical effort and fatigue for the operator - Improves stability and comfort during long teleop sessions
- Reinforced frame and high-resolution cameras - Aluminum extrusion frame: lightweight, stiff and expandable - Supports larger props and human co-workers in the workspace - Intel RealSense D405 cameras provide depth sensing, wide field of view and accurate 3D perception for manipulation tasks

ALOHA 2 components including cameras, grippers and gravity compensation system

The open-source philosophy behind ALOHA 2 encourages shared development of both hardware and software, helping the community push forward teleoperation and manipulation research. For detailed technical information, see the official project website .

4 Quick Start – ROS Interface Setup & Launch

ROS Interface

> **Note:** ROS2 interface is available as well.

The ROS1 interface simplifies teleoperation setup by integrating:

- Dynamixel motor control
- RealSense camera streams
- Visualization tools such as RViz

Below is an overview of the typical setup.

Setup

- Install dependencies Run the provided script:

```
./dependencies.sh
```

- Check Dynamixel configuration
- Use Dynamixel Wizard
- Set Protocol to 2.0
- Set baud rate to 1000000 (1 Mbps)
- Limit the current of the gripper motors to avoid overload
- Configure udev rules for serial ports
- Get the serial number of each USB device:

```
sudo udevadm info --name=/dev/ttyUSBX --attribute-walk | grep serial
```

Replace /dev/ttyUSBX with the appropriate device names and then create matching udev rules so ports remain consistent.

Teleoperation

Launch the 4-arm teleoperation node:

```
roslaunch aloha 4arms_teleop.launch
```

Robot visualization

Start the RViz visualization:

```
roslaunch aloha_viz view_robot.launch
```

Depth cameras

Launch each RealSense D405 camera (sequentially):

```
roslaunch aloha_realsense_cameras d405_01.launch
roslaunch aloha_realsense_cameras d405_02.launch
roslaunch aloha_realsense_cameras d405_03.launch
roslaunch aloha_realsense_cameras d405_04.launch
```

5 Operating Principles & Key Components

Operating Principles

The operation of ALOHA 2 combines:

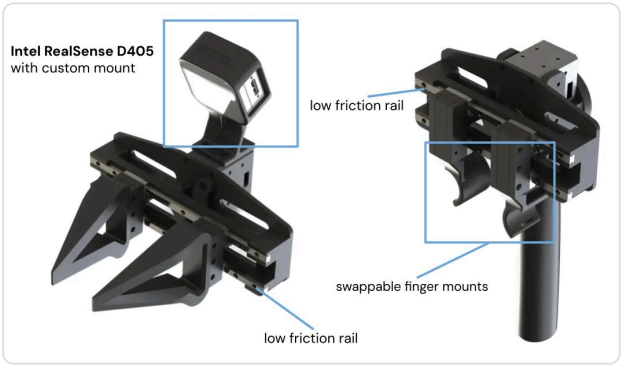
- Carefully engineered hardware
- Accurate simulation models
- Software interfaces for control, teleoperation and learning

This makes it possible to:

- Adapt to a wide variety of manipulation tasks
- Collect large-scale datasets
- Train and validate policies in both the real world and simulation

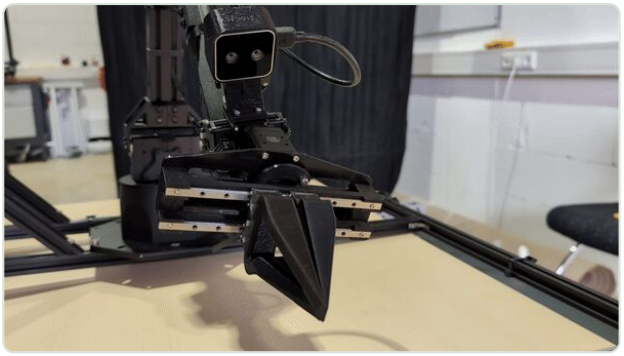
Key Components

- Redesigned grippers Two gripper types: Leader gripper : used directly by the human operator Follower grippers : mounted on the robot arms
- Emphasis on: Low latency Good force control Ability to handle objects of different shapes, sizes and weights
- Provides intuitive operator control with precise feedback on the robot side



Leader and follower grippers of the ALOHA 2 system

- Frame redesign - Aluminum extrusion structure for high stiffness and low weight - Supports complex setups, larger objects and human–robot collaboration - Easy to modify and expand to suit specific experiments
- High-resolution cameras Intel RealSense D405 sensors give: Dense depth information Wide field of view Accurate real-time 3D perception Enables fine manipulation, object tracking and robust teleoperation in visually complex scenes
- MuJoCo simulation A detailed MuJoCo model of the ALOHA 2 system reproduces the real robot's kinematics and dynamics Allows: Policy training in simulation Safety testing of algorithms Rapid iteration on control and learning methods before deployment The model is available in the MuJoCo ALOHA 2 repository .



Animated view of the ALOHA 2 gripper in use

Using simulation reduces wear on the physical hardware and speeds up development cycles.

ALOHA 2 targets researchers and developers who need:

- Reliable, repeatable bimanual teleoperation
- Open and modifiable hardware and software
- A platform suitable for both research and applied industrial scenarios

6 Advantages

Advantages

- Enhanced performance - High-quality grippers with low-friction guides - Advanced gravity compensation for stable, precise motion - High-resolution depth cameras for accurate, wide-area perception
- Operator-focused design - Ergonomic handles and motion paths - Intuitive teleoperation behavior - Suitable for long data-collection sessions with reduced fatigue
- Robustness and scalability Simplified but durable mechanical design Low maintenance and reduced downtime Modular structure: Supports small lab setups Scales to larger robotic workcells or testbeds

Because the system is open-source, users can adapt the architecture, share extensions and collaboratively evolve the platform over time.

7 Applications

Applications

ALOHA 2 is applicable in many areas where precise two-arm manipulation and teleoperation are valuable.

1. Robotic Learning

- Enables collection of large, high-quality datasets of manipulation trajectories
- Accurate grippers and reliable camera views provide rich training data for: - Object recognition - Grasping and placing - Sequential task execution and planning

2. Human–Robot Interaction (HRI)

- Ergonomic operator station and adaptable frame make it suitable for shared workspaces
- Use cases include: - Assembly assistance - Inspection tasks - Assistive and service robotics

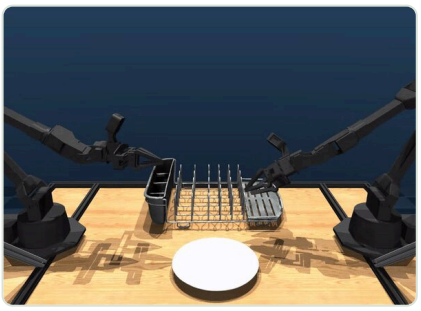
3. Teleoperation

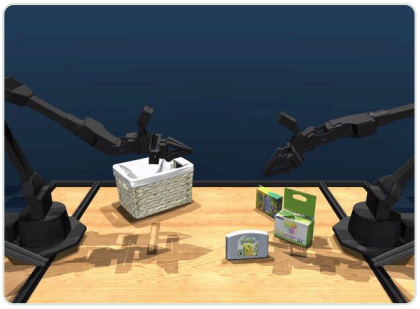
- Designed for responsive, high-fidelity remote control
- Potential scenarios: - Surgical or medical teleoperation - Disaster response - Handling of hazardous or sensitive materials
- Intuitive controls help operators execute complex tasks even in high-risk environments.

4. Simulation Research

- Tight integration with MuJoCo allows: - Training and testing of manipulation policies in simulation - Reproduction of complex scenarios at high fidelity
- Greatly accelerates experimentation without stressing the physical hardware.





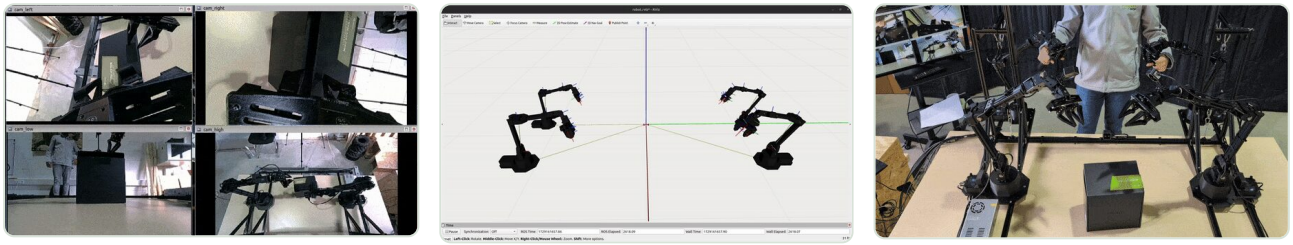


8 Use-Case Demonstrations

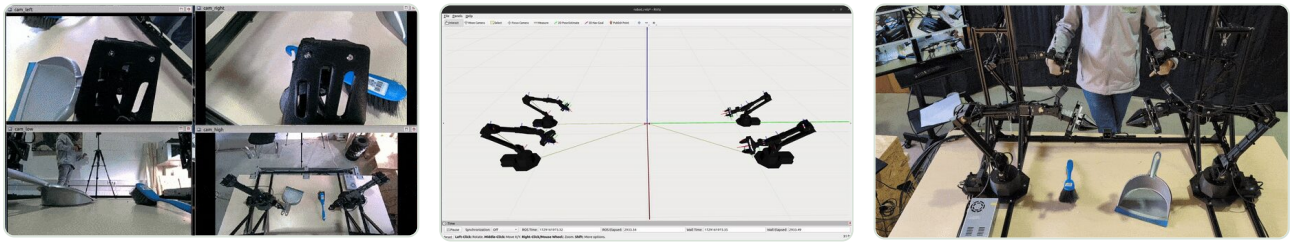
Use Cases

The following demonstrations highlight how ALOHA 2 performs in real tasks, with synchronized camera views, RViz visualizations and real-world footage.

1. Box Unboxing A precise bimanual task where ALOHA 2 opens a box and removes its contents, demonstrating coordinated motion and contact-rich manipulation.

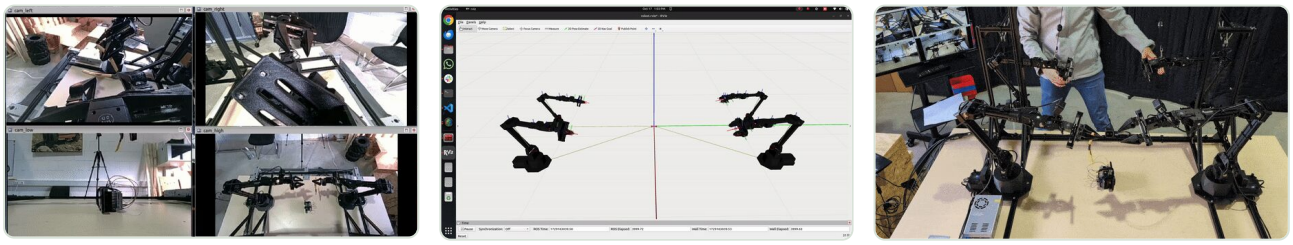


2. Taking Garbage with Small Brush ALOHA 2 uses a small brush to gather scattered debris, highlighting delicate surface interaction and precise tool control.



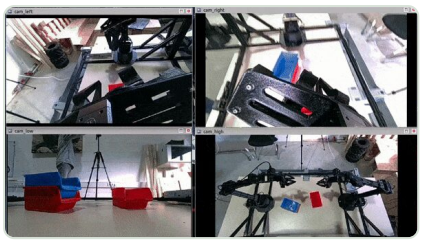
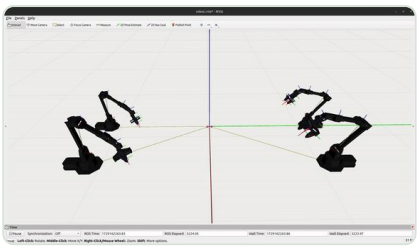
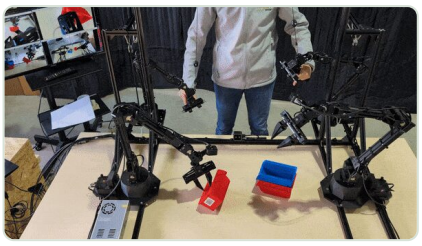
1. Removing/Cutting Wires from an Electronic Board

ALOHA 2 carries out fine manipulation on a circuit board, cutting and removing wires in confined spaces.



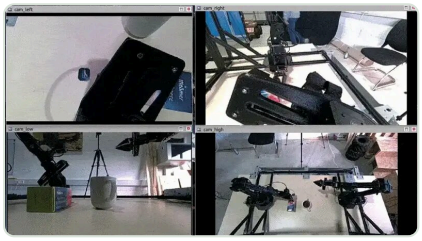
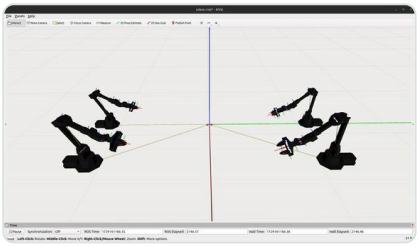
1. Assembling Lego-Type Organizer Boxes

ALOHA 2 assembles small containers, demonstrating accurate positioning and assembly skills in limited workspace.

1. Making Tea

ALOHA 2 prepares a cup of tea, which includes handling containers, pouring liquid and coordinating multiple steps—illustrating suitability for service robotics.


Special thanks are given to the MuJoCo ALOHA 2 project for providing key resources and contributions to this platform.

9 Getting Help & RMA

RMA / Support

How to Raise a Return Merchandise Authorization (RMA) Case

At MYBOTSHOP GmbH, we are committed to providing excellent support to ensure your issues are resolved promptly. If you encounter any problems with our products, please follow the steps below to raise a Return Merchandise Authorization (RMA) case:

Step 1: Open a Topic in Our Forum

1. Visit MYBOTSHOP Forum .
2. Open a new topic describing your issue in detail. Our support team and community members will attempt to assist you in resolving the problem remotely.

Step 2: Contact Support for RMA Number

support_qr

If the issue cannot be resolved remotely through our forum:

1. Email us at support @ mybotshop . de .
2. Provide a detailed description of the issue and include any troubleshooting steps already taken.
3. Our support team will evaluate your case and, if necessary, issue a RMA number along with a return address or a shipping label.

Important Shipping Information

Note: Please note: All goods must be sent back to the following address: MYBOTSHOP GmbH Willy - Messerschmitt - Strasse 12 50126 Bergheim Germany Do not ship goods without obtaining a RMA number. Parcels sent without a RMA number will be declined and returned to the sender.

Help Resources

In case of any issues, help can be taken from any of the following forums/resources:

1. MYBOTSHOP Forum : The forum is actively monitored by support teams at MYBOTSHOP GmbH .
2. Github Issues : Issues can be reported in the repository.
3. Online QA Sites: Questions can be asked on any of the QA sites like StackOverflow and Answers ROS .

10 FAQ

Frequently Asked Questions

Coming soon...