MYBOTSHOP

ROBOTICS

Clearpath Husky A300

User Manual

CONTACT

info@mybotshop.de

support@mybotshop.de

mybotshop.de

Contents

1 Attention 3

2 Disclaimer 4

3 About the Husky A300 5

4 Quick Start – Charging, E-Stop, Power On/Off & Controller 6

5 Network, Webserver & Remote Access 8

6 Navigation – SLAM, Odometric, Map & GPS 20

7 Sensor Payload – Seyond, Oak-D & Fixposition 22

8 ROS 2 Software Reference 26

9 Installation & Robot Computer Setup 35

10 Hardware Overview & Specification 36

11 Safety Guidelines 40

12 Getting Help & RMA 45

1 Attention

Attention: Read this document carefully before operating the robot. In case of doubt, consult the manufacturer (Clearpath Robotics) or the distributor (MYBOTSHOP GmbH) of the assemblies used. The robot must not be put into operation before clarification. Contact information is available in Chapter 11, Getting Help & RMA.

Do not allow persons who are not familiar with the robot or these instructions to operate it. Robots are dangerous in the hands of untrained users.

Do not operate the robot if you are intoxicated, under the influence of drugs, or unable to concentrate. Familiarize yourself with the charging, emergency-stop and power-on/off procedures in this manual before switching the robot on.

Caution: The Husky A300 is a skid-steer outdoor UGV capable of up to 2.0 m/s and 100 kg of payload. Keep the area clear while it is powered and under active control, start new operators on blocks with the wheels off the ground, and never cross the robot's path during operation.

2 Disclaimer

The Clearpath Husky A300 documented here is sold and supported by *MYBOTSHOP GmbH* as the German distributor for Clearpath Robotics (Canada). Basic ROS 2 understanding is required to operate the software stack covered in this manual — if you are not familiar with ROS 2, we recommend checking the ROS 2 documentation first.

The client acknowledges and agrees that any information or materials provided by MYBOTSHOP GmbH 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.

Regulatory status: The robot covered by this manual is an R&D device supplied by MYBOTSHOP GmbH and does not carry CE marking or a Certificate of Incorporation. It is considered a partly completed machine under Machinery Directive 2006/42/EC.

This manual documents the Husky A300 as shipped with ROS 2 Jazzy on Ubuntu 24.04, plus a MYBOTSHOP-configured sensor payload (Seyond Robin lidar, Oak-D Pro-POE depth camera, Fixposition GNSS/INS) and webserver used on at least one delivered configuration — other units may ship without some of these accessories, or with panels such as indoor/outdoor navigation and the LLM interface left disabled pending further integration. Always confirm what is actually enabled on your own unit before following a package name or launch command in this manual. For terms, policies and compliance with local laws and regulations, refer to the Clearpath Robotics website and the RMA/support process in Chapter 11.

MYBOTSHOP GmbH 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 the Husky A300

Overview

A300

A300 Custom Integration

The Husky A300 is an outdoor, all-terrain robotic platform designed for research and field applications. For full documentation, see the official guide: Clearpath Robotics Docs

4 Quick Start – Charging, E-Stop, Power On/Off & Controller

Pre-requisites

Before operating the Husky A300, ensure you have:

- Completed safety training (see Robotic Manipulator Safety)
- Access to the robot's SSH credentials
- A compatible joystick controller (paired with the robot)
- Adequate workspace with proper clearance

Charging Robot

Manual Charging:

1. Use only Clearpath-provided chargers (standard indoor or IP66-rated outdoor models)
2. Open the rear charge door to access charging terminals
3. Connect charger cables: red-to-red, black-to-black
4. LED indicator shows charging status: Red : Charging in progress Green : Fully charged (when robot is off) Red with pulsing status lights : Charging while robot is on

Wireless Charging (if equipped):

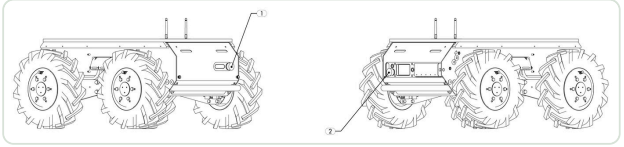
1. Position the robot's Mobile Coil within 30mm of the Stationary Coil
2. Charging begins automatically when aligned

Pre-Storage Charging:

- Charge batteries to minimum 50% before extended storage
- Set Battery Breaker to "OFF" for storage

> **Warning:** Never charge the robot in temperatures outside -20°C to +40°C range. LiFePO4 batteries require temperature-safe charging conditions.

Emergency Stop



_images/a300_estop.webp

Emergency Stop Buttons. Source: Clearpath Robotics

The Husky A300 is equipped with two red mushroom emergency stop buttons located at the front and rear of the robot. When pressed, they immediately disconnect power to the drivetrain.

Activating Emergency Stop:

- Press either red mushroom button to immediately halt the robot

Resetting Emergency Stop:

1. Twist both depressed red actuators clockwise until they pop out (extended position)
2. Press the Safety Restart button (green button)
3. The robot may begin moving immediately after restart if commanded

Wireless Emergency Stop (Optional):

- Optional wireless E-stop kit allows remote halting of the robot
- Automatically engages if communication with the wireless transmitter is lost

Power On

To power on the Husky A300:

1. Open the rear charge door
2. Locate the Battery Breaker and set it to “ON”
3. Press and hold the Power Button for one second
4. Wait approximately one minute for initialization Lights will transition from solid red to white/red pattern
5. Press the Safety Restart button (green button) to enable drivetrain

Important: The robot may begin moving immediately after pressing the Safety Restart button if it has pending motion commands. Ensure the area is clear.

Power Off

To power off the Husky A300:

1. Press and hold the Power Button for one second
2. Wait until all lights extinguish (approximately 10 seconds)
3. For extended storage, set the Battery Breaker to “OFF”

5 Network, Webserver & Remote Access

Basic Operation

Remote Control

Joystick Controls:

Before operating, ensure your joystick controller is paired with the robot.

Button/Control	Function
PS Button	Connect controller to robot
L1 (Hold)	Slow mode - max 0.3 m/s
R1 (Hold)	Fast mode - max 2.0 m/s
Left Thumbstick	Movement control (forward/reverse/turn)

Recommended Operating Speeds:

Terrain/Condition	No Payload	With Payload (up to 50kg)
Paved surfaces	2.0 m/s	1.5 m/s
Off-road terrain	1.5 m/s	1.0 m/s
Initial testing	0.1-0.3 m/s	0.1-0.3 m/s

Safety Tips:

- Place robot “up on blocks” during initial testing to keep wheels clear of ground
- Start with slower speeds (0.1 m/s is acceptable) while learning
- Never cross the robot’s path during operation
- Keep clear of wheels during operation
- Use chock blocks on wheels when stationary

Network Interface

Ethernet Direct Connection:

1. Connect your laptop directly to the robot’s Ethernet port
2. Configure your laptop’s network settings: IP Address : 192.168.131.100 Netmask : 255.255.255.0
3. Connect via SSH: ssh robot@192.168.131.1
4. Default credentials: Username : robot Password : clearpath

Warning: Change the default password upon first connection for security purposes.

Wi-Fi Configuration:

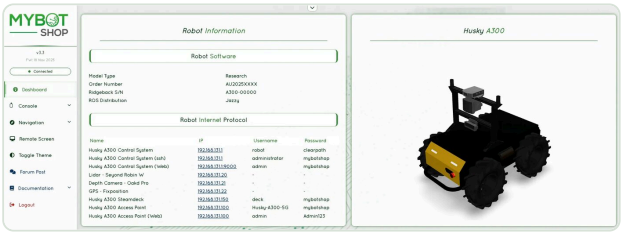
After establishing an Ethernet connection, you can configure Wi-Fi using standard netplan configuration procedures. Refer to the Clearpath Network Setup Guide for detailed Wi-Fi configuration instructions.

First Test

1. Place the robot on blocks so wheels are clear of the ground
2. Power on the robot following the Power On procedure
3. Connect to the robot via SSH
4. Verify ROS 2 is running: ros2 topic list
5. Test basic motion using the joystick at low speed (L1 held)
6. Once comfortable, place robot on ground and test motion at slow speeds
7. Gradually increase speed as you become familiar with the controls

Webserver

Robot Web Interface



_images/web_dashboard.webp

Husky A300 Web Dashboard

The Husky A300 includes a web-based interface for monitoring and basic control.

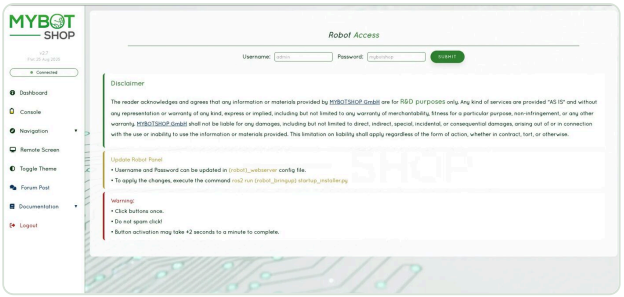
Accessing the Web Interface:

1. Connect to the robot's network
2. Open a web browser
3. Navigate to: http://192.168.131.1:9000/

Default Credentials:

- Username: admin
- Password: mybotshop

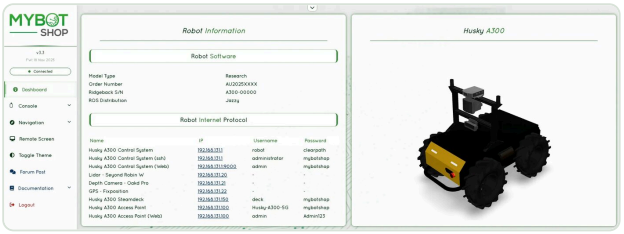
Login



_images/web_login.webp

Webserver Login

Dashboard



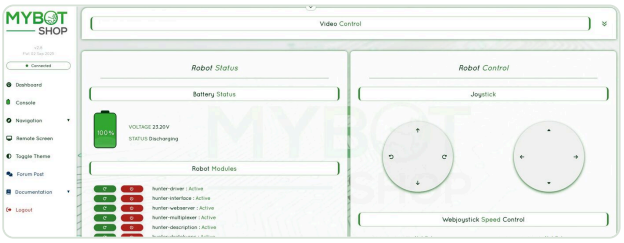
_images/web_dashboard.webp

Webserver Dashboard

The dashboard provides:

- View IP Address of the Husky A300
- View system load and status

Console



_images/web_console.webp

Webserver Console

From the Console you can:

- Enable/Disable Husky A300 ROS 2 services
- Record system logs
- Monitor battery status
- Use pre-configured action buttons
- Use the web joystick
- View online image streams

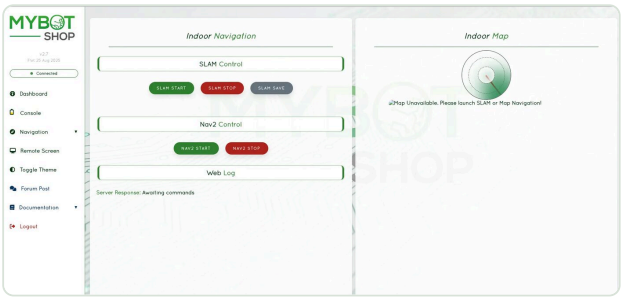
Remote Desktop

_images/web_vnc.webp

Husky A300 Remote Desktop (VNC)

Provides access to the on-board screen of the Husky A300's computer.

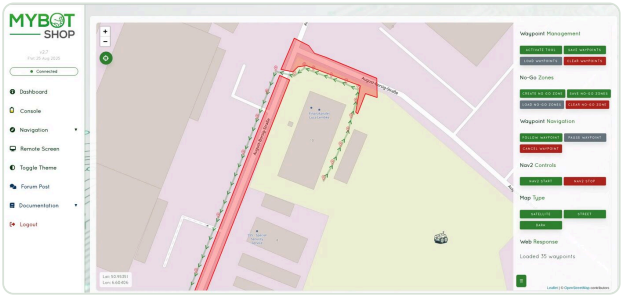
Indoor Navigation



_images/web_nav_indoor.webp

Indoor Navigation Interface

Outdoor Navigation



_images/web_nav_outdoor.webp

Outdoor Navigation Interface

ROS 2 Web Bridge

For advanced web-based ROS 2 interaction using rosbridge:

```
sudo apt-get install ros-jazzy-rosbridge-server
ros2 launch rosbridge_server rosbridge_websocket_launch.xml
```

This enables WebSocket-based communication with ROS 2 topics and services.

Foxglove WebSocket

For modern web visualization, use Foxglove Bridge:

```
sudo apt install ros-jazzy-foxglove-bridge
ros2 launch foxglove_bridge foxglove_bridge_launch.xml
```

Connect using Foxglove Studio for real-time visualization and debugging.

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for webserver information.

Teleoperation

Joystick Teleoperation

The Husky A300 supports teleoperation via a paired PlayStation-style controller.

Controller Mapping:

- PS Button : Connect controller to robot
- L1 (Hold) : Slow mode - max 0.3 m/s
- R1 (Hold) : Fast mode - max 2.0 m/s
- Left Thumbstick : Movement control

Keyboard Teleoperation

For keyboard control from a connected workstation:

```
ros2 run teleop_twist_keyboard teleop_twist_keyboard --ros-args -r cmd_vel:=/cmd_vel
```

Keyboard Controls:

- i : Forward
- k : Stop
- j : Turn left
- l : Turn right
- , : Backward
- u : Forward-left curve
- o : Forward-right curve

Custom Velocity Commands

To send velocity commands programmatically:

```
ros2 topic pub /cmd_vel geometry_msgs/msg/Twist "{linear: {x: 0.5}, angular: {z: 0.0}}"
```

Teleoperation via RQT

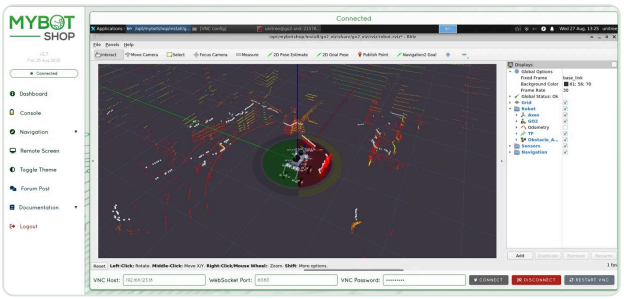
For a graphical teleoperation interface:

```
ros2 run rqt_robot_steering rqt_robot_steering --ros-args -r cmd_vel:=/cmd_vel
```

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for teleoperation instructions.

Visualization

RViz2 Visualization



_images/web_vnc_viz.webp

Husky A300 RViz2 Visualization

To visualize the robot state and sensor data:

```
ros2 launch husky_a300_viz view_robot.launch.py
```

Or using Clearpath packages:

```
ros2 launch clearpath_viz view_robot.launch.py
```

This launches RViz2 with a pre-configured layout showing:

- Robot model
- TF frames
- Sensor data (if available)
- Odometry

Custom RViz Configuration

To save your custom RViz configuration:

1. Configure RViz displays as desired
2. File > Save Config As > /path/to/my_config.rviz

To load a custom configuration:

```
ros2 launch clearpath_viz view_robot.launch.py rviz_config:=/path/to/my_config.rviz
```

Foxglove Studio

For an alternative web-based visualization:

1. Install Foxglove Bridge: sudo apt install ros-jazzy-foxglove-bridge
2. Launch the bridge: ros2 launch foxglove_bridge foxglove_bridge_launch.xml
3. Open Foxglove Studio and connect to your robot's IP address.

Viewing TF Frames

To visualize the transform tree:

```
ros2 run tf2_tools view_frames
```

This generates a PDF showing the complete TF tree structure.

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for visualization instructions.

MYBOTSHOP Auto Drivers Startup, Visualization & Description (This Configuration)

5.1 Auto Drivers Startup

To verify the robot system from the terminal:

- Many drivers are off by default except the webserver and can be activated via the webserver or: sudo service clearpath - platform start

The list of all drivers is in hsky_autostart/startup_installer.py .

Check services:

```
sudo service hsky-webserver status
sudo service clearpath-platform status
```

The Husky A300 launches the hsky_autostart system.launch.py on startup (if configured). Verify startup:

```
sudo service clearpath-platform status
```

If you see "Unit ros2.service could not be found", startup is not installed.

Service markers:

- Red – startup job failed.

- Green – running correctly.
- Grey – service not started.

Restart service if needed:

```
sudo service clearpath-platform restart
```

To modify the startup job, update system.launch.py in hsky_autostart and then:

```
ros2 run hsky_autostart startup_installer.py
```

5.2 Visualization

Ensure drivers are activated via web GUI or system services, then:

```
ros2 launch hsky_viz view_robot.launch.py
```

5.3 Robot Description

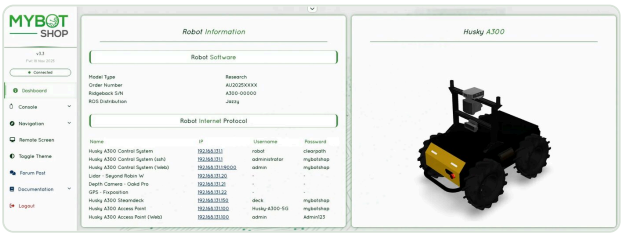
The description package contains URDFs and meshes for the Husky A300. Additional sensors can be added as needed.

View the model:

```
ros2 launch hsky_description view_robot.launch.py
```

MYBOTSHOP Webserver & Robot Interface (This Configuration)

The following webserver panels and IP layout are reproduced from a documented MYBOTSHOP customer configuration. Indoor/outdoor navigation and the LLM interface panel are present in the webserver on this configuration but were left disabled pending further integration — check your own unit's Console before assuming a panel is unavailable.



Husky A300 Webserver

Husky A300 Webserver

This module comes pre-installed for heavy integration projects. It should be accessible directly at:

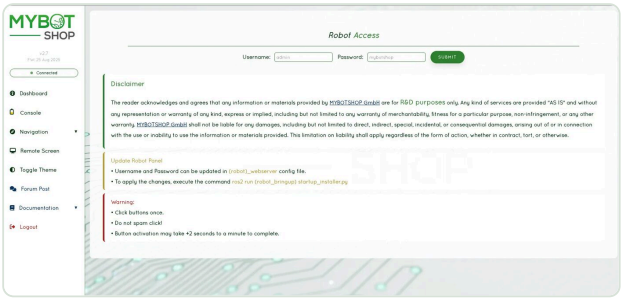
```
http://192.168.131.1:9000/
```

or via the Wi-Fi IP to which the robot is connected.

The Husky A300 webserver can be configured via the config file in the ROS 2 package:

/opt/mybotshop/src/mybotshop/husky_webserver/config/robot_webserver.yaml

3.1.1 Login

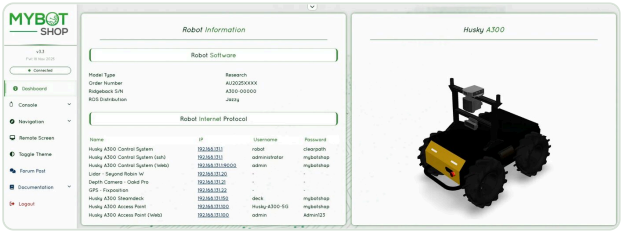


Webserver Login

Webserver Login

- Username: admin
- Password: mybotshop

3.1.2 Dashboard

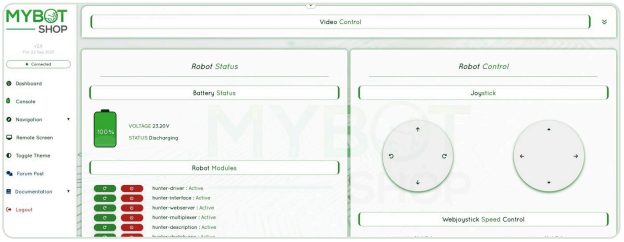


Webserver Dashboard

Webserver Dashboard

- View IP Address of the Husky A300.
- View system load.

3.1.3 Console



Webserver Console

Webserver Console

From the Console you can:

- Enable the Husky A300 ROS 2 services.
- Disable the Husky A300 ROS 2 services.
- Record system Husky A300 logs.
- Monitor battery status.
- Use pre-configured action buttons (adaptable to new ROS 2 services).
- Use the web joystick.
- View online image streams.
- (Optionally) STT → AI → TTS (disabled by default).

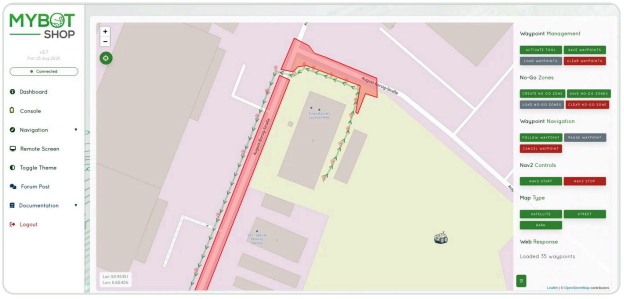
3.1.4 Remote Desktop

Remote Desktop

Husky A300 Remote Desktop

- Provides access to the on-board screen of the Husky A300's computer.

3.1.5 Navi Indoor

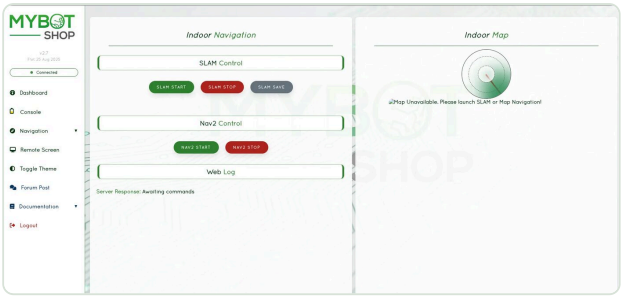


Indoor Navigation

Indoor Navigation (Disabled)

- Currently disabled.

3.1.6 Navi Outdoor



Outdoor Navigation

Outdoor Navigation (Disabled)

- Currently disabled.

3.1.7 LLM Interface

- Currently disabled.

3.2 Robot Interface

Instructions for interfacing with the robot using Ubuntu 24.04 and ROS 2 Jazzy.

3.2.1 Static Network Connection

For the first configuration, connect either via Wi-Fi or LAN cable to the robot's network.

On the host PC (Ubuntu):

1. Open Settings → Network .
2. Add a new wired connection.
3. In IPv4 settings, select Manual .
4. Set: Address: 192.168.131.51 Netmask: 24
5. Save and restart the network.

Then:

- Check host IP: ifconfig
- Ping the robot: ping 192.168.131.1
- Access the robot via SSH: ssh - X robot @ 192.168.131.1 Default password: clearpath

3.2.2 Husky A300 IP Addresses

Example IP configuration:

Device	IP Address	Username	Password
Husky A300 MCU	192.168.131.1	robotistrator	123
Husky A300 MCU Web	192.168.131.1:9000	admin	mybotshop
Seyond Robin W Muster	192.168.131.20		

Oak D Pro	192.168.131.21		
Fixposition	192.168.131.22		
Router SSID	192.168.131.100	Husky A300XXXXX -5G	mybotshop
Router Web	192.168.131.100	admin	Admin123

Note: Other active networks can interfere with connecting to the Husky A300. Disable unused connections when connecting to the robot.

3.2.3 Interfacing

1. Connect to the Husky A300 as described in the network section.
2. Open several SSH sessions: ssh - X robot @ 192.168.131.1
3. Verify that the robot is processing information: ros2 topic list If topics are displayed, the drivers are running.

3.3 Visualization

View the Husky A300's current state:

```
ros2 launch husky_a300_viz view_robot.launch.py
```

3.4 Tele-operation

To teleoperate the Husky A300 (update namespace/environment variables as required):

```
ros2 run teleop_twist_keyboard teleop_twist_keyboard \
  --ros-args --remap cmd_vel:=/$HSKY_NS/cmd_vel \
  --ros-args -p stamped:=true
```

6 Navigation – SLAM, Odometric, Map & GPS

Navigation

Simultaneous Localization and Mapping (SLAM)

To create a map of the environment using SLAM Toolbox:

```
ros2 launch clearpath_nav2_demos slam.launch.py
```

Drive the robot around using teleoperation to build the map. Save the map when complete:

```
ros2 run nav2_map_server map_saver_cli -f ~/maps/my_map
```

Odometry Navigation

For navigation without a pre-built map (odometry-based):

```
ros2 launch clearpath_nav2_demos nav2.launch.py use_sim_time:=false
```

Map Navigation

For navigation with a pre-built map:

```
ros2 launch clearpath_nav2_demos nav2.launch.py map:=/path/to/map.yaml
```

Use RViz to:

1. Set the initial pose with “2D Pose Estimate”
2. Set navigation goals with “2D Goal Pose”

GPS Navigation

For outdoor GPS-based navigation:

```
ros2 launch clearpath_nav2_demos gps_nav.launch.py
```

Requires a configured GPS receiver on the robot.

Nav2 Parameters

Navigation parameters can be customized in the nav2_params.yaml file. Key parameters include:

- controller_frequency : Control loop rate
- goal_tolerance : Position tolerance for goal reaching
- max_vel_x : Maximum linear velocity
- max_vel_theta : Maximum angular velocity

> **Warning:** ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for navigation instructions.

MYBOTSHOP Navigation Packages

The MYBOTSHOP navigation module is under development. Use Clearpath's existing Nav2 packages for navigation where appropriate.

4.1 SLAM (Simultaneous Localization and Mapping)

To create a map for map-based navigation:

- Launch SLAM: ros2 launch hsky_navigation slam . launch . py
- Use teleoperation (e.g., 0.2 m/s via keyboard or Logitech controller) to explore the environment.
- Save the map (example paths): ros2 run nav2_map_server map_saver_cli - f \ / opt / mybotshop / src / mybotshop / husky_a300_nav2 / maps / custom_map \ -- ros - args -- remap map :=/ husky_a300_0001 / map ros2 run nav2_map_server map_saver_cli - f \ / opt / mybotshop / src / mybotshop / husky_a300_nav2 / maps / custom_map_2 \ -- ros - args -- remap map :=/ husky_a300_0001 / map
- Rebuild so the new maps are found (required if map name is not map): cd / opt / mybotshop / && colcon build -- symlink - install source / opt / mybotshop / install / setup . bash

4.2 Odometric Navigation

To navigate without a map, launch odometric navigation and give goals in RViz:

```
ros2 launch hsky_navigation odom_navi.launch.py
```

4.3 Map Navigation

This uses the generated map (default name map). If a different name is used, update parameters in the hsky_navigation package.

- Ensure the map is generated, placed correctly in the ROS package, and the workspace has been built with colcon .
- Launch map navigation: ros2 launch hsky_navigation map_navi . launch . py

7 Sensor Payload – Seyond, Oak-D & Fixposition

Sensors

Default Sensors

The Husky A300 includes the following built-in sensors:

- IMU : Inertial Measurement Unit for orientation and acceleration data
- Wheel Encoders : For odometry calculation

IMU Data:

```
ros2 topic echo /imu/data
```

Odometry:

```
ros2 topic echo /odometry/filtered
```

Depth Cameras

Supported depth cameras include Intel RealSense and ZED series.

Example: Adding a RealSense D435 to robot.yaml:

```
sensors:
  cameras:
    - model: intel_realsense
      urdf_enabled: true
      launch_enabled: true
      parent: top_plate_link
      xyz: [0.15, 0.0, 0.1]
      rpy: [0.0, 0.0, 0.0]
```

Lidars

Supported LiDAR sensors include Velodyne, Ouster, and SICK series.

Example: Adding a Velodyne VLP-16 to robot.yaml:

```
sensors:
  lidar3d:
    - model: velodyne_vlp16
      urdf_enabled: true
      launch_enabled: true
      parent: top_plate_link
      xyz: [0.0, 0.0, 0.2]
      rpy: [0.0, 0.0, 0.0]
```

GPS

GPS receivers can be added for outdoor navigation.

Example: Adding a GPS receiver to robot.yaml:

```
sensors:
  gps:
    - model: nmea_gps
      urdf_enabled: true
      launch_enabled: true
      parent: top_plate_link
      xyz: [0.0, 0.0, 0.3]
```

Auxiliary Sensors

Additional sensors and accessories can be configured through the robot.yaml file. Refer to the Clearpath Integration Guide for detailed sensor integration instructions.

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for sensor information.

Named Sensor Drivers (This Configuration)

5.4 Lidar – Seyond Robin

Seyond is a 3D lidar providing point clouds. The ROS 2 package is modified for A300 and time synchronization.

It is turned on by default via auto services. If auto service is disabled, manually start:

```
ros2 launch hsky_lidars seyond.launch.py
```

5.5 Depth Camera – Oak-D Pro-POE

Oak-D Pro is a stereo depth camera providing 3D point clouds.

Normally enabled via auto services. If needed, start manually:

```
ros2 launch hsky_depth_cameras oakd.launch.py
```

5.6 GPS – Fixposition

Fixposition provides high-accuracy GPS and odometry. It requires pre-configuration via the Fixposition interface at 192.168.131.22 .

Reference: Fixposition RTK streaming

Normally enabled automatically. To launch manually:

```
ros2 launch hsky_gps fixposition.launch.py
```

5.7 Web Interface

1. Connect your PC to the Fixposition Wi-Fi (SSID starting with fp-). Password: 1234567890 .
2. Open a browser and navigate to 10.0.1.1 to access the Fixposition dashboard.

5.8 Software Upgrade

To update the Vision-RTK 2 software:

- In the web interface, go to System → Update .
- Upload the .swu file via the upload area or drag and drop.

5.9 Configuration

Configuration is available in the Configuration tab.

5.9.1 Fusion Configuration

Key options:

- Autostart – start Fusion engine automatically on boot.
- Housing – Prototype (3D-printed) or Standard (aluminum).
- Tuning Mode – platform dynamics; for this setup use Slow robot .
- GNSS Extrinsics – GNSS antenna positions relative to the Vision-RTK 2 sensor frame (meters, preferably millimeter accuracy).

5.9.2 GNSS Configuration

Configure the correction data source to receive GNSS correction data as required.

5.9.3 Network Configuration

Options:

- Wi-Fi Client – network the device will connect to.
- Wi-Fi Access Point – SSID and password of the Fixposition AP.
- Ethernet – custom IP address for wired access.

5.9.4 I/O Configuration

In the Output Messages table, select TCP0 for all items except those highlighted in orange when TCP0 is selected.

5.10 Status

After configuration, start Fusion with Start .

Monitor:

- IMU Status – should show converging .
- Baseline Status – should be green.

8 ROS 2 Software Reference

Installation

_images/a300.webp

Husky A300 Custom Integration

Installation on Robot

The Husky A300 comes with ROS 2 Jazzy pre-installed on Ubuntu 24.04. If you need to reinstall or update:

```
sudo apt-get update
sudo apt-get install --reinstall ros-jazzy-clearpath-robot
```

Verify that udev rules are installed:

```
ls /usr/lib/udev/rules.d/60-ros-jazzy-clearpath-robot.rules
```

Installation on External PC

To set up a remote workstation for development and monitoring:

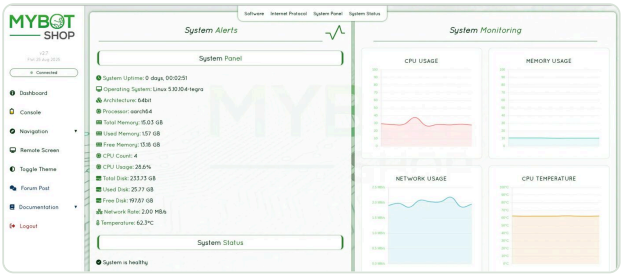
1. Install Ubuntu 24.04 on your workstation
2. Install ROS 2 Jazzy following the official instructions : sudo apt install software-properties-common sudo add-apt-repository universe sudo apt update && sudo apt install curl -y sudo curl -sSL https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o /usr/share/keyrings/ros-archive-keyring.gpg echo "deb [arch= $(dpkg --print-architecture) signed-by=/usr/share/keyrings/ros-archive-keyring.gpg] http://packages.ros.org/ros2/ubuntu $(. /etc/os-release && echo $UBUNTU_CODENAME) main" | sudo tee /etc/apt/sources.list.d/ros2.list > /dev/null sudo apt update sudo apt install ros-jazzy-desktop
3. Install Clearpath packages: sudo apt-get update sudo apt-get install ros-jazzy-clearpath-desktop
4. Configure ROS 2 environment: echo "source /opt/ros/jazzy/setup.bash" >> ~/.bashrc source ~/.bashrc export ROS_DOMAIN_ID = 0 export RMW_IMPLEMENTATION = rmw_cyclonedds_cpp

5. Install CycloneDDS (recommended for Clearpath robots): sudo apt install ros-jazzy-rmw-cyclonedds-cpp

> **Warning:** ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for installation instructions.

Autostart

Autostart Configuration



_images/web_system.webp

Husky A300 System Services

The Husky A300 uses systemd services to automatically start ROS 2 nodes on boot.

Check Service Status:

```
sudo systemctl status clearpath-robot.service
```

Or via the web interface:

```
sudo service clearpath-platform status
sudo service hsky-webserver status
```

Restart Service:

```
sudo systemctl restart clearpath-robot.service
```

View Service Logs:

```
journalctl -u clearpath-robot.service -f
```

Service Status Indicators

- Green - Service running correctly
- Red - Startup job failed
- Grey - Service not started

Robot YAML Configuration

In ROS 2 Jazzy, the robot is configured via a YAML file instead of environment variables.

Location: /etc/clearpath/robot.yaml

Example Configuration:

```
system:
  ros2:
    namespace: ""
    domain_id: 0
    rmw_implementation: rmw_cyclonedds_cpp
platform:
  model: a300
  serial_number: A300-XXXX
extras:
  ros2:
    - package: my_custom_package
      launch_file: my_launch.py
```

Apply Configuration Changes:

After modifying robot.yaml , restart the service:

```
sudo systemctl restart clearpath-robot.service
```

MYBOTSHOP Autostart

For MYBOTSHOP custom integrations, autostart is managed via:

```
ros2 run hsky_autostart startup_installer.py
```

The startup configuration is defined in hsky_autostart/startup_installer.py .

For detailed configuration options, refer to the Clearpath Configuration Documentation .

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for autostart configuration.

Simulation

Gazebo Harmonic Simulation

The Husky A300 can be simulated in Gazebo Harmonic with ROS 2 Jazzy.

Prerequisites:

Set up your simulation workspace:

```
mkdir -p ~/clearpath_sim_ws/src
cd ~/clearpath_sim_ws/src
```

```
git clone https://github.com/clearpathrobotics/clearpath_simulator.git
vcs import . < clearpath_simulator/clearpath_sim.repos --recursive
```

Install Dependencies:

```
cd ~/clearpath_sim_ws
rosdep install -r --from-paths src --rosdistro jazzy -i -y
sudo apt install ros-jazzy-rmw-cyclonedds-cpp
```

Build the Workspace:

```
colcon build --symlink-install
source install/setup.bash
```

Launch Simulation:

```
ros2 launch clearpath_gz simulation.launch.py
```

Robot Configuration for Simulation

Create a robot.yaml file to customize your simulated robot:

```
system:
  ros2:
    namespace: a300
    domain_id: 0
platform:
  model: a300
```

Isaac Sim

NVIDIA Isaac Sim support is available for advanced simulation scenarios. Refer to the Clearpath Isaac Sim Documentation for setup instructions.

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for simulation instructions.

Packages

Robot Description

The clearpath_description package contains URDF models for the Husky A300.

```
ros2 launch clearpath_viz view_model.launch.py
```

In ROS 2 Jazzy, robot configuration uses a YAML file (robot.yaml) instead of environment variables.

Twist Mux

The twist_mux package manages multiple velocity input sources with priority handling.

Topics are prioritized in the following order (highest to lowest):

1. Emergency stop commands
2. Joystick teleoperation
3. Navigation commands
4. External commands

EKF Localization

The robot_localization package provides Extended Kalman Filter (EKF) based localization, fusing wheel odometry with IMU data.

To view the current odometry:

```
ros2 topic echo /odometry/filtered
```

Clearpath Common Packages

In ROS 2 Jazzy, Clearpath uses common packages across all supported platforms:

- clearpath_common - Shared configurations and utilities
- clearpath_config - Robot YAML configuration handling
- clearpath_description - Robot URDF models
- clearpath_generator - Configuration file generators
- clearpath_msgs - Custom message definitions
- clearpath_platform - Platform-specific drivers

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for package information.

Debugging

Common Debugging Commands

List Active Topics:

```
ros2 topic list
```

Check Topic Publishing Rate:

```
ros2 topic hz /odometry/filtered
```

View Node Information:

```
ros2 node list
ros2 node info /robot_state_publisher
```

Check TF Tree:

```
ros2 run tf2_tools view_frames
```

This generates a PDF showing the TF tree structure.

Diagnostic Tools

System Diagnostics:

```
ros2 topic echo /diagnostics
```

Hardware Status:

```
ros2 topic echo /platform/mcu/status
```

RQT Robot Monitor:

```
ros2 run rqt_robot_monitor rqt_robot_monitor
```

Log Files

System logs are stored in:

- /var/log/syslog - System messages
- ~/.ros/log/ - ROS 2 log files

To view real-time ROS 2 logs:

```
ros2 run rqt_console rqt_console
```

Reinstalling Packages

If packages become corrupted:

```
sudo apt-get update
sudo apt-get install --reinstall ros-jazzy-clearpath-robot
```

Checking Configuration

Verify your robot.yaml is valid:

```
ros2 run clearpath_config check_config /etc/clearpath/robot.yaml
```

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for debugging information.

Miscellanious

Backing Up Robot Configuration

Before making changes, back up your robot configuration:

```
git clone https://github.com/clearpathrobotics/robot-backup
cd robot-backup
./backup.sh
```

Keep a copy of your robot.yaml file for use when upgrading or restoring.

Upgrading from Humble to Jazzy

If upgrading from ROS 2 Humble:

1. Back up your robot.yaml configuration
2. Follow the Clearpath Upgrade Guide
3. Restore your robot.yaml after upgrade

Updating Packages

To update all Clearpath packages:

```
sudo apt-get update
sudo apt-get upgrade ros-jazzy-clearpath-*
```

Network Configuration

Check Network Status:

```
ip addr
nmcli device status
```

Configure Static IP with Netplan:

Edit netplan configuration:

```
sudo nano /etc/netplan/01-network-config.yaml
```

Example configuration:

```
network:
  version: 2
  ethernets:
    eth0:
```

```
      addresses:
        - 192.168.131.1/24
```

Apply changes:

```
sudo netplan apply
```

Time Synchronization

Ensure time is synchronized for proper TF operation:

```
timedatectl status
sudo systemctl enable systemd-timesyncd
sudo systemctl start systemd-timesyncd
```

CycloneDDS Configuration

For multi-robot setups or complex networks, configure CycloneDDS:

Create /etc/cyclonedds/cyclonedds.xml :

```
<?xml version="1.0" encoding="UTF-8" ?>
<CycloneDDS>
  <Domain>
    <Id>0</Id>
  </Domain>
</CycloneDDS>
```

Export the configuration:

```
export CYCLONEDDS_URI=/etc/cyclonedds/cyclonedds.xml
```

Warning: ROS 2 Humble is not supported on the Husky A300. The A300 ships with ROS 2 Jazzy on Ubuntu 24.04. Please refer to the Jazzy tab for additional information.

MYBOTSHOP Simulator Launch (This Configuration)

6.1 Launch Gazebo – Onboard Computer

Run on the onboard computer:

```
ros2 launch clearpath_gz simulation.launch.py \
  setup_path:=/opt/mybotshop/src/mybotshop/hsky_gazebo/clearpath/
```

6.2 Launch Gazebo – External Computer

On an external machine:

```
ros2 launch clearpath_gz simulation.launch.py \
  setup_path:=/home/$USER/ros2/src/mybotshop/hsky_gazebo/clearpath/
```

Ensure setup_path points to the local location of hsky_gazebo .

6.3 Teleoperate Robot

Example teleoperation commands in simulation:

```
export HSKY_NS=a300_00045
ros2 run teleop_twist_keyboard teleop_twist_keyboard \
  --ros-args --remap cmd_vel:=/$HSKY_NS/cmd_vel \
  --ros-args -p stamped:=true
```

9 Installation & Robot Computer Setup

7.1 Robot Computer Setup

Note: The repository should already be available and built on the Husky A300's computer if configured by MYBOTSHOP.

1. Create directory: cd / opt / sudo mkdir mybotshop sudo chown - R administrator : administrator / opt / mybotshop
2. Sync repository from robot (example): rsync - avP - t -- delete - e ssh src \ robot @ 192.168.131.1 : // opt / mybotshop
3. Clone/copy repository and install dependencies: cd / opt / mybotshop / src / mybotshop / && ./ ros2_dependencies . sh cd / opt / mybotshop / src / mybotshop / hsky_webserver sudo chmod + x webserver_installer . sh ./ webserver_installer . sh
4. Build ROS 2 workspace: cd / opt / mybotshop && colcon build -- symlink - install source install / setup . bash
5. Add sources to ~/.bashrc : # Mybotshop Additions source / opt / ros / jazzy / setup . bash source / opt / mybotshop / install / setup . bash
6. Upgrade Clearpath Husky firmware via Clearpath docs.
7. Add Clearpath repo and user: sudo adduser robot sudo usermod - aG sudo robot cd / opt / mybotshop / src / mybotshop / hsky_bringup / scripts / ./ clearpath_install . sh
8. Reload services: sudo systemctl daemon - reload sudo systemctl start clearpath - robot . service
9. Build ROS 2 workspace in Release: cd / opt / mybotshop colcon build -- symlink - install -- cmake - args - DCMAKE_BUILD_TYPE = Release source install / setup . bash
10. Edit /etc/clearpath/robot.yaml and replace with hsky_autostart/config/a300.yaml .
11. Restart services: sudo systemctl daemon - reload && \ sudo systemctl start clearpath - robot . service
12. Replace dev: '/dev/input/ps4' with device name: "PS4 Controller" in: /opt/ros/jazzy/share/clearpath_control/config/a300/teleop_ps4.yaml
13. Reinstall startup: ros2 run hsky_autostart startup_installer . py

10 Hardware Overview & Specification

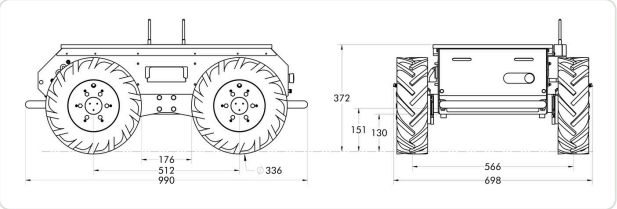
_images/a300_isometric.webp

The Husky A300 is an all-terrain unmanned ground vehicle (UGV) designed for rugged outdoor research and development applications. Evolved from its 2010 origins and progressing through the A200, the A300 represents Clearpath Robotics' latest generation of versatile mobile robotic platforms.

> **Note:** Images on this page are sourced from Clearpath Robotics Documentation .

Specifications

Mechanical



_images/a300_dimensions.webp

Husky A300 Dimensional Drawing. Source: Clearpath Robotics

Parameter	Value
External Dimensions (L x W x H)	990 x 698 x 372 mm (39 x 26.5 x 14.6 in)
Weight	80 kg (176 lbs)
Ground Clearance	130 mm (5 in)
Maximum Payload	100 kg (220 lb)
All-Terrain Payload	50 kg (110 lb)
Maximum Speed	2.0 m/s (4.4 mph)

Maximum Climb Grade	30°
Maximum Curb Height	150 mm
Drive Type	Skid Steer
Motor Configuration	Four In-Wheel Brushless Motors
Chassis Material	Aluminum (Weather Resistant)

Electrical

Parameter	Value
Battery Chemistry	LiFePO4 (Lithium Iron Phosphate)
Battery Voltage	25.6 V (does not exceed 30 VDC)
Standard Battery Capacity	40 Ah @ 25.6V
Upgraded Battery Capacity	80 Ah @ 25.6V
Extended Battery Capacity	120 Ah @ 25.6V
Standard Charge Time	3-4 hours
Upgraded Charge Time	7-8 hours
Extended Charge Time	8-10 hours
Standard Runtime	4 hours
Upgraded Runtime	8 hours
Extended Runtime	12 hours
User Power Output	12V @ 10A, 24V @ 5A, VBAT @ 5A
Optional Power Output	VBAT @ 40A

Environmental

Parameter	Value
IP Rating	IP54
Operating Temperature	-20°C to +40°C (-4°F to 104°F)
Noise Level	Up to 80 dBA

Base Software

The Husky A300 comes with ROS 2 installed and configured out of the box. The platform ships with comprehensive documentation, tutorials, and demos to help you get started quickly.

Parameter	Value
Operating System	Ubuntu 24.04
ROS Distribution	ROS 2 Jazzy
Standard Computing	Intel i3-13100TE
Performance Computing (Optional)	Intel i7-13700TE
Network Interface	Ethernet, Wi-Fi

Features

- Four Programmable LED Lights : Two front, two rear for status indication and visibility
- E-Ink Display : 3.70” display showing battery status, charge levels, and WiFi connectivity
- Robust Chassis : Aluminum weather-resistant construction for harsh environments
- High-Powered Drivetrain : Twice as fast as predecessor models
- Multiple Battery Configurations : 2, 4, or 6 battery configurations available
- Wireless Charging Option : Optional wireless charging capability
- Wireless Emergency Stop : Optional remote emergency stop kit

Manuals

For detailed technical documentation, please refer to the official Clearpath Robotics documentation:

- User Manual
- Integration Guide
- Maintenance Manual
- Troubleshooting Guide

Resources

- Clearpath Robotics Husky A300 Product Page
- Husky GitHub Repository
- Clearpath ROS 2 Documentation

Transport

Unpacking

When unpacking your Husky A300:

1. Carefully remove the robot from its shipping container
2. Inspect for any visible shipping damage

3. Verify all accessories and documentation are included
4. Remove any protective packaging materials
5. Store packaging for potential future transport

For detailed unpacking instructions, see the Clearpath Unpacking Guide .

Packing

When preparing the Husky A300 for transport:

1. Power off the robot completely
2. Set the Battery Breaker to “OFF”
3. Charge batteries to minimum 50% for storage
4. Secure any loose accessories
5. Use original packaging when possible
6. Ensure the robot is properly secured during transit

For detailed packing instructions, see the Clearpath Packing Guide .

11 Safety Guidelines

Robotic Manipulator Safety

When deploying robotic manipulators, it is imperative to prioritize safety procedures to mitigate risks and ensure secure operations. The following guidelines delineate key safety measures when working with robotic manipulators.

Work Area Safety

- Maintain a clean and well-organized work area. Cluttered or inadequately lit spaces can impede the proper functioning of sensors and hinder precise manipulation.
- Avoid operating robotic manipulators in hazardous environments, such as those containing corrosive substances, extreme temperatures, or sharp objects that may damage the manipulator.
- Ensure that only authorized personnel are present in the vicinity during manipulator operation to prevent interference and ensure a safe working environment.

Electrical Safety

- Ensure the manipulator's power system adheres to electrical safety standards. Regularly inspect and maintain power components to prevent malfunctions.
- Implement safeguards to protect the manipulator from adverse environmental conditions, such as exposure to moisture or extreme temperatures.
- Regularly inspect power cables and connections, promptly replacing damaged components to minimize the risk of electrical issues.

Manipulation Safety

- Implement collision detection systems to prevent unintended contact with objects, humans, or other equipment during manipulation tasks.
- Define and enforce safety zones around the manipulator's workspace to minimize the risk of unintended interactions with personnel or other objects.
- Regularly calibrate and test the manipulator's sensors and systems to ensure precise and reliable performance during manipulation tasks.

Emergency Response

- Install an emergency stop mechanism to swiftly halt manipulator operation in unforeseen circumstances or emergencies.
- Clearly mark and communicate emergency stop locations within the manipulator's operational area.

- Conduct regular emergency response drills to ensure personnel are familiar with procedures for handling unexpected situations during manipulator operation.

Data Security and Privacy

- Implement robust cybersecurity measures to safeguard the manipulator's control systems and data from unauthorized access or manipulation.
- Ensure compliance with privacy regulations when collecting, storing, or transmitting data captured by the manipulator's sensors.

Human Interaction Safety

- Integrate sensors and communication systems to detect and respond to the presence of humans in the manipulator's vicinity.
- Clearly communicate the manipulator's operational status and intentions using visual and audible signals to alert nearby individuals.
- Establish protocols for safe human-robot collaboration, particularly in shared workspaces where manipulators are in operation.

Residual Risks

Despite the implementation of safety measures, certain residual risks may persist. These include:

- Impairment of sensor functionality.
- Risk of collisions during complex manipulation tasks.
- Cybersecurity vulnerabilities.
- Unintended human interactions due to unforeseen circumstances.

Robotic manipulators are sophisticated technologies that demand correct usage to avoid accidents and ensure a secure environment. Please adhere to proper procedures diligently, prioritizing both precision and safety.

Autonomous Robot Safety

When deploying autonomous mobile robots, prioritizing safety procedures is essential to prevent accidents and ensure secure operations. The following guidelines outline key safety measures when working with an autonomous mobile robot:

Work Area Safety

Maintain a clean and well-lit work area. Cluttered or poorly illuminated spaces can impede the proper functioning of sensors and navigation systems.

- Avoid operating autonomous mobile robots in explosive atmospheres, such as areas with flammable liquids, gases, or dust. The robot's components may pose a risk in such

environments.

- Keep bystanders and unauthorized personnel at a safe distance during robot operation to prevent interference with autonomous navigation.

Electrical Safety

- Ensure the robot's power system adheres to electrical safety standards. Regularly inspect and maintain power components to prevent malfunctions.
- Implement mechanisms to protect the robot from adverse weather conditions, such as rain or wet environments.
- Regularly inspect power cables and connections and replace damaged components promptly to minimize the risk of electrical issues.

Navigation Safety

- Implement obstacle detection and avoidance systems to prevent collisions with objects, people, or other robots.
- Define and enforce safety zones within the robot's operational area to minimize the risk of unintended interactions with personnel or other equipment.
- Regularly calibrate and test the robot's navigation sensors and systems to ensure accurate and reliable performance.

Emergency Response

- Install an emergency stop mechanism to quickly halt the robot's operation in case of unforeseen circumstances or emergencies.
- Clearly mark and communicate emergency stop locations throughout the robot's operational area.
- Conduct regular emergency response drills to ensure personnel are familiar with procedures for handling unexpected situations.

Data Security and Privacy

- Implement robust cybersecurity measures to protect the robot's control systems and data from unauthorized access or manipulation.
- Ensure compliance with privacy regulations when collecting, storing, or transmitting data captured by the robot's sensors.

Human Interaction Safety

- Integrate sensors and communication systems to detect and respond to the presence of humans in the robot's vicinity.

- Clearly communicate the robot's operational status and intentions using visual and audible signals to alert nearby individuals.
- Establish protocols for safe human-robot collaboration, especially in shared workspaces.

Residual Risks

Despite the implementation of safety measures, certain residual risks may persist. These include:

- Impairment of sensor functionality.
- Risk of collisions in crowded or dynamic environments.
- Cybersecurity vulnerabilities.
- Unintended human interactions due to unforeseen circumstances.

Autonomous Mobile Robots (AMR) are advanced technologies that require correct usage to avoid accidents and ensure a secure environment. Learn and follow the proper procedures diligently; prioritize both quality and safety.

Danger: Critical Hazards: Fire Risk : Never operate outside specified temperature range (-20°C to +40°C) and humidity constraints. LiFePO4 batteries can be hazardous outside these conditions. Explosion Risk : Do not operate in explosive atmospheres with flammable liquids, gases, or dust. Crushing/Impact Risk : The Husky A300 does NOT have built-in obstacle avoidance. Maintain at least 10 meters distance from the robot when possible during autonomous operation.

Required Personal Protective Equipment (PPE)

When operating or working near the Husky A300:

- Safety Footwear : Steel-toed boots recommended when working near the robot
- Hearing Protection : Robot emits up to 80 dBA; hearing protection recommended for extended exposure
- Gloves : Required during maintenance and battery handling

Emergency Stop System

The Husky A300 features a dual emergency stop system:

Physical Emergency Stop:

- Two red mushroom buttons located at front and rear of the robot
- Pressing either button immediately disconnects drivetrain power
- To reset: twist both buttons clockwise until they pop out, then press the green Safety Restart button

Wireless Emergency Stop (Optional):

- Allows remote halting of the robot

- Automatically engages if communication with transmitter is lost
- Provides additional safety margin for autonomous operations

> **Warning:** The robot may begin moving immediately after pressing the Safety Restart button if motion commands are queued. Always ensure the area is clear before resetting emergency stops.

Operating Limits

Parameter	Safe Limit
Operating Temperature	-20°C to +40°C (-4°F to 104°F)
Maximum Curb Height	150 mm (approach at reduced speed)
Off-road Speed (No Payload)	1.5 m/s maximum
Off-road Speed (With Payload)	1.0 m/s maximum
Maximum Climb Grade	30°

Safe Operating Practices

- Place robot on blocks during initial testing to keep wheels clear of ground
- Start with slow speeds (0.1 m/s) while learning the controls
- Never cross the robot's path while it is moving
- Never place obstacles on the robot while in motion
- Keep clear of wheels during operation
- Use chock blocks on wheels when the robot is stationary
- Approach curbs at reduced speeds

12 Getting Help & RMA

RMA / Support

How to Raise a Return Merchandise Authorization (RMA) Case

At MYBOTSHOP, 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 the 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 an RMA Number

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 an RMA number along with a return address or a shipping label.

Important Shipping Information

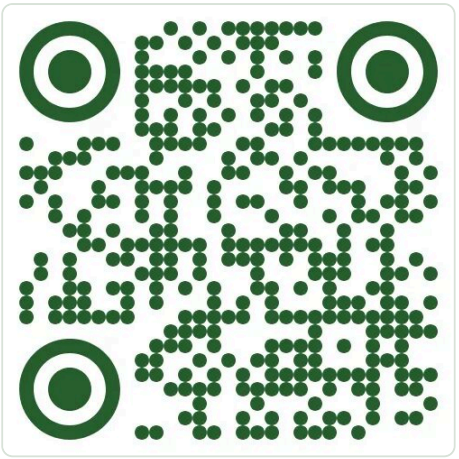
> **Note:** All goods must be sent back to the following address: MYBOTSHOP GmbH, Willy-Messerschmitt-Strasse 12, 50126 Bergheim, Germany. Do not ship goods without obtaining an RMA number — parcels sent without one will be declined and returned to the sender.

Resources

For your convenience, we have compiled the most important resources related to the robot platform. Each link can be accessed directly or by scanning the corresponding QR code.

Documentation

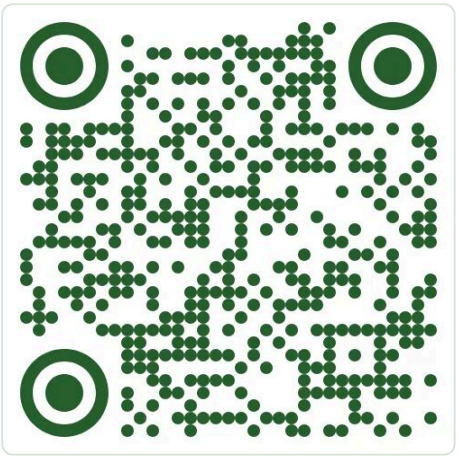
Our official documentation contains detailed setup instructions, usage guidelines, and troubleshooting information. Access the latest version here: https://docs.mybotshop.de/projects/robot_a300/html/



_images/qr_docs.webp

Forum

Stay informed about product updates, events, and special offers by subscribing here: https://www.mybotshop.de/Newsletter_1

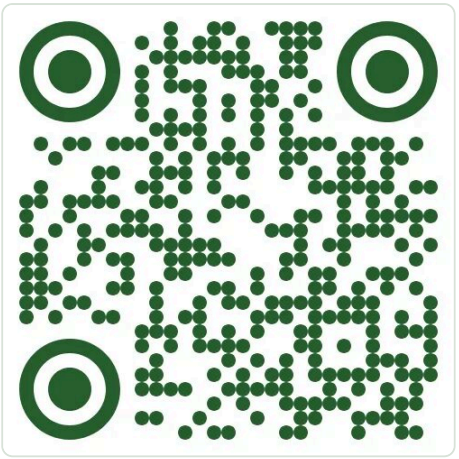


_images/qr_newsletter.webp

Contact Information

Forum

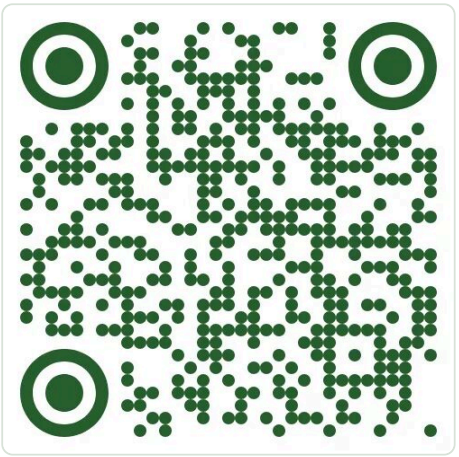
Connect with other developers and researchers in our community forum. Here you can ask questions, share experiences, and stay up to date: https://forum.mybotshop.de/



_images/qr_forum.webp

Rentals

If you would like to test or temporarily use a robot, we also offer rental services. Browse our available systems here: https://www.mybotshop.de/Vermietung_3



_images/qr_rentals.webp

Contact Information

- Sales 📞 +49 (0) 2271 588 93 10 | ✉️ sales @ mybotshop . de
- After Sales 📞 +49 (0) 2271 588 93 20 | ✉️ support @ mybotshop . de
- Accounting 📞 +49 (0) 2271 588 93 80 | ✉️ accounting @ mybotshop . de
- General inquiries 📞 +49 (0) 2271 588 93 0 | ✉️ info @ mybotshop . de

Frequently Asked Questions

...