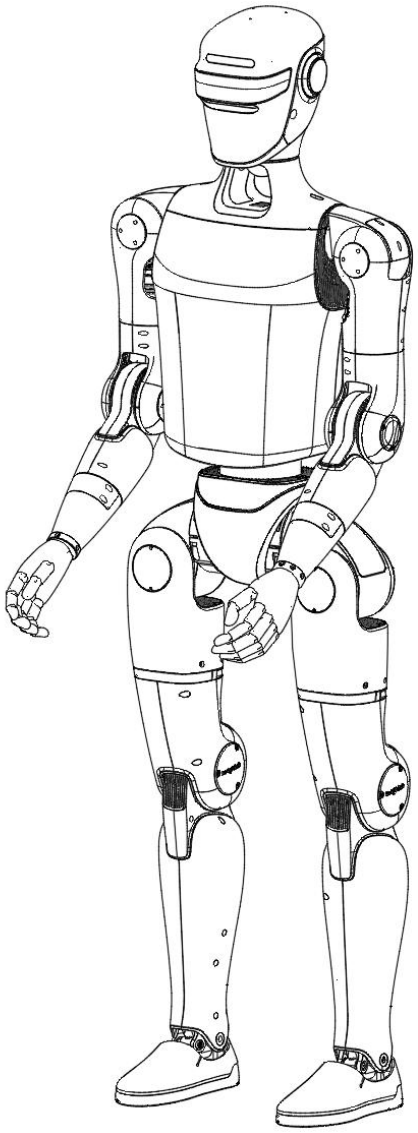
MagicBot Z1 Product Manual
V2.0



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This product is a civilian robot product. Please do not perform dangerous modifications or use the robot in a dangerous manner.

Please visit the official website of MagicLab to learn more about product-related terms and policies, and please comply with the laws and regulations of each region.

Manufacturer: MagicLabic Robot Technology (Wuxi) Co., Ltd. Manufacturing Address: No. 98 Jianghai West Road, Liangxi District, Wuxi City.

Disclaimer

To avoid illegal activities, potential harm, and losses, please ensure compliance with the following regulations:

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10. This user manual has included descriptions and instructions for all functions as comprehensively as possible during compilation. However, due to continuous improvement of product functions, design changes, etc., there may still be discrepancies with the product you purchased.

11. This user manual will be updated irregularly, and the latest user manual will include the latest content and images without prior notice.

12. This user manual may deviate from the actual product in terms of color, appearance, etc. Please refer to the physical product.

13. Magiclab has the final right of interpretation of the above terms and complies with relevant laws and regulations. Magiclab reserves the right to update, change, or terminate these terms without prior notice.

Safety Instructions

1. This product is not a toy and is not suitable for use by individuals under 18 years of age. Keep it out of reach of children, and exercise extra caution when operating in the presence of children.

2. You are obliged to be aware of the laws in your area and comply with relevant laws and regulations.

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3. This manual is the introductory chapter for new players to operate robots. New players can quickly master how to use the APP or controller to control robots by reading this section, enabling robots to demonstrate excellent motion performance. This manual is also a chapter that experienced players need to refer to frequently. Experienced players can grasp the essentials of operating robots by repeatedly referring to the content of this chapter, draw inferences from one instance, and be well aware of which actions are not recommended.

4. When users run their self-developed programs in developer mode: during high-level (application layer) development, remote control commands remain effective. At this time, if high-level API commands and remote control commands are sent to the robot simultaneously, the robot will execute both types of commands, which may cause the robot to become unstable. Please be sure to judge whether it is necessary to use the remote control based on the robot's operating status.

5. When using, please keep the robot within sight for control, maintain a certain safety distance from the humanoid robot, and do not touch the robot with your hands after it is powered on!

6. After the robot is powered on, if it needs to be in standby mode for an extended period, please hang it on the protective rack in a timely manner; when the robot is in motion, please keep the area around the robot clear or use a safety rope for traction to prevent it from accidentally tripping and hitting objects or people.

7. When the handling robot or machine is in motion, do not touch the robot. Pay attention to the joints, such as the knee joint, to avoid getting fingers pinched! When the last battery indicator flashes, please stop and turn off the robot in a timely manner, remove the battery for charging, and avoid damage caused by the robot falling to the ground due to low battery power!

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Product Overview

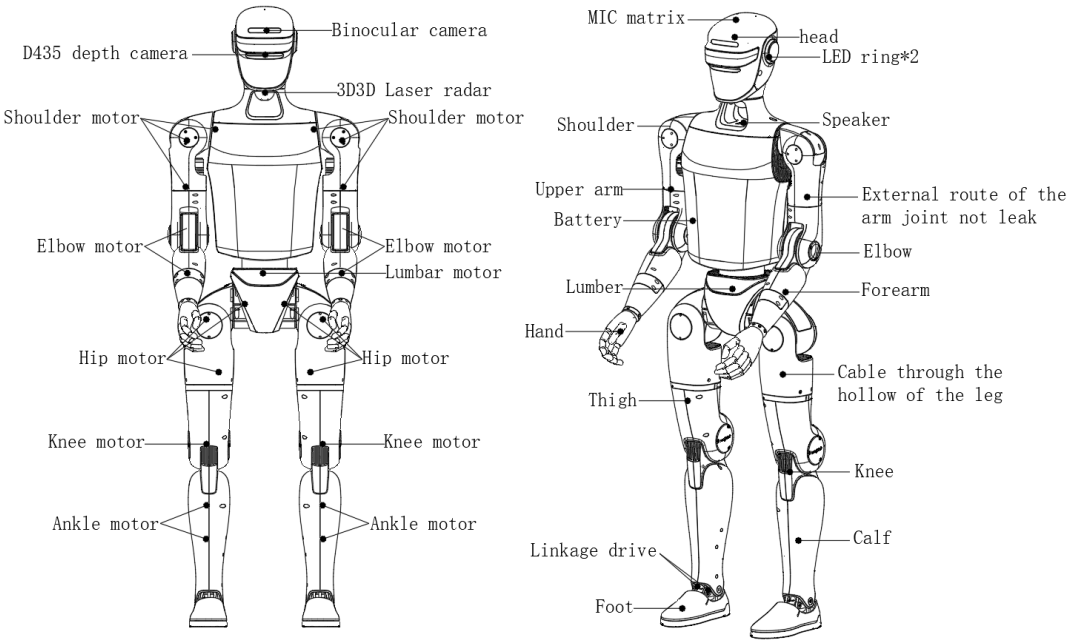
Introduction

Magicbot Z1 is a flexible and intelligent small humanoid robot capable of achieving highly dynamic full-body flexible movements. The entire Z1 robot has 24 degrees of freedom in its joints, with each leg and arm having 6 and 5 degrees of freedom respectively, endowing it with excellent motion flexibility. MagicBot Z1 is made of high-strength aluminum alloy and engineering plastic**,** enhancing the robot's anti-fall and anti-wear capabilities. MagicBot Z1 optimizes the overall structure and air duct design to keep the internal temperature within a suitable range at all times, ensuring

the robot's long-term stable performance output. It is equipped with an 8-core high-performance CPU, depth camera, 3D lidar, and binocular fisheye camera, supporting Wi-Fi 6 and Bluetooth 5.2 wireless communication to achieve efficient data interaction. The Z1 development version strengthens the expansion attributes on the basis of the basic version, with options for 24-50 degrees of freedom, optional installation of dexterous hands, high-performance computing power packs, and increased degrees of freedom in the arms. MagicBot Z1 is widely used in scenarios such as scientific research and education, exhibition and culture and tourism, commercial performance and entertainment, etc.

Component Name

The MagicBot Z1 whole body is divided into the upper body and the lower body, with multiple degrees of freedom. The head has 1 degree of freedom (Yaw). A single arm has 5+ degrees of freedom, including the shoulder-body joint, upper arm joint, elbow joint, and wrist joint (optional). A single leg has 6 degrees of freedom, including the hip joint, leg joint, hip joint, knee joint, and ankle joint. The waist has 1 degree of freedom (Yaw). Depending on the version, the whole body can be divided into the Z1 basic version with 24 degrees of freedom, and the Z1 development version with an optional 24 to 50 degrees of freedom. Having multiple joint motor degrees of freedom enables the robot to achieve precise motion and posture control. The MagicBot Z1_24 degrees of freedom humanoid robot body is shown in the figure below; please refer to the actual product for details.



Specification Parameters

The main specifications of MagicBot Z1 are as shown in the following table (* please refer to the physical product and contract deliverables for details):

Category	Specification Parameters	Z1	Z1 Developer Edition
Mechanical Parameters	Height, Width, Thickness (Standing)	1369*422*200mm	1369*422*200mm
	Height, Width, Thickness (Folded)	730*422*395mm	730*422*395mm
	Weight with battery	Approximately 40kg	Approximately 40kg+
	Total Degrees of Freedom (Number of Joints)	24	24 - 50
	Single-leg Degrees of Freedom	6	6
	Head Degree of Freedom	1	1
	Waist Degree of Freedom	1	1
	Single-arm degrees of	5	5 + (2 additional wrist degrees of freedom can be

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	freedom		selected)
	Degrees of Freedom of the Dexterous Hand	/	Optionally equipped with a 11-degree-of-freedom tactile dexterous hand
	Joint Output Bearing	Industrial-grade high-rigidity roller bearing (capable of withstanding 8.7KN impact force)	Industrial-grade high-rigidity roller bearing (capable of withstanding 8.7KN impact force)
	Joint Motor	Low inertia, high speed, high overload permanent magnet synchronous motor (control frequency 25kHz, high burst power, better heat dissipation)	Low inertia, high speed, high overload permanent magnet synchronous motor (control frequency 25kHz, high burst power, better heat dissipation)
	Maximum Knee Torque*	100N.m	130N.m
	Maximum Arm Load*	2kg	3kg
	Shank + Thigh Length	0.6m	0.6m
	Arm Span	Approximately 0.5m	Approximately 0.5m
	Range of Motion of the Head Z-axis Joint	±40°	±40°
	Range of Motion of the Lumbar Z-	±160°	±160°

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	Axis Joint		
	Range of Motion of the Knee Joint	0~152°、	0~152°、
	Range of Motion of Hip Joint	P±160°、R-30~+110°、Y±160°	P±160°、R-30~+110°、Y±160°
Electrical Characteristics	Joint Encoder	Dual Encoder	Dual Encoder
	Heat Dissipation System	Intelligent Air Cooling Heat Dissipation	Intelligent Air Cooling Heat Dissipation
	Power Supply Mode	15-cell battery	15-cell battery
	Basic Computing Power	8-core high-performance CPU	8-core high-performance CPU
	Perceptual Sensor:	3D LiDAR + Depth Camera + Binocular Fisheye Camera + Head Tactile Sensor	3D LiDAR + Depth Camera + Binocular Fisheye Camera + Head Tactile Sensor
	WiFi6, Bluetooth 5.2	has	has
	Microphone Array	has	has
	5W Speaker	has	has
Accessories	High Computing Power Module	None	Optional

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	Smart Battery (Quick Release)	10000mAh	10000mAh
	Charger	62V 5A	62V 5A
	Handheld Remote Control	has	has
Other	Endurance Time*	Approximately 2h	Approximately 2h
	OTA Upgrade	Support	Support
	Secondary development	None	has

1. Maximum torque, maximum arm load, endurance time, etc. are measured under laboratory conditions.

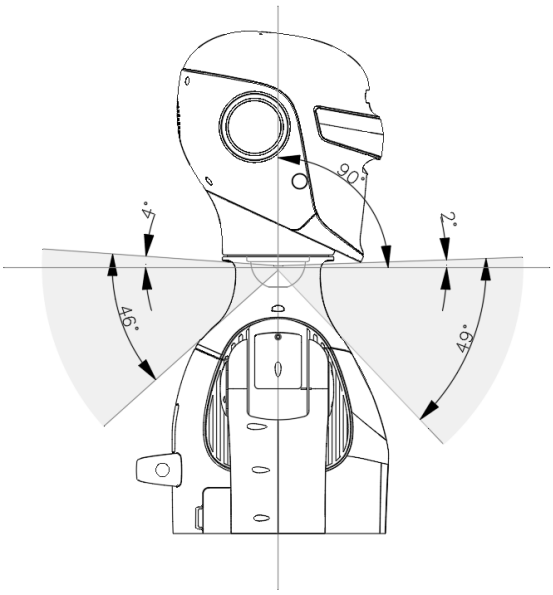
2. The above parameters may vary under different business scenarios and device configurations. Please refer to the actual usage experience.

Field of view of Z1 radar and camera:

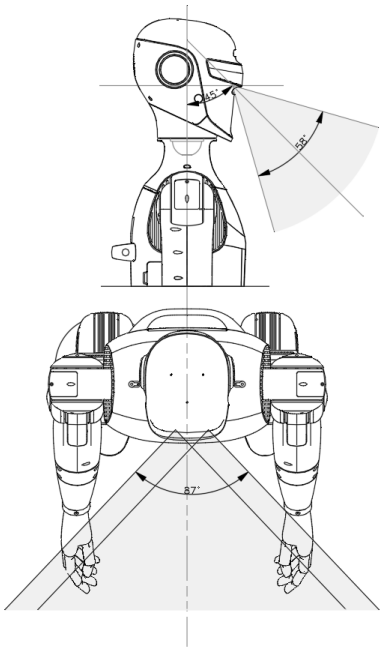
The Z1 head is equipped with a LIVOX-MID360 lidar, which provides the robot with excellent environmental perception capabilities. The lidar uses an all-round, full-angle scanning technology, with a horizontal FOV of up to 360° and a maximum vertical FOV of 49°, enabling it to obtain accurate environmental data in real time. It can quickly identify and measure surrounding objects, providing high-resolution point cloud data.

The Z1 head is equipped with a D435i depth camera (FOV horizontal 87°, vertical 58°) and a binocular fisheye camera (FOV horizontal 135°, vertical 75°). This provides the robot with excellent visual perception capabilities, enabling it to more accurately perceive and understand the surrounding environment, achieve precise spatial perception and obstacle detection, and allowing the robot to interact with the environment more intelligently and flexibly and handle various scenarios.

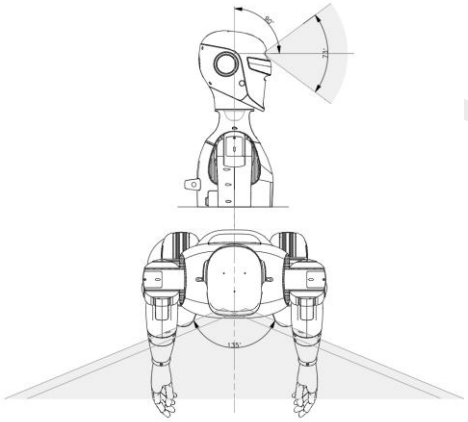
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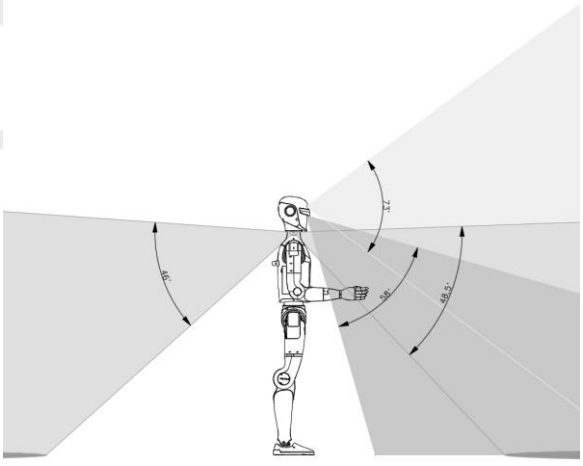
MID360 FOV



D435 depth camera FOV



Binocular camera FOV



MID360 and D435 depth camera and Binocular camera merged FOV

How to charge

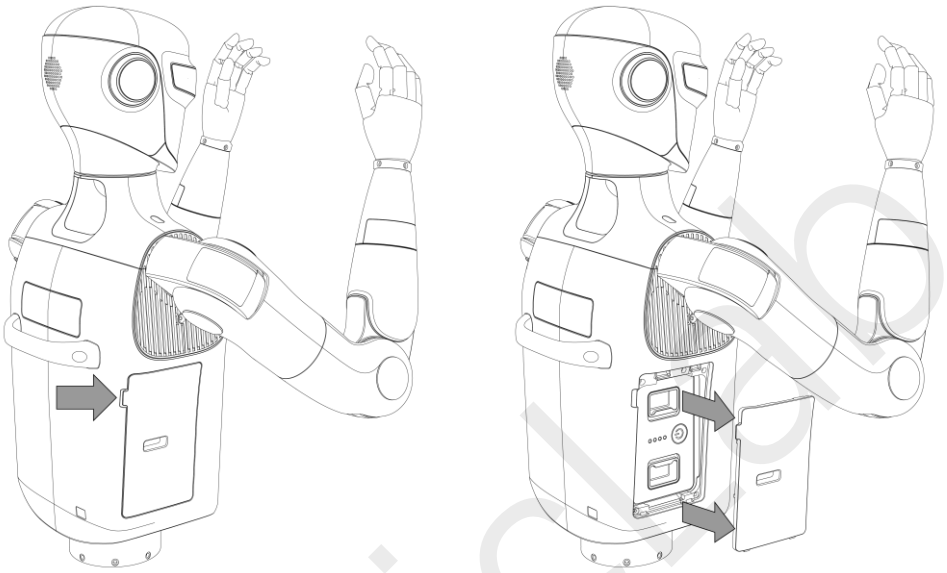
Due to reasons such as battery self-discharge during transportation and storage, it is normal for the battery level to be low or empty when used for the first time. Charge it in the following way

Electricity is sufficient.

Battery charging

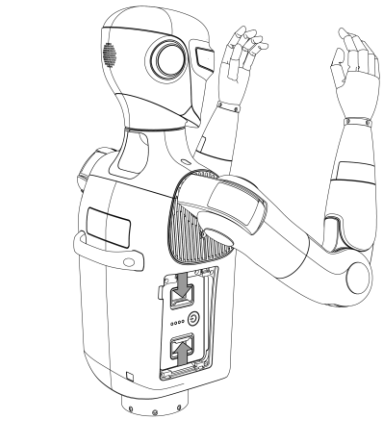
Open the battery front cover

As shown in the figure below, locate the front battery cover of the robot and pull it outwards.



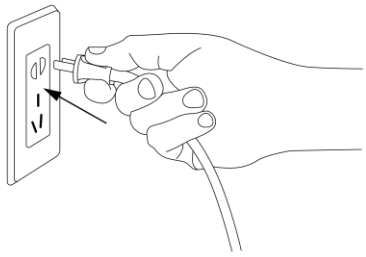
Remove the battery and charge it

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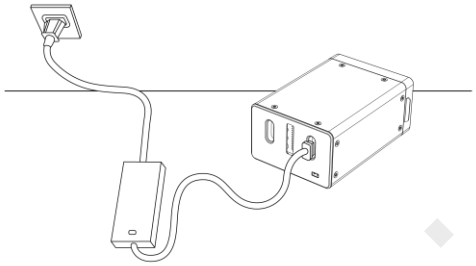
① Remove the battery from the Z1 body

(Press down on the two buckles of the battery pack with both hands)

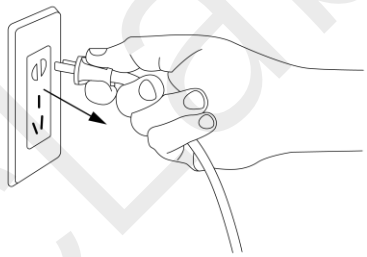


② First, plug the charger into the input AC power source

(100-240V, 50/60Hz)



③ Connect Z1 battery



④ Manually power off after fully charged

1. When charging the battery pack, it is necessary to remove the battery pack from the body.

2. Before charging the battery, first plug in the input AC power supply, then connect the charger to the battery.

3. Connect the charger to an AC power source (100-240V, 50/60Hz). Before connecting, ensure that the external power supply voltage matches the charger's rated input voltage

4. Match; otherwise, it may cause damage to the charger (the rated input voltage of the charger is marked on the charger nameplate).

5. Before charging the battery, please ensure that the battery pack is turned off; otherwise, it may damage the battery and charger.

6. When charging, the battery pack charge indicator will flash at a frequency of 1Hz (1 second per flash) to indicate the current charging progress.

7. When the 1st, 2nd, 3rd, and 4th lights are lit, the corresponding battery levels are 25%, 50%, 75%, and 100% respectively;

8. When all battery indicator lights are on, it indicates that the battery pack is fully charged. Please disconnect the power supply to complete the charging.

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9. When ending charging, you need to first disconnect the AC power supply, and then disconnect the charger from the battery.

10. After the robot finishes running, the battery pack temperature may be high. It is necessary to wait until the battery pack temperature drops to room temperature before charging the battery pack.

Charging Precautions

	Please only use the original charger provided by our company for charging, and do not use chargers from other brands!
	For safety reasons, MagicBot-Z1 does not support direct wired charging on the main body.
	The charger is not waterproof, so it should be placed in a dry environment. Do not use the charger to charge in environments with excessively high or low temperature and humidity.
	When charging the battery, be sure to place it within sight to prevent any unexpected incidents.
	During the charging process, the charger may become hot, so please handle it with care when touching.
	Please place the battery and charger in a flat, dry area away from direct sunlight, and keep them away from high temperatures, magnetic fields, electrostatic fields, and any flammable or explosive items. Do not use the charger if the indoor temperature is below -5°C or above 40°C.
	It is recommended that after the robot has been used, wait for it to cool to room temperature before charging to extend the battery life.
	To ensure battery life, please fully charge at least once every three months.
	When the battery level of MagicBot-Z1 drops below 20%, it is recommended to turn off the robot and charge it.
	Do not charge for an extended period to avoid accidents such as battery overheating and fire.
	When the battery is fully charged, charging should be stopped promptly to prevent the battery from being locked and unable to discharge.

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	During the charging process, if any abnormal odor, smoke, overheating, color change, or shape deformation is detected, please immediately disconnect the charger and stop using the robot.
	If the battery leaks and electrolyte accidentally gets into the eyes, do not rub the eyes with hands. Instead, immediately rinse the eyes with plenty of clean water and seek medical attention as soon as possible.

Remote control charging

The remote control is charged via a Type-C charging cable.

Power Status	**Indicator Light Effect Prompt**
Battery level is less than 20%	Red Flash Prompt
Charging	Red breathing (slow flashing)
Charging completed after power-on	Red always on
Shutdown charging completed	The red light stays on constantly for 7 seconds and then goes out

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Instructions for Use

Environmental Requirements for Use

1. Operate in an environment with good weather conditions at 0°C - 40°C. Do not operate in adverse weather conditions such as fog, snow, rain, thunder and lightning, sandstorms, gales, tornadoes, etc. The robot is not waterproof, so do not operate it when the ground is wet, in rainy or snowy weather, or in a humid environment! The robot is not dustproof, so do not operate it on gravel ground or in a dusty environment!

2. When in use, please keep the robot within sight for control, ensuring that the robot maintains a safety distance of at least 2 meters from obstacles, cliffs, complex terrain, crowds, water surfaces, and other objects at all times.

3. Do not operate the robot in an environment with electromagnetic interference. Sources of electromagnetic interference include, but are not limited to: high-voltage power lines, high-voltage power transmission stations, mobile phone base stations, and television broadcast signal towers.

4. Please do not operate the robot in an environment with Wi-Fi signal interference. Wi-Fi signal interference is usually caused by co-channel interference. When interference occurs, be sure to turn off some or all Wi-Fi signal sources of other wireless devices, and then operate the robot using the remote control.

5. Since the proficiency levels of actual operators vary, for the sake of reliability and safety, please use the robot in an open, unobstructed, and flat ground environment. When the robot needs to walk on complex ground or terrain with certain undulations and slopes, the operator should reduce the robot's walking speed and operate it carefully to prevent the robot from tripping over obstacles. Note: The robot does not support standing on slopes (slope parking).

6. Humanoid robots have certain requirements for the walking surface. Do not use the robot on surfaces with very low friction, such as ice. Do not use the robot on soft surfaces, such as thick sponge floors. If using on relatively smooth surfaces, such as glass or tile floors, please carefully and gently operate the robot during movement, avoid strenuous exercise, and reduce the robot's walking speed to prevent the robot's feet from slipping and falling.

Unboxing

Place the box on a flat surface according to the placement requirements (with the front side facing up), then open the upper box and lift the robot out as a whole. Take out the humanoid robot, remote control, charger, wireless emergency stop, etc. separately from the box, lay the humanoid robot flat on a flat surface, and then prepare to turn it on.

Pre-start inspection

1. Only genuine MagicLab parts are used, and all parts are guaranteed to be in good working condition.

2. Ensure that the firmware, etc., has been updated to the latest version.

3. The user shall ensure that they are not operating the robot while under the influence of alcohol, drugs, or in a state where they are unable to concentrate.

4. Familiarize yourself with the characteristics of each gait pattern. Familiarize yourself with the emergency braking method in case of robot instability or loss of control.

5. Ensure that there are no foreign objects (such as water, oil, sand, soil, etc.) inside the robot and its components.

6. Ensure that the remote control module and battery pack have sufficient power.

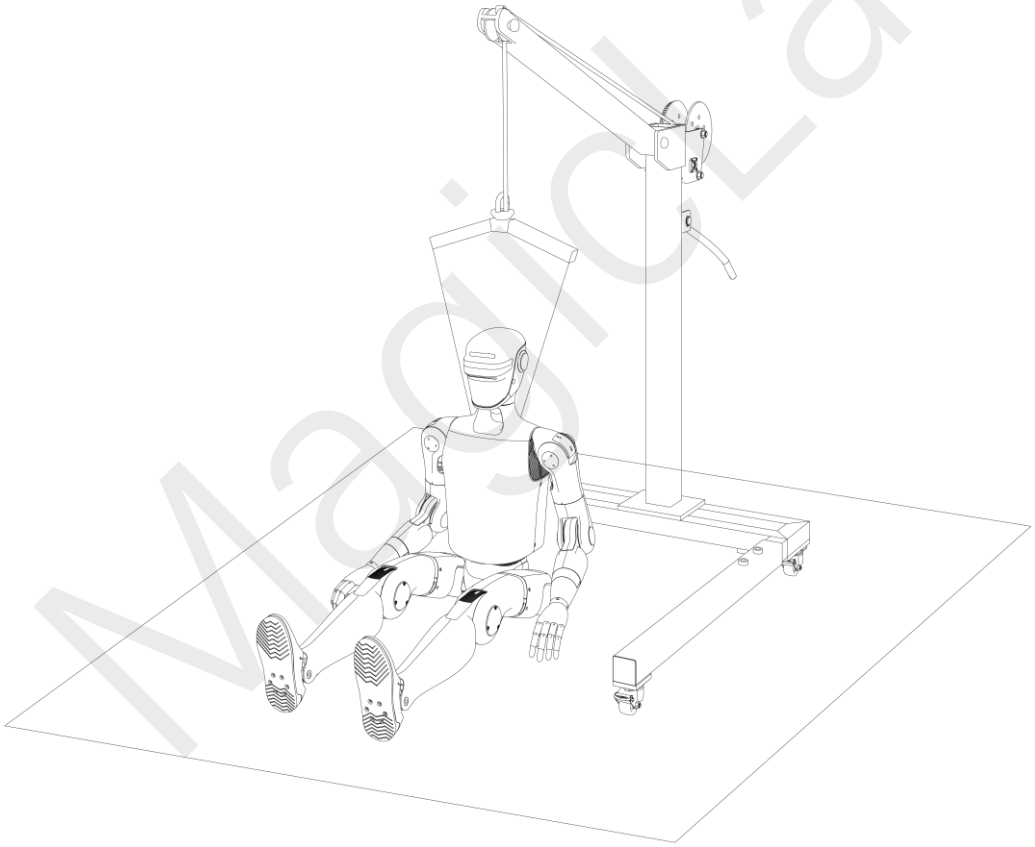
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7. If a protective support is used, check whether the protective support is correctly installed and whether the bottom universal wheels are locked.

Hang and Power On

(1) Preparation before starting the machine

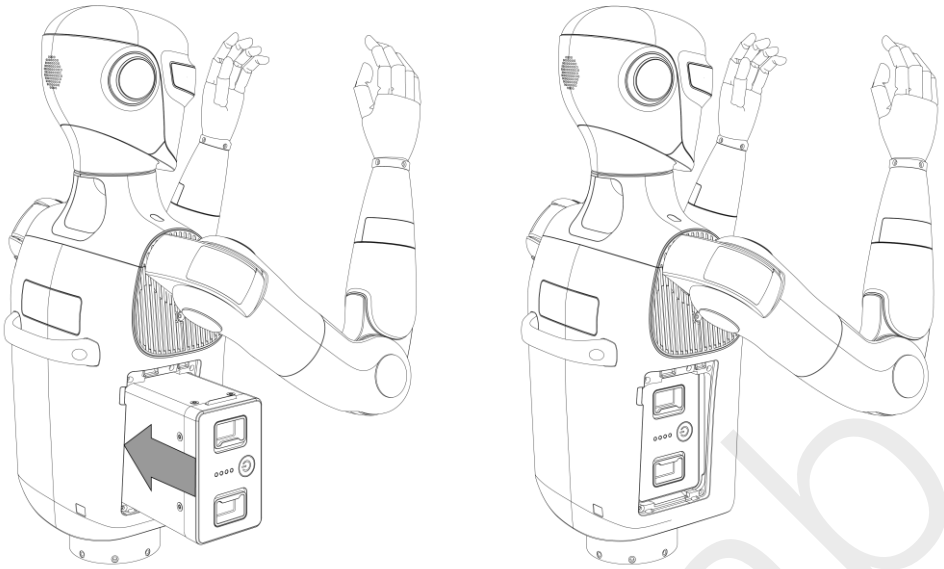
Please place Z1 stably on the ground, thread the rope through the dedicated hanging buckles on both shoulder positions, and securely tie a knot. Hang the rope onto the hanging buckle of the protective frame, and gradually raise Z1 by adjusting the support to ensure that the robot's body is completely suspended and its feet do not touch the ground.



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(2) Install the battery pack

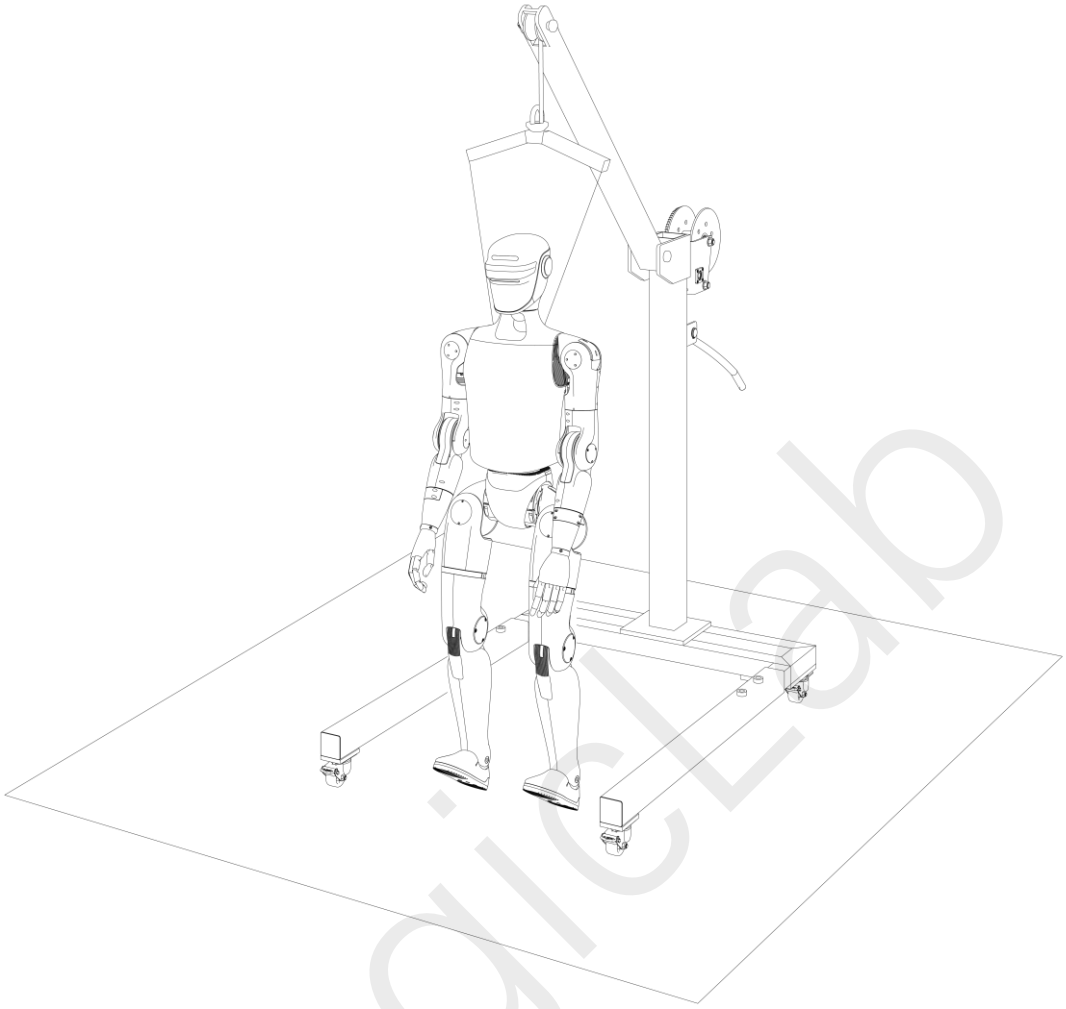
Insert the battery into the battery slot from the side of the robot, paying attention to the installation direction. The power on/off button should face the back of the robot. If the battery pack cannot be fully inserted, adjust the direction of the battery pack. Do not forcefully press it to avoid damaging the battery interface and the buckle. When you hear a "click~" sound, the battery pack installation is complete. Please ensure that the buckle is properly engaged!



(3) Body Placement

Control the hanger to lift the robot, ensuring that the robot's feet are off the ground. Naturally position the arms and legs, making sure that the joints are not entangled.

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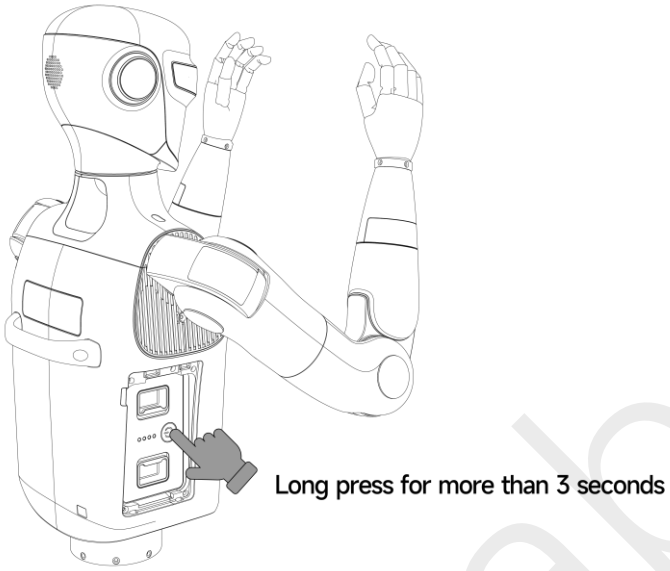


(4) Start on Boot

After the robot has completed pre-boot inspection and preparation requirements and is properly positioned, press and hold the power on/off button on the battery for more than 3 seconds. After the battery power indicator flashes, the robot can be turned on.

Note: For safety reasons, the robot does not support remote power on/off.

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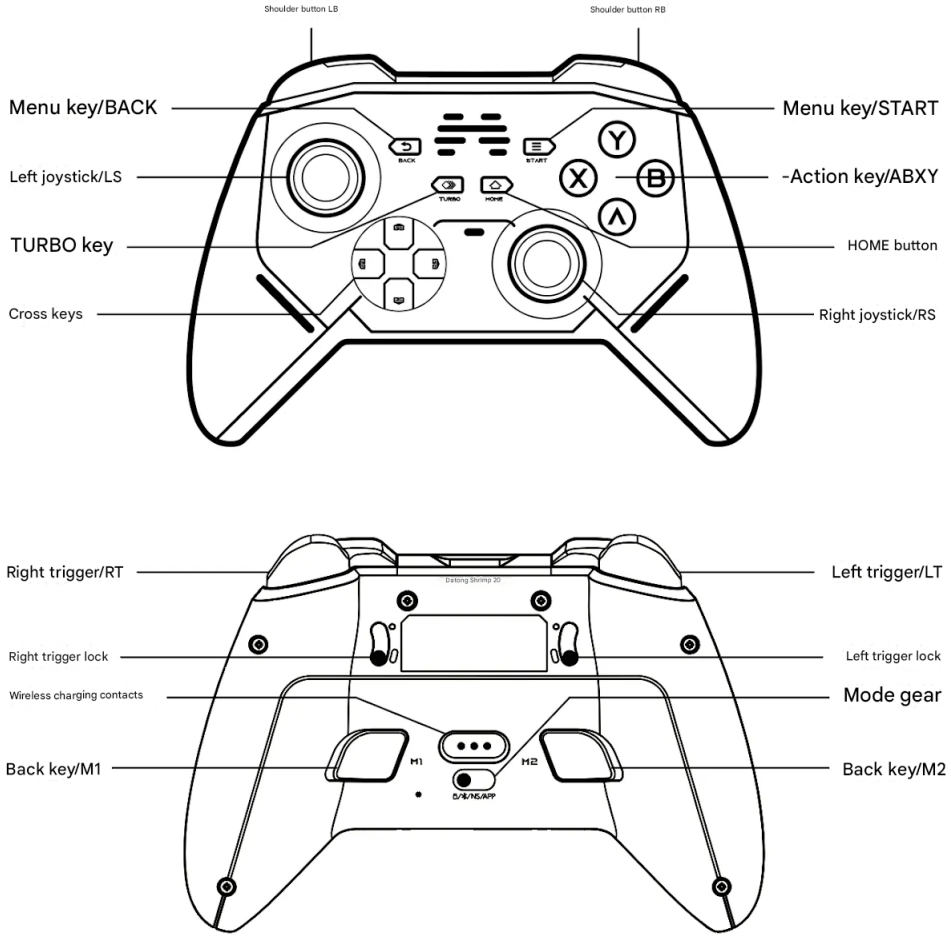


(5) Startup successful

The entire startup process takes approximately 1 minute. After the battery starts, please wait patiently. Wait for the robot's voice to announce the self-check information "Self-check completed", which indicates successful startup.

(6) Remote Control Pairing

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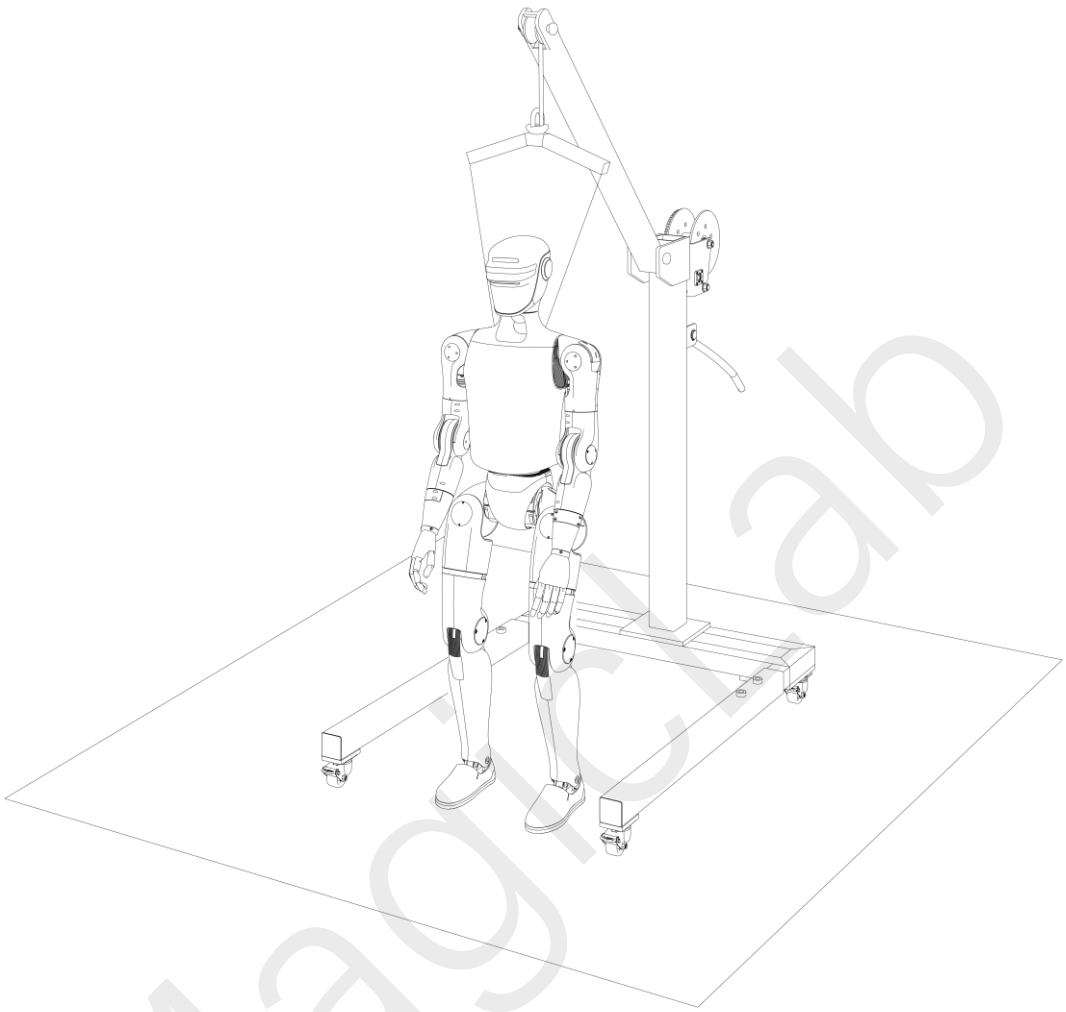
The remote control buttons are shown in the figure above. Press the Home button to turn on the remote control. Bring the remote control close to the robot for automatic pairing. If pairing is successful, the remote control will vibrate once; if pairing fails, the indicator light will flash red rapidly. Press the Home + Start buttons to enable the remote control to operate the robot.

Note: The remote control is paired and communicates with the robot via 2.4G, and the corresponding indicator light is red. If other colors such as yellow, blue, or green appear, the mode gear of the remote control is incorrect. You need to push the mode gear to the leftmost position on the reverse side, as shown in the button schematic diagram.

(7) Stand in place

Press the LT + RT + A combination on the remote control. It is observed that both the

legs and hands of the robot have small joint displacements, and the limbs will slowly enter the standing state in place, as shown in the figure below.



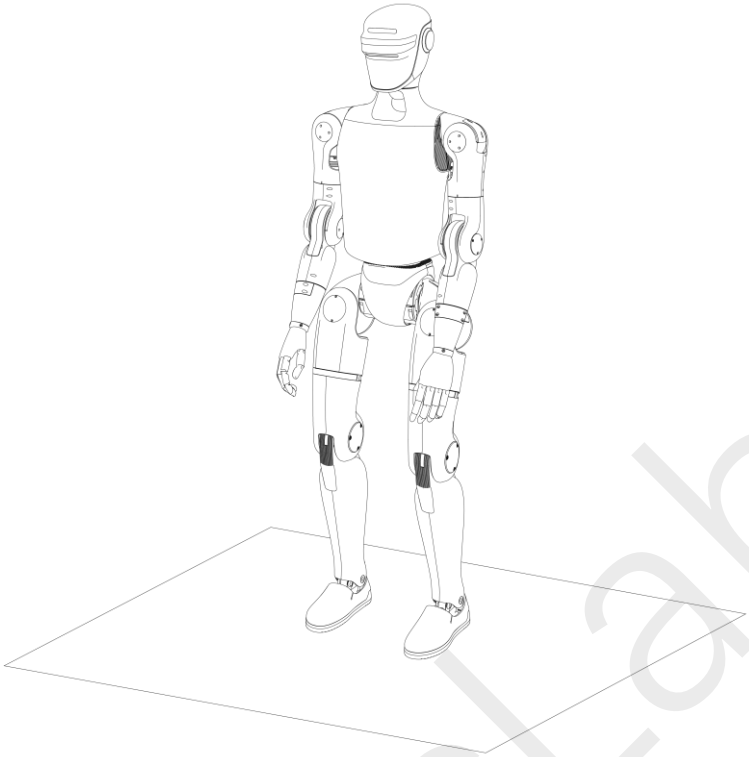
(6) Lower the suspension rope

After the robot enters the standing state, lower the suspension rope to make the Z1 biped touch the ground. After standing, observe whether the robot's standing is balanced. If there are no abnormalities such as shaking or tilting forward, backward, left, or right, then the standing is balanced. Press the LT + RT + X combination keys on the remote control, and the robot enters the anthropomorphic walking mode.

(7) Untie the suspension rope

After Z1 stands stably, the protective frame hook can be fully released. At this time, the left joystick of the remote control can be used to move Z1 forward and backward.

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APP Connects to Robot

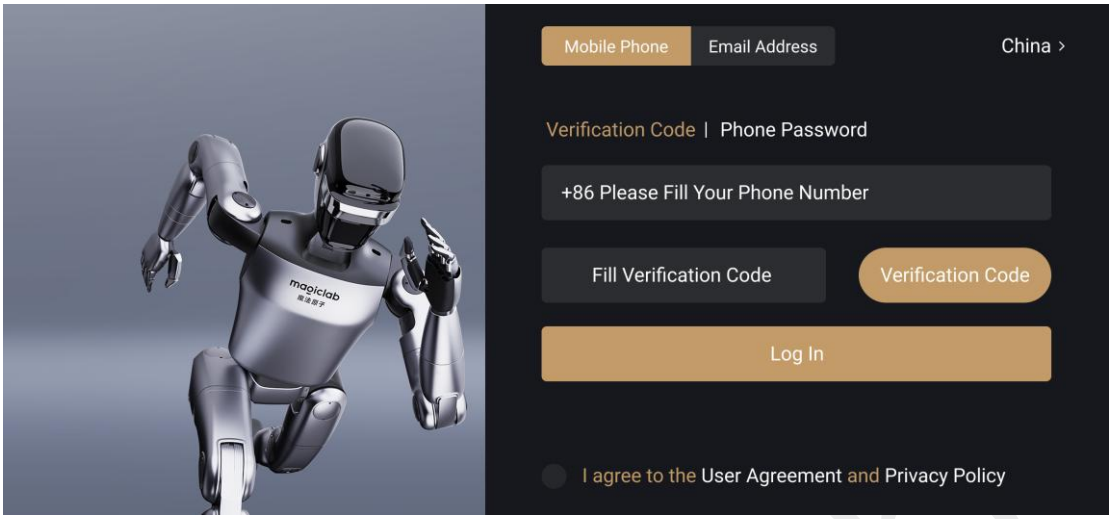
APP Download and Registration

Android users can enter the app market to search for MagicBot Z1 or scan the QR code on the left, while iOS users scan the QR code on the right, download the software, and register and log in (registration with a mobile phone number is sufficient).

Android APP

IOS APP

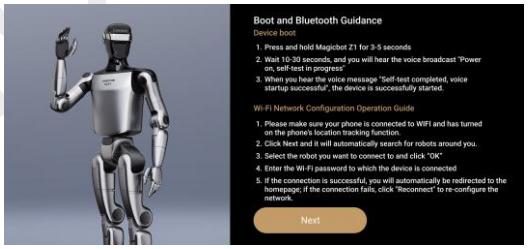
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APP connects to the robot for network configuration for the first time

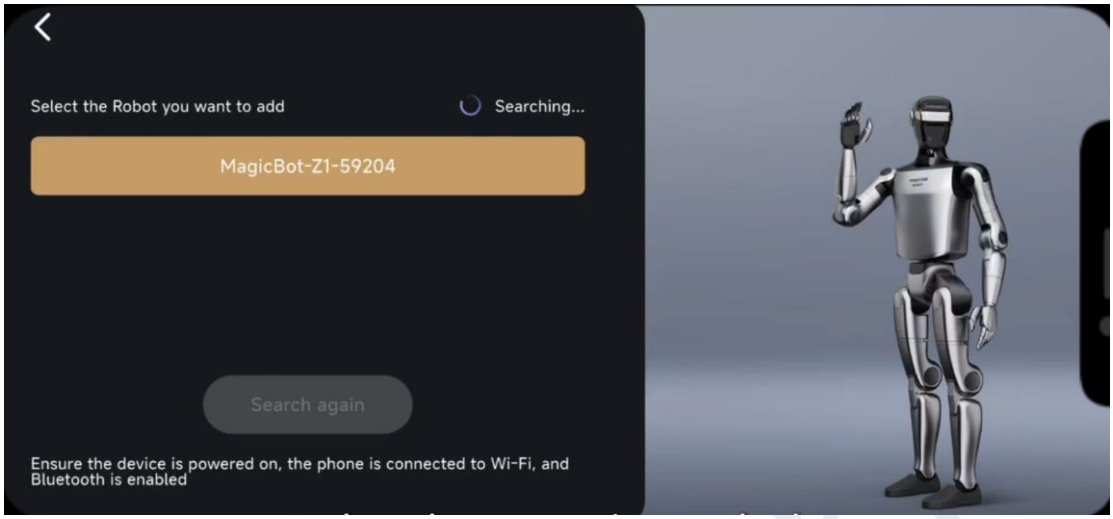
- Connect your phone to a stable Wi-Fi network that can access the Internet, and turn on your phone's Bluetooth;
- When using for the first time, you need to add a device first. Click "Add Device", and turn on the robot's Bluetooth via voice, saying "Xiaomai Xiaomai, turn on Bluetooth". The robot will respond that it has been turned on.



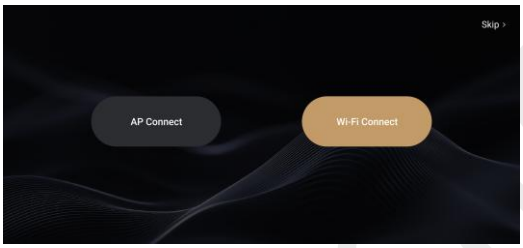


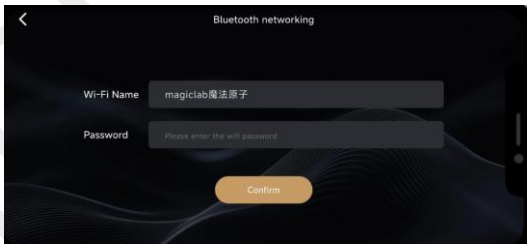
- Click "Next", and it will automatically search for nearby robots. Click "Add" to successfully add the device. After the page pops up "Device binding successful", the robot is successfully bound;

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- Click the "Wi-Fi Connection" option, enter the Wi-Fi network configuration page, enter the password of the stable Wi-Fi connected to your phone, and when you hear the robot's voice saying "Bluetooth turned off", the robot's network configuration is successful;

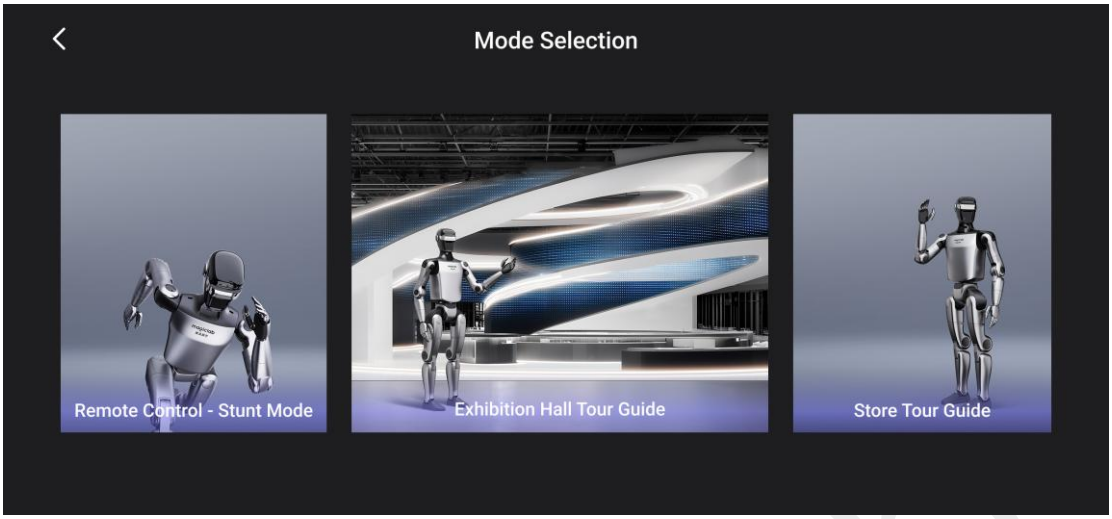




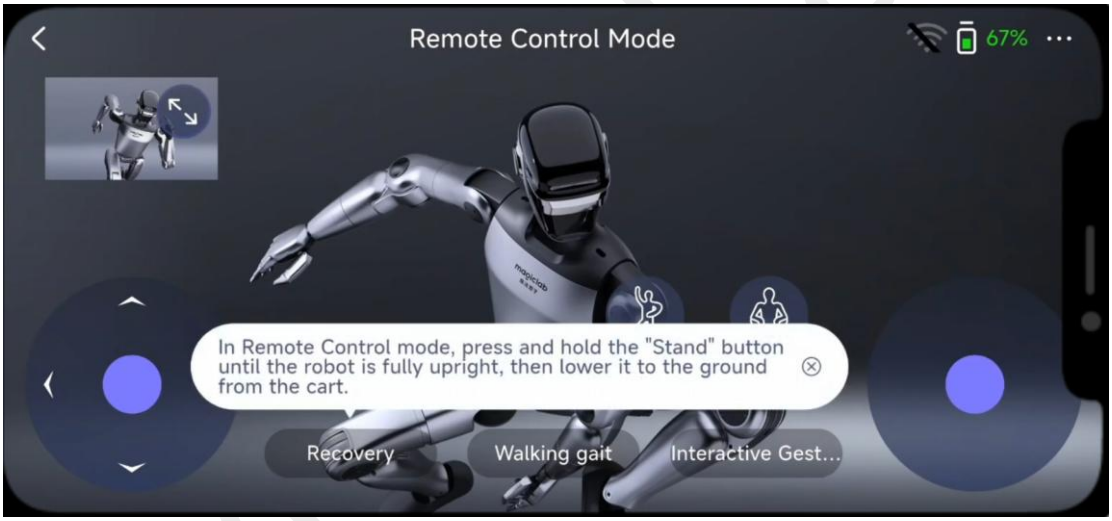
After connecting to WiFi, enter the main page of the APP, as shown below:



- Click "Mode Selection" and select the Remote Control Stunt Mode, as shown in the figure below.



After entering the remote control stunt interface, long press the "Stand/Reset" button. Observe that both the robot's legs and hands have small joint displacements, and the limbs will slowly enter the standing state; (Before clicking the stand button, the robot must be fixed on the protective bracket)



- Control the protective support to slowly descend, lower the robot to stand on the ground. After standing, observe whether the robot's standing is balanced. If there are no abnormalities such as shaking, tilting forward, backward, left, or right, then the standing is balanced.

Control Your Z1

Note: It is recommended to use the robot under the protection of the support bracket throughout the process before you are proficient in operating the robot.

Walking Mode Switching

Remote control mode

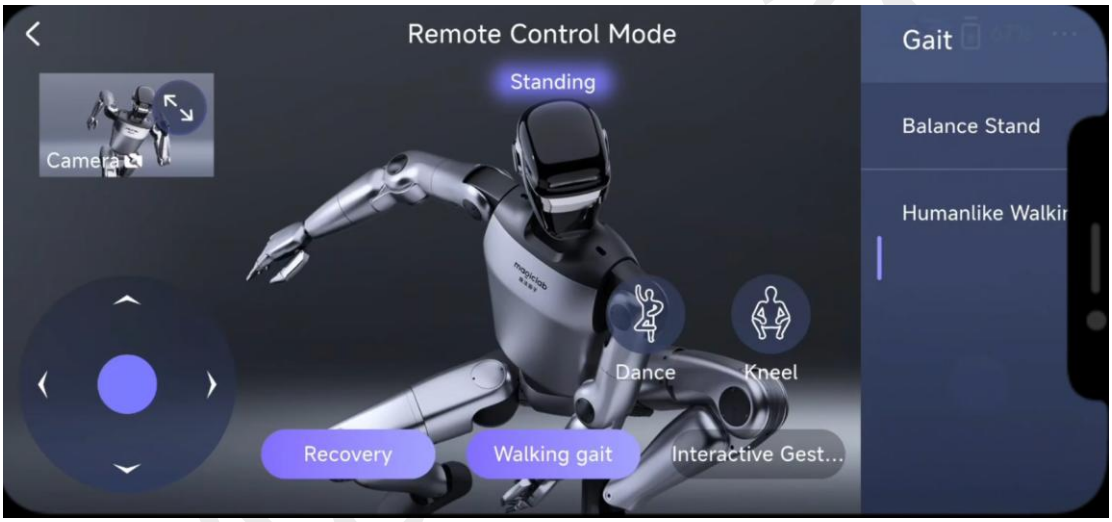
- Confirm that the robot is in a standing position and has landed on the ground;
- Press the LT + RT + X combination on the remote control, and the robot enters the anthropomorphic walking mode. In this mode, the robot walks slowly with its arms swinging.

Pushing the left joystick forward moves the robot forward; pushing the right joystick left rotates the robot left; pushing the right joystick right rotates the robot right. Note: For safety reasons, the robot does not support backward or lateral movement.

APP Mode

Confirm that the robot is already in a standing state;

Click the gait button to switch between two gaits: posture display and anthropomorphic walking.

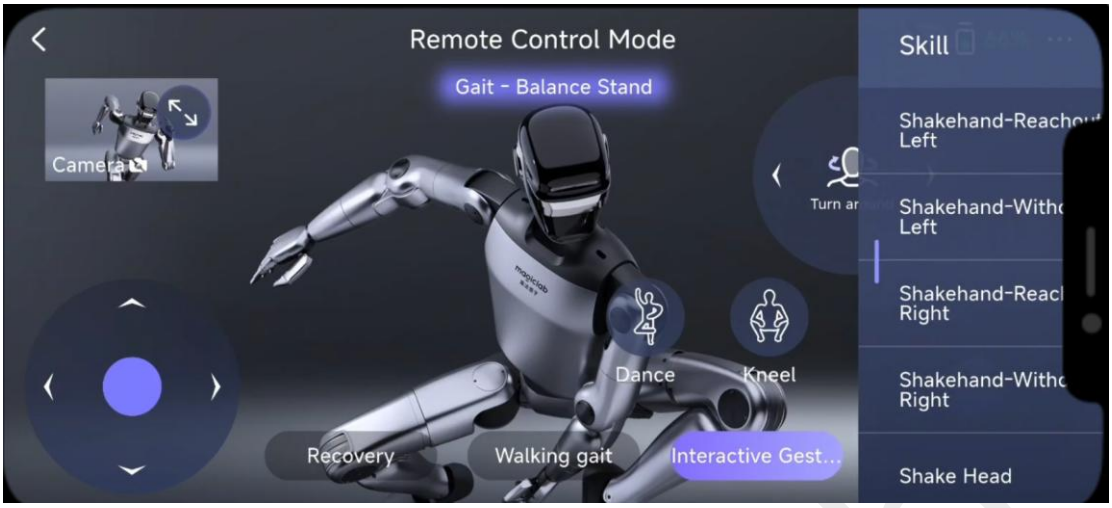


Pushing the left virtual joystick forward moves the robot forward; pushing the right virtual joystick left rotates the robot left; pushing the right virtual joystick right rotates the robot right. Note: For safety reasons, the robot does not support backward and lateral movement.

Stunt Action Display

Click the gait button to switch to posture display;

In the pose display mode, click the stunt button, and corresponding interactive gestures can be performed as needed.



Note: Remote control stunts are still under continuous development and improvement, and more and more new stunt actions will be opened to users in the future.

Stop and return to the standing state

Remote control mode

In the posture display mode and anthropomorphic walking mode:

- The remote control robot remains in a stopped state;
- Press the LT + RT + A combination on the remote control, and the robot enters the standing state.

APP Mode

In the swinging arm walking and anthropomorphic walking modes:

- When the up, down, left, and right virtual joysticks of the APP stop being moved, the robot remains in a stopped state;
- Long press the "Stand/Reset" button on the APP, and the robot will enter the standing state.

Emergency Stop Method

Wireless Emergency Stop Button

In the event of the following emergency situations, it is necessary to promptly press the wireless emergency stop button, which will disable the joints of the robot. At this time, the joints will be powered off, and the robot will be unable to maintain any posture, immediately collapsing and falling:

- The robot is smoking or has a burning smell;

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- Water or other foreign objects have entered the robot;
- The robot is out of control and cannot be stopped via the remote control or other means;
- Robot damage may lead to further danger;
- Emergency avoidance, such as loss of control during high-altitude operations or in a hazardous environment;
- Sudden changes in the external environment, such as earthquakes, fires, etc.

Suspend Shutdown

Remote control mode

- Press the LT + RT + A combination on the remote control to make the robot enter the standing state;
- Rehang the robot onto the protective frame, ensuring that the robot is in a stationary state (the robot's position is in the initial state after successful startup, with no operation on the handle, and in the state of static standing), and the rope exerts tension on Z1.
- Long press the robot battery button (about 3 seconds), the power status light flashing indicates that the robot is in the shutdown process, and when the power status light goes out, it indicates that the robot has completed the shutdown and power-off process.

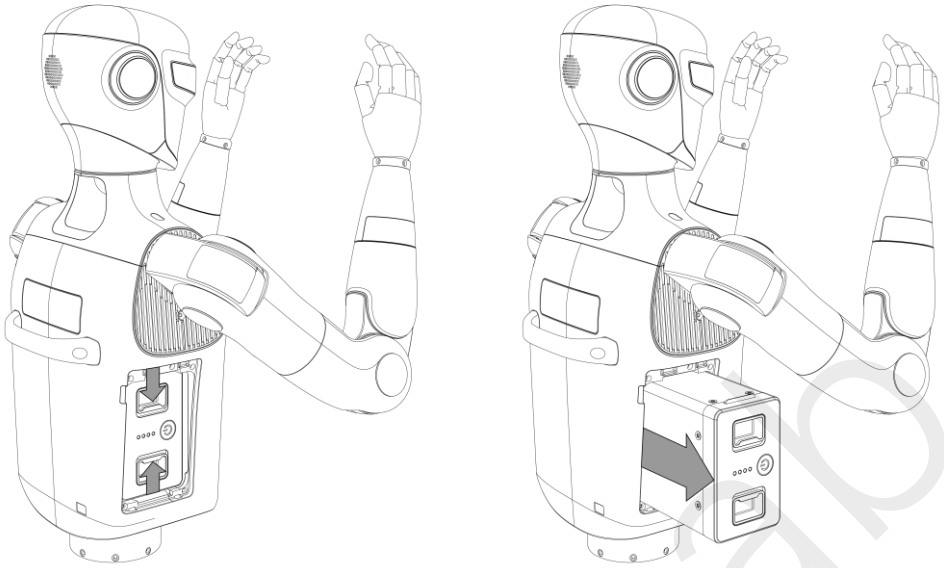
APP Mode

- Long press the "Stand/Reset" button on the APP, and the robot will enter the standing state;
- Rehang the robot onto the protective frame, ensuring that the robot is in a stationary state (the robot's position is in the initial state after successful startup, with no operation on the handle, and in the state of static standing), and the rope exerts tension on Z1.
- Long press the robot battery button (about 3 seconds), the power status light flashing indicates that the robot is going through the shutdown process, and when the power status light goes out, it indicates that the robot has completed the shutdown and power-off process.

After turning off the power, please position the robot arm joint limiters and foot joint limiters according to the requirements for the body placement to prepare for the next power-on. If the Z1 will not be used for an extended period, please promptly remove the battery pack: press the battery pack bayonet with both hands to remove the

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battery.



Packing

Packing Steps:

1. Hang the Z1 robot vertically and prepare the matching shipping container.

2. Lift the thigh and calf of the Z1 robot, fold them back until they are level with the waist, and please pay attention to the direction.

3. Slowly lower the suspension rope so that the buttocks of the Z1 robot enter the transport box first, and then move it to the corresponding side of the transport box.

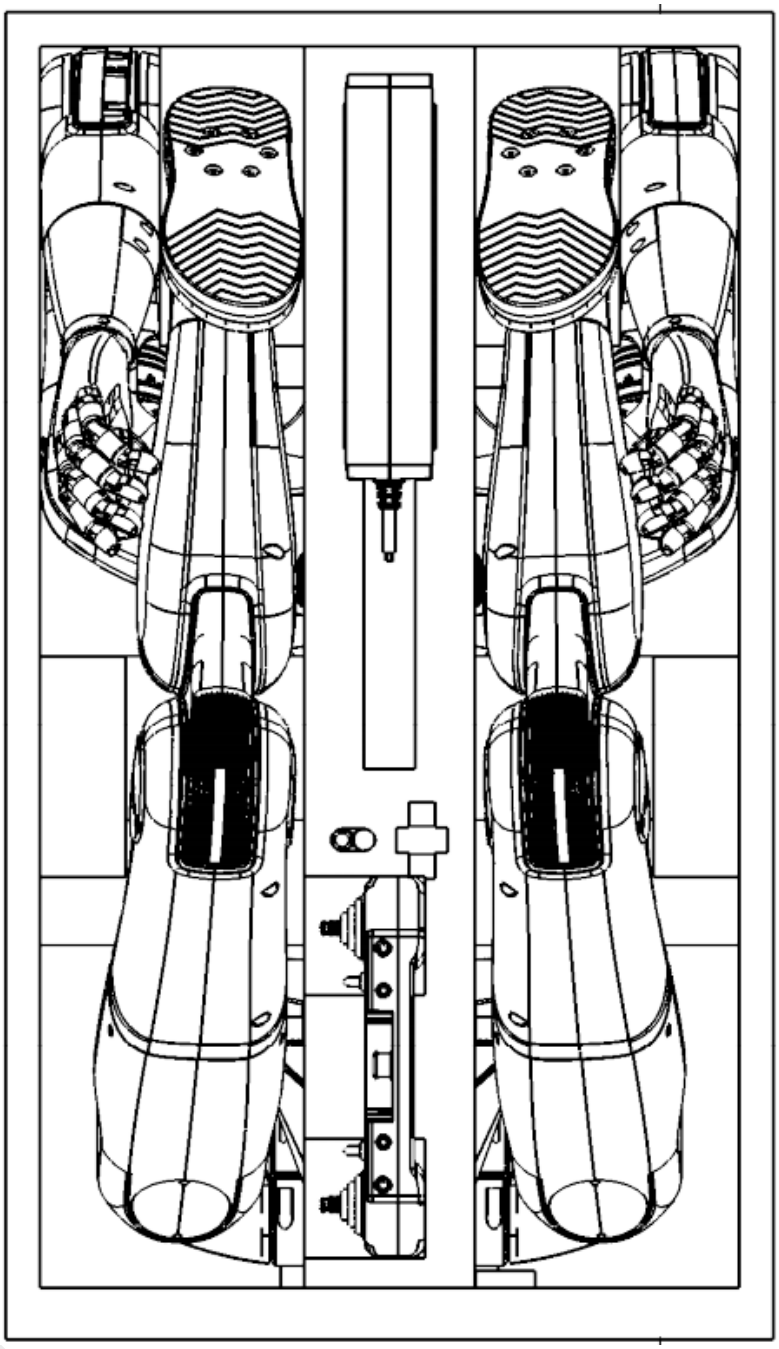
4. Place the Z1 head and chest down, lying flat in the box, and please pay attention to the orientation.

5. Place the robot arms on both sides of the body, with the wrists rotated vertically to ensure they can fit into the box.

6. Fold the leg back towards the body and place it inside the box, with the sole of the foot and calf fitting snugly against the lining.

7. Ensure anti-collision buffering for all contact surfaces of the robot, place relevant accessories such as the remote control, charger, etc., complete the packing, and note not to omit placing the square inner liner in the middle of Z1.

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Troubleshooting

When an abnormality occurs during product operation, please refer to the following table to troubleshoot the issue.

Fault Phenomenon	Cause of Failure	Solution
The robot fails to start up normally	Battery is depleted	Check if the battery level is normal

The remote control cannot control the robot to stand normally	① Check if the battery level of the remote control is normal. ② When the robot is powered on, the power supply to all body joints will be stiff; wait for the stiffness to end and become soft.	Press the LT + RT + A combination on the remote control or long press "Stand/Recover" in the APP, and the machine will slowly enter the standing state
Robot zero position attitude is incorrect	The original calibration data was accidentally lost, or the zero position shifted due to accidental impact during operation or transportation	Contact the after-sales engineer for zero calibration
The robot has no sound or low volume	Speaker Volume Adjustment	Find the volume function through the settings button in the upper right corner of the APP to adjust the volume
APP cannot connect to the robot	No communication between the phone and the robot	Connect the phone to the robot's Wi-Fi

If you encounter other usage anomalies, please contact the after-sales engineer for professional support. (Contact phone: 400-828-8022, Contact email: contact@magiclab.top)

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Warnings and Precautions

1. Regarding battery life: The robot's comprehensive operating battery life is approximately 2 hours, specifically depending on the actual operating conditions of the robot. For example, long periods of walking at a relatively fast speed, long periods of intense adjustment of the robot's body posture while standing, the robot standing with bent legs, operating under load, walking at a lower body height, and operating on terrain with appropriate undulations and slopes, etc., will all reduce the battery life.
2. Regarding uneven terrain: When the robot is walking on complex ground or

terrain with certain undulations and slopes, the operator should reduce the robot's walking speed and operate it carefully to prevent the robot from tripping.

3. Regarding speed: Under stable control on flat terrain, the moving speed is 2.5 m/s, which is achieved under special configuration. In practice, speed will be limited for safety reasons. Please stay away from crowds when controlling it to run!

4. When the robot is in motion, please keep the surrounding area clear. Try to use a tow rope or a protective frame for protection to prevent tripping that may cause damage to the robot, surrounding personnel, or items. Do not touch the robot during motion or transportation! Be careful of getting your fingers pinched at joints, such as the knee joint.

- Do not place MagicBot Z1 in high-temperature environments, including but not limited to open flames, electric heaters, radiators, and direct sunlight, to avoid hazards such as fire and electric leakage.
- Do not disassemble, repair, or modify the robot's hardware or software by yourself.
- Do not squeeze, deform, bend, drop, burn, or heat the robot.
- Do not allow the robot to get wet. The operating humidity environment for MagicBot Z1 is 20%-80%.
- Do not place the robot in a dusty, sandy, or other particulate or dusty environment.
- Do not allow children under 14 to approach MagicBot Z1 without the accompaniment of a guardian.
- Do not shake MagicBot Z1, as it may fall and cause you injury.
- Do not use optical devices to view the lidar of MagicBot Z1.
- Please keep the surfaces of the lidar, camera, and sensors of MagicBot Z1 clean to prevent MagicBot Z1 from malfunctioning due to dust.
- Do not allow conductive objects (such as pencil lead, metal sheets) to come into contact with MagicBot Z1 to avoid causing a fire or short circuit.
- Please use the dedicated charging adapter for MagicBot Z1, and do not use other charging adapters with similar sockets.
- Please refer to the MagicBot Z1 sensor range diagram and place objects

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beside it to prevent the robot from tripping due to sensor blind spots.
• Do not block the sensors of MagicBot Z1, including the camera and lidar.
• Do not cover the head or neck of MagicBot Z1, or dress its body or cover it with any accessories/coverings, to avoid overheating of the body, sensor malfunction, or joint movement malfunction.
• Do not lean on MagicBot Z1.
• When MagicBot Z1 emits abnormal noises, odors, or smoke, please immediately press the power button to turn off the robot, then unplug the power supply, and contact the technical support center.
• Do not bend or pull the fingers or palms of MagicBot Z1 to avoid causing joint malfunction.

Maintenance and Upkeep

Overall Machine Cleaning

1.**Cleaning:**After using Z1, if there are stains on the surface, please clean the surface of the device promptly. Before wiping, please turn off the power first, and use a dry and clean soft cloth to wipe the device, paying particular attention to whether the surfaces of the camera and radar are wiped clean. Avoid using water, alcohol, or amino substances for cleaning.

2. **Storage:** Z1 is not dustproof or waterproof, and needs to be stored in a dry and cool room to avoid sun exposure and rain, so as to avoid water rust and shorten the service life of parts. Take out the battery pack when storing for a long time.

Inspection and Maintenance

Conducting routine inspections before and after use can significantly improve the reliability of the product, reduce potential safety hazards, and extend its service life.

Power-off Inspection Checklist

Type	Key Points
	1. Is the fuselage exterior clean, free of damage or signs of

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Overall Appearance of the Machine	deformation? 2. Is there any foreign object on the camera surface lens? 3. Is there any foreign object blocking around the head lidar?
Structure	1. Visually and physically inspect the fuselage, each joint, and connection point to ensure they are in good condition. If there are cracks or damages, they need to be replaced promptly and after-sales service should be contacted. 2. Check whether the screws of each connecting component are tightened, with particular attention to the screws of the joint connectors and the battery locking . 3. Check if there are any foreign objects blocking the inlet and outlet of the cooling fan
battery pack	1. Check if there are any foreign objects or deformations in the battery pack interface of the fuselage 2. Check if the battery pack is installed securely to ensure it does not come loose during operation 3. Check if the battery pack housing has any obvious damage. Battery packs with obvious damage are prohibited from use.
Remote Control	1. Are the joysticks of the remote control all in the neutral position? Have the joysticks been exposed to foreign objects such as sand? 2. Are there any laggy buttons on the remote control?

Power-on inspection

Type	Key Points
Remote Control	1. Confirm whether the basic operation functions of the joystick are normal 2. Confirm whether the current battery level is sufficient
Battery	Check if the current battery level is sufficient
Cooling Fan	Listen carefully with your ears to confirm that the cooling fan is working properly and there are no

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	scraping or other abnormal noises

Battery Maintenance

- Do not use the charger to charge the battery pack in an environment with excessively high or low temperature.
- Please regularly check the battery level and health to prevent overuse or malfunction. When the battery life is significantly reduced, please contact customer service to replace the battery.
- Disconnect the power supply promptly after the battery is fully charged to avoid long-term connection to the charger. Overcharging can cause excessive heat to build up inside the battery, leading to accelerated battery aging and even potentially posing safety hazards.
- If the battery is not used for a long time, please regularly check the remaining battery level. If the battery level is below 30%, please charge it to 70% before continuing to store it to avoid a rapid decline in battery capacity caused by deep discharge, which shortens the battery's cycle life.
- 2. Do not store the battery in an ambient temperature exceeding 0°C - 40°C.
- When storing, please ensure that the environment around the battery has good heat dissipation and is free of flammable and explosive items such as debris.
- The environment where batteries are stored should be kept dry. Do not place batteries in water or in places where water may leak.
- Mechanical impact, rolling, piercing of the battery are prohibited, as well as dropping the battery or causing a man-made short circuit.
- Do not store or transport batteries together with glasses, watches, metal necklaces, hairpins, or other metal objects.

Transportation, handling, and storage

Transportation

Please follow the following principles when transporting the robot:

- The robot is transported in a custom-designed shipping aviation case specifically designed for the robot and its related components.
- During transportation, the shipping air crate should be kept upright, and it is strictly prohibited to place it upside down.
- During transportation, it is necessary to prevent severe vibration, impact, or extrusion.
- Robot batteries should be transported in a semi-charged state (20-50% state of charge).

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Handling

When the robot is handling, please follow the following principles:

- Ensure the robot is in a powered-off state during the process of transporting the robot.
- Each joint of the robot may pinch fingers and other parts of the body, and may also entangle loose clothing, long hair, jewelry, etc., so extra caution is required.
- Robots are heavy and difficult to move. It is recommended that at least two people work together and use safe lifting methods to prevent damage to the robot caused by pinching or dropping.
- No additional personal protective equipment is required, but wearing safety shoes and safety anti-slip gloves is recommended to enhance safety.

Storage

When storing the robot, please follow the following principles:

- Store in a clean, dry, and well-ventilated indoor environment at a temperature range of -20 to 50°C.
- Avoid contact with corrosive substances, and keep away from direct sunlight, fire sources, strong electromagnetic fields, and flammable and explosive substances.
- It is recommended that the robot be stored in the shipping box provided with the robot.

After-sales Warranty

- We provide warranty services for the goods. The warranty period is determined in accordance with the provisions of the purchase and sales contract between the two parties.
- After receiving a repair request, for products within the warranty period, we will remotely diagnose the product's faults. If it is determined to be a simple fault, we will provide remote repair guidance, and you may perform product repairs yourself under the guidance of our authorized personnel; if it is determined to be a complex issue, and we determine that providing remote repair guidance is insufficient to eliminate the fault and that the product must be returned to the factory for repair, please return the product for repair, and the shipping fee will be borne by us (applicable to products sold in Chinese Mainland; for other regions, see the separate provisions in the contract).
- After receiving the product you claim to be within the warranty period and request warranty service for, we will conduct a test on the product to determine the product issue and liability:

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- If it is determined that the product damage is caused by factors outside the warranty period and non-product quality issues, and does not meet the conditions for free repair, you may choose paid repair or return the original machine. In this case, you shall bear the inspection fee and the shipping fee for returning the original machine.
- Products sent for repair should be packed in the original packaging and transported safely. The company will not be liable for any damage or loss incurred during transportation.
- During the warranty period, if there is a repair requirement that does not arise from the quality issues of our company, our company has the right to refuse to provide services or charge for repair parts and service fees based on the circumstances, as specifically stipulated in the contract between the two parties.
- We look forward to providing you with high-quality service. If you have any questions regarding Magiclab's warranty service, please contact us (Contact Phone: 400-828-8022, Contact Email: contact@magiclab.top).

Names and Contents of Hazardous Substances in Products

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
circuit board	×	○	○	○	○	○
Metal Plate	×	○	○	○	○	○
Shell	○	○	○	○	○	○

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Revision History

Version	Date	Modified Content
1.0	2025-7-23	Initial Version
2.0	2025-12-23	Update the operation method of remote control

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