

Walker Tienkung Humanoid Robot User Manual

Foreword

- Thank you for choosing a humanoid robot product (hereinafter referred to as 'this product' or 'the robot') from UBTECH ROBOTICS CORP. LTD. (hereinafter referred to as 'the company').
- Before using this product, please read this user manual carefully and operate strictly according to its instructions. By using this product, you acknowledge that you have read and agreed to all terms and specifications in this manual and its appendices.
- This manual covers three models in the Walker Tienkung series: Walker Tienkung, Walker Tienkung - Voice & Vision, and Walker Tienkung - Embodied Intelligence. Refer to your specific robot when learning about it and using it.
- Thank you for your understanding and support. We hope you enjoy using our product!

1. Legal Disclaimer

- Users are responsible for their own actions and undertake to use this product only for lawful and legitimate purposes.
- When using this product, users must comply with local laws and regulations. Do not use this product to harm or intimidate other people or animals, or as a weapon, accessory, or for any other activity that violates laws and regulations.
- The company shall not be held liable for any property damage, personal injury, or safety hazards resulting from non-compliance with the usage guidelines in this manual.
- To the fullest extent permitted by law, the company makes no express or implied warranties regarding this product, including, but not limited to, warranties of fitness for a particular purpose.
- To the fullest extent permitted by law, the company shall not be liable for any indirect, consequential, incidental, collateral, special, or punitive damages. The total liability shall not exceed the amount you paid for the product and to the company.
- The company reserves the right to final interpretation of the above terms and complies with relevant laws and regulations. The company also reserves the right to update or modify these terms without prior notice.

2. Precautions

2.1 Usage Conditions

- This product is intended for use by individuals aged 18 and above, in accordance with the provisions of this manual.
- This product is designed as a humanoid robot for scientific research and education. Do not use it in scenarios other than those specified in this manual.
- Users with sensory or cognitive impairments, or those lacking experience, are prohibited from using this product independently without assistance from a professional (personnel who have completed the company's delivery training) and without being familiar with this user manual.
- If this product requires repair, contact official after-sales service. Users or third-party organisations are prohibited from disassembling or repairing the product themselves. If disassembling or repairing by users or third-party organisations affects the company's ability to provide after-sales repair, the user shall be responsible, and the company will not bear the corresponding after-sales responsibility.

2.2 Operational Safety

- Please use all robot components and accessories correctly. Do not modify or disassemble the robot without authorisation.
- Do not place fingers, hair, or clothing near robot joints, gaps, or moving parts to prevent pinching or entanglement.
- Avoid touching the motor surface during operation to prevent burns.
- Do not cover sensor areas (torso, head, etc.) to avoid affecting the robot's perception and control.
- Avoid using the robot in harsh environments such as those with high humidity, high temperature, or strong magnetic fields. The normal operating temperature is 0–30°C, and humidity should be below 75% RH.
- Do not carry or transport the robot when it is powered on or when the battery is not in sleep mode.
- When the robot is performing actions, maintain a safe distance and avoid entering the robot's arm and leg movement range to prevent collision injuries.
- When moving the robot, use a dedicated transfer machine. Do not move or drag the robot alone.
- In case of abnormal situations such as when the robot loses motion control, immediately press the 'C' button on the remote control to immobilise all robot joints and take protective measures as soon as possible.
- If remote stop or other operations do not take effect promptly, quickly press the

emergency stop button on the back of the robot to cut off power and ensure safety.

2.3 Special Operation Warnings

- Execute the following operations with caution if there is no protective stand support; otherwise, there is a risk of the robot falling and being damaged:
 - Long press the 'A' button in running mode to make the robot stand.
 - Press the 'D' button on the remote control to zero the robot.
 - Move the joystick of the remote control "G" to the right and press the "C" button to disable the joint.
 - Press the emergency stop button.

Additionally:

- Before extended standby, secure the robot with a protective stand to prevent falls due to automatic shutdown from low battery.
- When the battery level is low, stop and power off the robot promptly to prevent falls and damage.
- Do not push the robot from the side when it is standing, walking, or running normally.

3. Packing List

- Robot body × 1
- Power adapter × 1
- Remote control × 1
- Safety rope × 1
- User manual × 1
- Certificate of conformity × 1
- Warranty card × 1
- Factory inspection report × 1

4. Product Overview

4.1 Product Introduction

- The Walker Tienkung series robots are full-sized, pure electric anthropomorphic running robots developed by UBTECH ROBOTICS CORP. LTD. in collaboration with Beijing Humanoid Robot Innovation Center Co., Ltd. They feature a highly bionic torso design and anthropomorphic motion control capabilities. They can have up to

42 degrees of freedom (DOF), with dual arms employing a 7-DOF robotic arm design at maximum. The wrists can be equipped with high-precision six-axis force sensors and dexterous five-finger hands.

- The Walker Tienkung series robots can perform standing, walking, running, and various specific actions. They can stably adapt to complex terrains such as slopes and sandy ground, possessing excellent dynamic balance and anti-interference capabilities. Equipped with powerful joint drives, high-precision IMUs, and a dual-battery quick-swap system, the robots have a battery life that exceeds 3.5 hours.
- Additionally, the Walker Tienkung - Voice & Vision and Walker Tienkung - Embodied Intelligence models can integrate speech modules and large speech interaction models, supporting natural language interaction, with the entire robot's computing power reaching up to 550 TOPS.
- As a general-purpose humanoid robot platform, the entire Walker Tienkung series offers open interfaces for all joints and sensors, facilitating secondary development for innovative applications in scientific research, education, and other scenarios.

4.2 Features

- **Complex Terrain Adaptability:** Can walk stably on uneven terrains such as slopes and sandy ground.
- **Humanoid Running:** Possesses running capability.
- **Dynamic Balance Control:** Can resist external interference in real-time and maintain posture stability.
- **Motion Control Modes:** Includes reinforcement learning motion control mode.
- **Speech Interaction Control:** Equipped with a speech module, with support for customer deploys speech models for natural speech commands and interaction.
- **Open Interface Design:** Provides interfaces for all body joints and sensors, supporting remote operation, data acquisition, and secondary development.

4.3 Application Scenarios

This product is designed for scientific research and educational purposes.

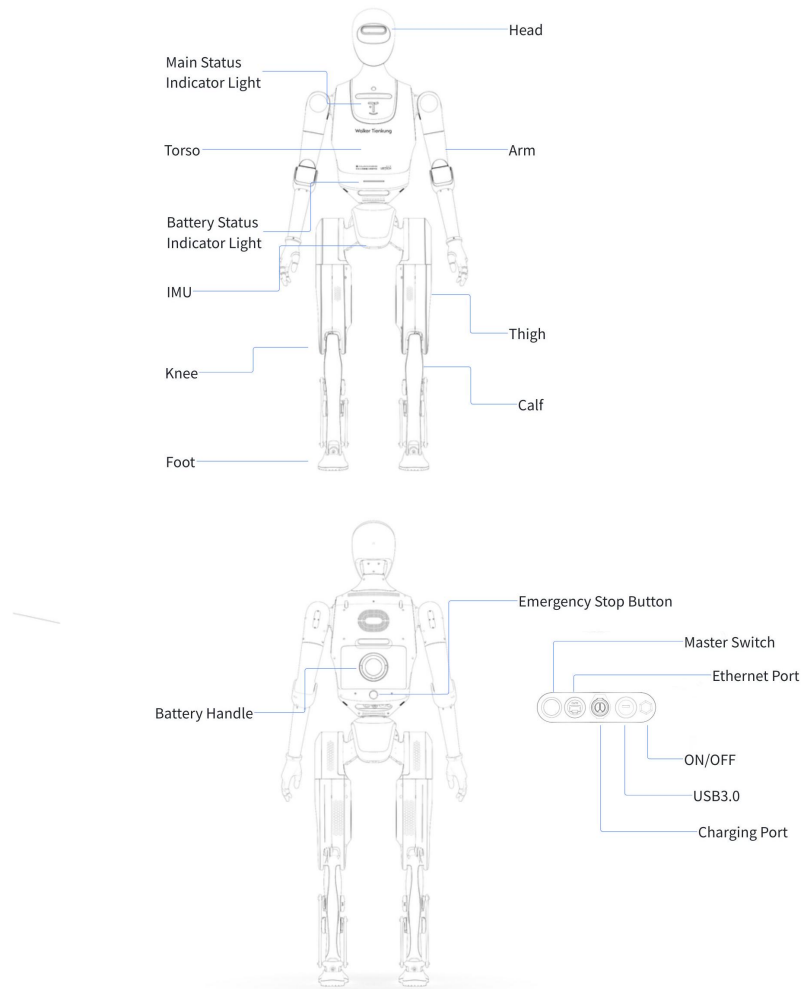
Note:

- Users can explore other application scenarios through secondary development, but must ensure compliance with relevant laws, regulations, safety requirements, and other necessary qualifications for that specific application.
- Any use beyond scientific research and educational purposes shall be the sole responsibility of the user.
- Do not directly use the factory-configured product in unprotected public places or high-risk environments (e.g., rescue, medical care, etc.).

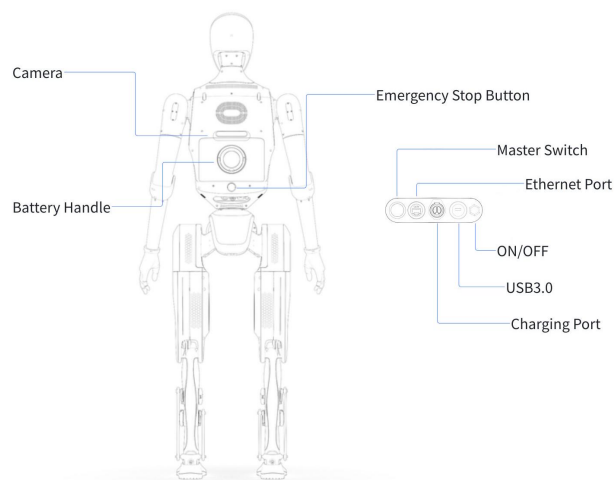
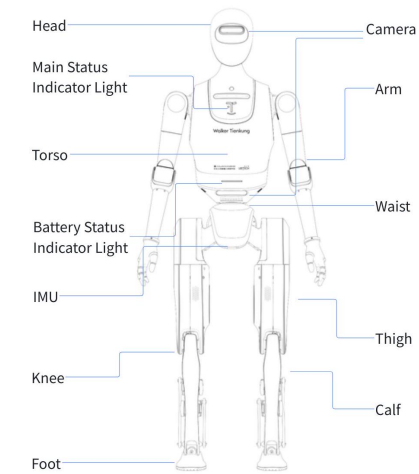
4.4 Product Composition

4.4.1 Robot Composition

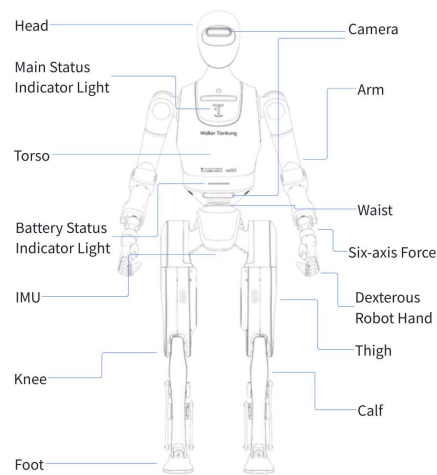
4.4.1.1 Walker Tienkung

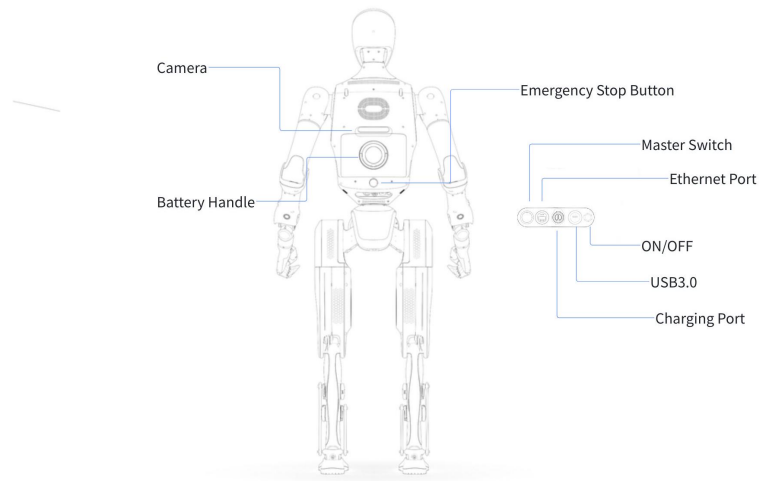


4.4.1.2 Walker Tienkung - Voice & Vision

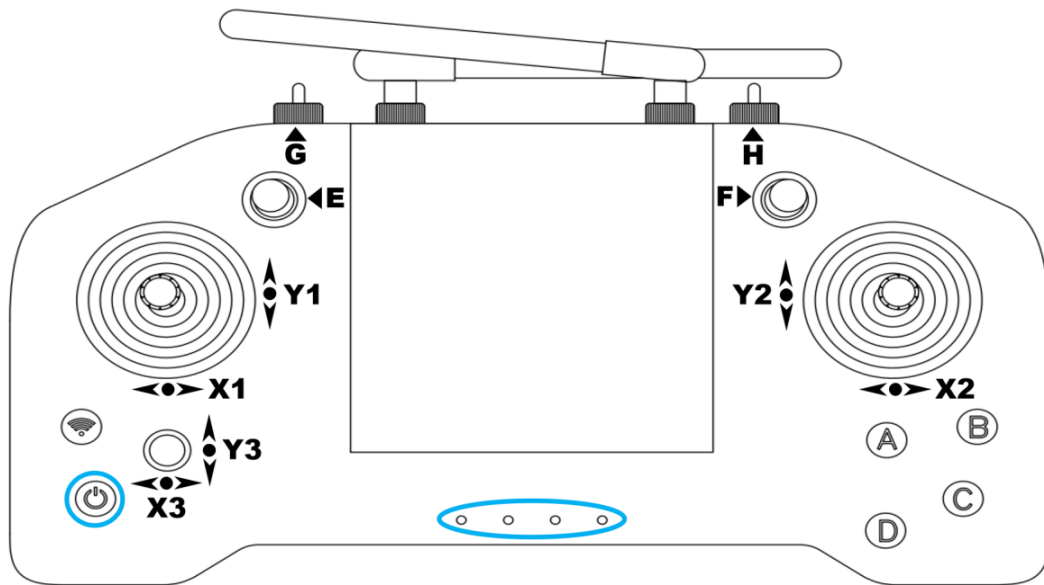


4.4.1.3 Walker Tienkung - Embodied Intelligence





4.4.2 Remote Control Instructions



Remote Control Buttons

Function Descriptions:

Lever	Function Position	Gear Meaning
G	Switch between overall machine operation and emergency stop for incapacitation	Left: Customer-defined business mode (reserved) Middle: Regular operation mode (default) Right + C: Joint incapacitation

E	Functional mode selection	Up: Customer-defined navigation mode (reserved) Middle: Standard motion control mode (default) Down: Customer-defined business mode (reserved)
F	Key function switching	Up: Voice broadcast Middle: Motion control (default) Down: Half-body control mode (reserved)
H	Motion mode switching	Left: Walking mode Middle: Standing mode (default) Right: Running mode (only for reinforcement learning)

Functions of Remote Control Buttons		Remarks
Function	Button	
Zero	D	
Immobilise	C	
cmd_vel Control Mode	'E' Joystick Upwards	
Stand	'H' Joystick to Middle + Long press A.	It is not possible to directly transition from a running state to a standing state. One needs to switch to walking first.
Walk	'H' Joystick to Left - Return Joystick to Middle	
Run	'H' Joystick to Right - Return Joystick to Middle	
Specific	Perform the action instruction cycle in	

Actions	the following order: wave, shake hands, bow, dance 1, dance 2. B: Press continuously to confirm the action number. After the motion control service is started, the default action is waving. During the action execution, the action number cannot be input. A: Press A briefly to confirm the execution of the instruction. When a specific action is continuously executed 3 times, the robot should adjust its walking and then stand still to restore the normal gait before performing further action operations.	
Corpus Broadcast	F: Push the lever upward B: Press continuously to confirm the audio number A: Press A briefly to confirm audio playback D: Press D briefly to stop playback	
Move Left/Right	X1 - Left joystick: Left, right	
Move Forward/s/Backwards	Y1 - Left joystick: Up, down	
Rotate Clockwise/Anti-clockwise	X2 - Right joystick: right, Left	
Disable Joints	G - Move the joystick to the right + C	

5. Basic Parameters

5.1 Basic Hardware Parameters

Parameter Type	Parameter Name	Description		
Device Information	Product Name	Walker Tienkung - Embodied Intelligence	Walker Tienkung - Voice & Vision	Walker Tienkung
	Model	TK2301	TK2201	TK2101
Specification	Height	1,730±10 mm	1,730±10 mm	1,730±10 mm
	Arm Span	600 mm	535 mm	535 mm
	Net Weight	74 kg	64 kg	64 kg
	Colour	Metallic grey + Black	Metallic grey + Black	Metallic grey + Black
	Material	Aluminium alloy + Engineering plastic	Aluminium alloy + Engineering plastic	Aluminium alloy + Engineering plastic
	DOF	42 integrated joints (Heads: 3, Arms: 7 × 2, Hands: 6 × 2, Waist: 1, Legs: 6 × 2); joints are integrated with motors, reducers, and encoders into compact units	21 integrated joints (Arms: 4 × 2, Waist: 1, Legs: 6 × 2); joints are integrated with motors, reducers, and encoders into compact units	20 integrated joints (Arms: 4 × 2, Legs: 6 × 2); joints are integrated with motors, reducers, and encoders into compact units

Battery Parameters	Main Battery	Type: Nickel-Cobalt-Manganese (NCM) Capacity: 30 Ah + 3 Ah Voltage: 48 V	Type: Nickel-Cobalt-Manganese (NCM) Capacity: 30 Ah + 3 Ah Voltage: 48 V	Type: Nickel-Cobalt-Manganese (NCM) Capacity: 30 Ah + 3 Ah Voltage: 48 V
	Charging Time	< 4 h	< 4 h	< 4 h
	Battery Life	3.5 h	3.5 h	3.5 h
Sensor Parameters	High-precision IMU	Yes	Yes	Yes
	High-precision Six-axis Force	Yes	N/A	N/A
	Camera	Head RGBD × 1, Waist RGBD × 1, Back RGBD × 1	Head RGBD × 1, Waist RGBD × 1, Back RGBD × 1	N/A
	Speech Module	MIC array: Linear MIC × 4 Speaker × 1 Sound card × 1 720P RGB monocular camera × 1	MIC array: Linear MIC × 4 Speaker × 1 Sound card × 1 720P RGB monocular camera × 1	N/A
Control and Computing Parameters	Motion Control Computing Unit	Model: Intel x86 i7-1355U CPU: 10 cores, 12 threads Main Frequency: up	Model: Intel x86 i7-1355U CPU: 10 cores, 12 threads Main Frequency:	Model: Intel x86 i7-1355U CPU: 10 cores, 12 threads Main Frequency:

		to 5 GHz Memory: 16 GB SSD: 256 GB	up to 5 GHz Memory: 16 GB SSD: 256 GB	up to 5 GHz Memory: 16 GB SSD: 256 GB
	Development Computing Unit	Model: Orin AGX 64 × 2 Computing Power: 275 TOPS × 2	Model: Orin AGX 64 × 1 Computing Power: 275 TOPS × 1	N/A
	System Platform/Software	Operating System: Ubuntu 22.04.4 LTS Middleware: ROS	Operating System: Ubuntu 22.04.4 LTS Middleware: ROS	Operating System: Ubuntu 22.04.4 LTS Middleware: ROS
Actuator Parameters	Robotic Arm	7-DOF arm × 2	4-DOF arm × 2	4-DOF arm × 2
	Dexterous Robot Hand	Standard	N/A	N/A
Communication Parameters	External Communication	Wi-Fi 6, Ethernet, Bluetooth	Wi-Fi 6, Ethernet, Bluetooth	Wi-Fi 6, Ethernet, Bluetooth
	Internal Communication Network	Full-body CAN/EtherCAT bus communication Leg control rate: not less than 1 kHz Arm control speed: > 400 Hz	Full-body CAN/EtherCAT bus communication Leg control rate: not less than 1 kHz Arm control speed: > 400 Hz	Full-body CAN/EtherCAT bus communication Leg control rate: not less than 1 kHz Arm control speed: > 400 Hz

5.2 Status Indicator Lights

The Walker Tienkung has a **main status indicator light** on its chest and a **battery status indicator light** on its abdomen, which together form the status indicator system. Users can intuitively understand the robot's operating status through the combination of light effects.

Meaning		Main Status Indicator Light	Battery Status Indicator Light	Sound effect description
Power On/Off	Power On	White - Multicolour - Blue-green (slow breathing)	Blue-green (follows battery level)	The process is accompanied by a prompt sound once.
	Standby State	Blue-green (slow breathing)		The process is accompanied by a prompt sound once.
	Press A to Start Self-check	Gorgeous Colors		One key press sound.
	Self-check in Progress	Blue-green (fast breathing)		The sound effect lasts until the self - check is success

				ful.
	Self-check Successful	Blue-green (solid)		
	Self-check Failed	Red (flashing)		
	Power Off	Blue-green (off)	Blue-green (off)	
Battery Level	Charging (Power On)	Blue-green (solid)	White (breathing)	
	Charging Complete (Power On)		Green (solid)	
	Battery level 30%–100%		Blue-green (follows battery level)	
	Battery level 10%–30%		Orange (solid)	
	Battery < 10%		Orange (flashing)	Two beeps are emitted every 5 seconds, with an interval of 0.3 seconds between the two beeps. (The light also flashes

				once every 5 seconds, synchronized with the buzzer.)
	Powered by Small Battery		Purple (solid)	Every 5 seconds, three beeps are emitted: <u>beepbeepbeep</u> ~, with an interval of 1 second between the beeps.
Motion	Running	Blue-green (solid)	Blue-green (follows battery level)	
Fault	Static Fault	Red (flashing)		
	Dynamic Fault			The fault sound is emitted once every 2 seconds.
	Alarm	Yellow (flashing)		

At the same time, the **ON/OFF button** indicator light on the robot's back (abdomen area) will also change with the status.

Meaning	Current Operation	Indicator Light
Power On	Toggle master switch to the 'ON' position	Blue
	Short-press the ON/OFF button after toggling the master switch to the 'ON' position	Green
Power Off	Press and hold the ON/OFF button for 6s	Blue
	Press and hold the ON/OFF button for 6s, then toggle the master switch to the 'OFF' position	Off
Emergency Stop	After pressing the emergency stop button	Red

6. Operation Guide

Note: For login passwords in this chapter, contact customer service.

6.1 Unpacking Guide

6.1.1 Unpacking Inspection

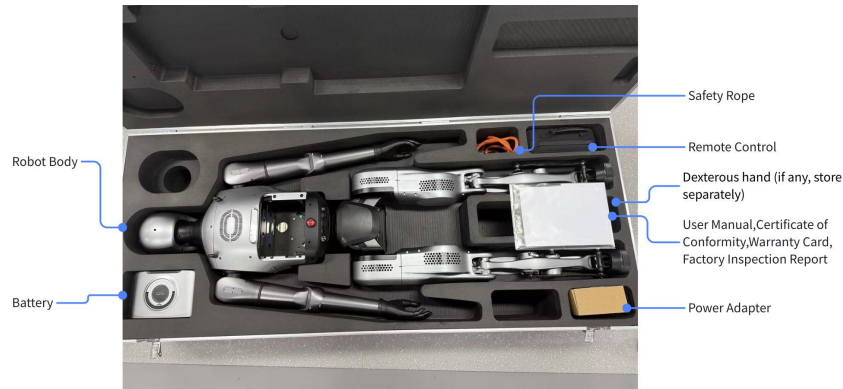
1. The robot is packaged in a flight case with external dimensions of 1,850 × 780 × 500 mm (L × W × H).



2. Upon delivery, carefully inspect the flight case to ensure it is intact. If you notice

any damage, promptly contact the logistics company and your local supplier.

3. After confirming the case's condition, turn the butterfly latch and release the two square locks on the sides.
4. Open the flight case to reveal its contents, as illustrated below. Compare the actual items inside the case against **3. Packing List**. If any items are missing, immediately contact customer service to arrange for replacements.



6.1.2 Removing the Robot

1. Secure the safety rope's hook to the fixing ring located below the robot's neck. Connect the other end of the safety rope to a protective stand.
2. Slowly raise the protective stand to lift the robot. During the lifting process, pay attention to the position of each robot joint. If necessary, a dedicated person should assist in supporting and moving the robot to ensure a smooth lift.
3. Manually place the robot's feet on the edge of the flight case.
4. Gently push the flight case forwards to smoothly hoist the robot onto the protective stand.

Note: After removing the robot, do not discard the flight case. This flight case is specifically designed for transporting the robot and its accessories.

6.2 Preparations Before Use

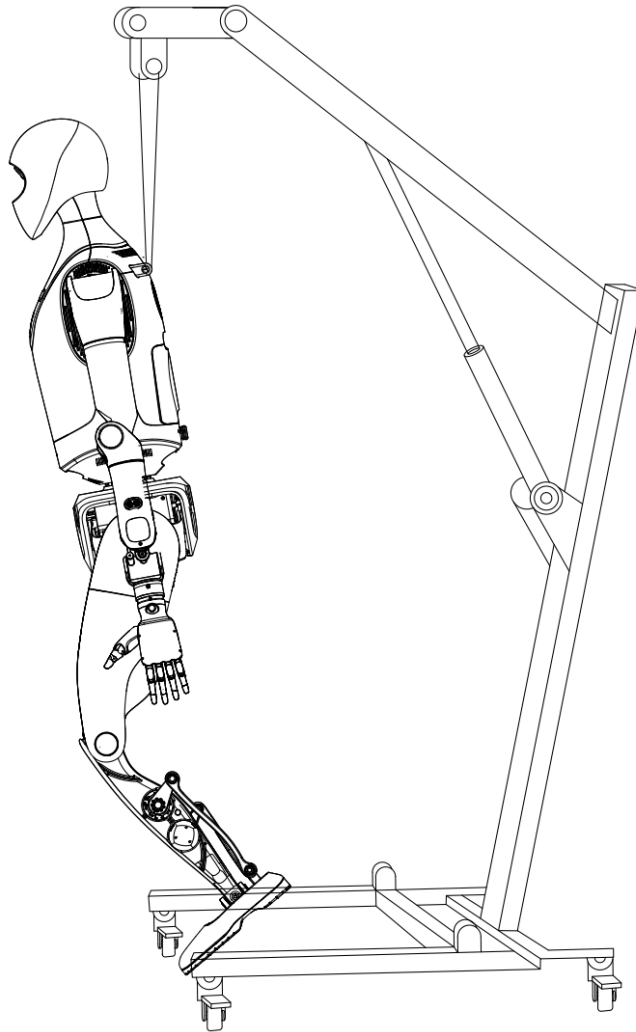
6.2.1 Environment Inspection

1. The ground should be flat and not slippery. We do not recommend using the robot on uneven ground, steep slopes, muddy surfaces, loose materials, or slippery ground. We recommend leaving at least 4 m of free space around the robot.
2. Environmental temperature and humidity requirements: operating temperature 0–30°C, relative humidity below 75% RH.

3. The environment must be free of flammable, corrosive liquids or gases, and there should be no strong sources of electronic noise or magnetic fields nearby.

6.2.2 Robot Inspection

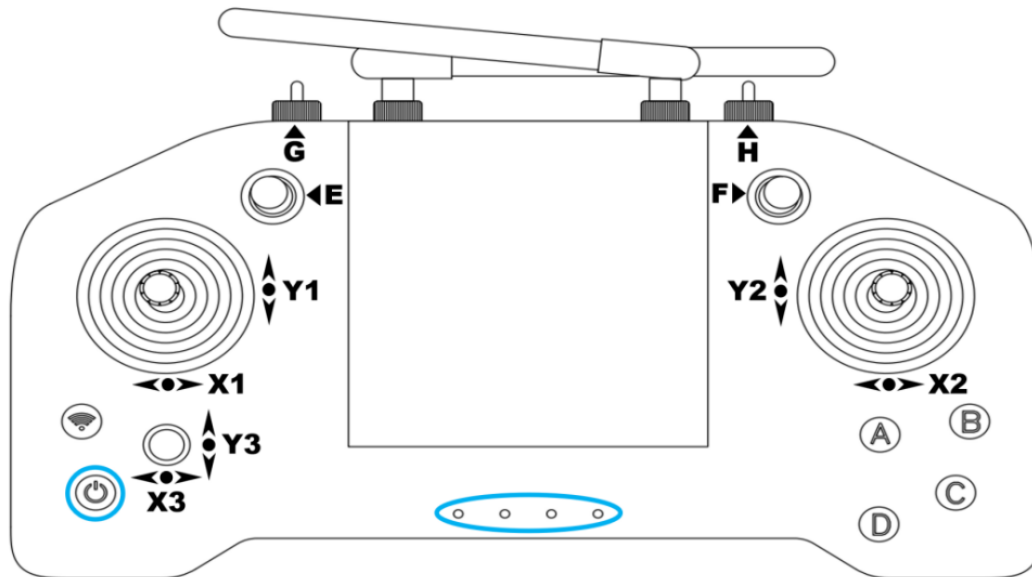
1. Confirm that the robot is suspended on the stand.



2. Check all parts for looseness or damage, ensuring flexible movement without jamming.
3. To confirm that the robot battery is sufficiently charged, first ensure the robot is powered on (refer to [6.3 Starting the Robot](#) for details), then check the battery level by:
 - Judging by the length of the battery status indicator light on the front abdomen (refer to [5.2 Status Indicator Lights](#) for the correspondence between light effects and battery level).
 - View the detailed battery level in the upper-right corner of the [7.1 Robot Status](#) page in the diagnostics interface.

4. Power on the remote control and confirm that its battery is sufficiently charged. The specific steps are as follows:

- a. As shown in the figure, short-press then immediately press and hold the power button on the remote control to turn it on.
- b. At this point, the indicator lights at the bottom centre of the remote control will illuminate, indicating the battery status from left to right. When the 1st, 2nd, 3rd, and 4th lights are on, the corresponding battery levels are 25%, 50%, 75%, and 100%, respectively.



6.3 Starting the Robot

After the robot is powered on, it will automatically complete system startup and enter standby state. The specific steps are as follows:

1. **Press the master power switch.**
 - The ON/OFF button indicator light will turn blue.
2. **Press the ON/OFF button.**
 - The ON/OFF button indicator light will turn red.
3. **Confirm that the emergency stop button is rotated clockwise until it pops out.**
 - The main status indicator light will change from off → white → multicolour → blue-green breathing, indicating the robot is waking up. Upon successful wake-up, the robot will emit a long tone. The status indicator light enters a blue-green breathing state.

- The battery status indicator light simultaneously displays the current battery level (blue-green).
4. **The robot automatically enters the standby state. At this point, the robot can be started via remote control.**
- The main status indicator light will be blue-green (slow breathing).
5. **Press the 'A' button on the remote control to start the self-check.**
- The main status indicator light will flash **Gorgeous Colors** once, followed by blue-green (fast breathing).
6. **Self-check Results**
- **Successful:**
 - The main status indicator light is blue-green (solid). The robot will emit a short beep.
 - It enters the Ready state (operable).
 - The auto-start service defaults to Reinforcement Learning motion control mode. Operate according to the [Reinforcement Learning mode remote control function instructions](#).
 - **Failed:**
 - The main status indicator light is red (flashing).
 - Self-check will restart after 20s.



Note: Do not move the robot during self-check.

6.4 Main Control Board Login and Connection

Currently, the main control board of the Walker Tienkung series robots can consist of up to three parts: the x86 main control board, Orin1, and Orin2. The usernames and static addresses for each main control board are shown in the table below. After configuring Wi-Fi, you can remotely connect to the robot via the ssh command. Users can configure Wi-Fi for each main control board according to their usage requirements.

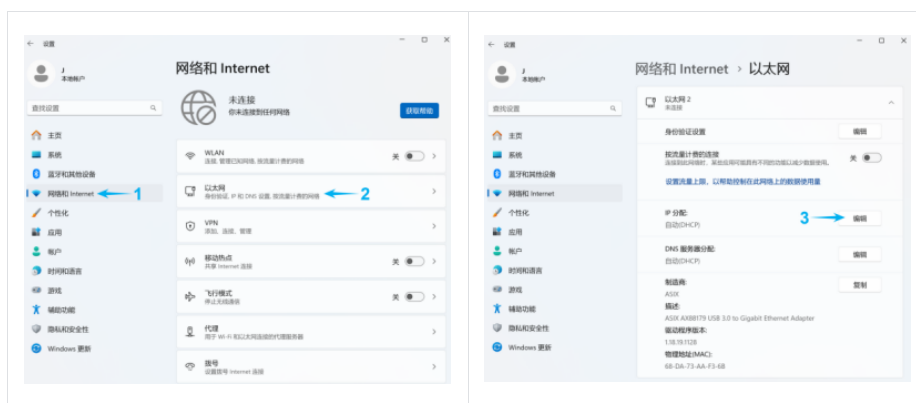
Main Control Module	Username	Static Address	Wi-Fi	Configuration Device
x86 Main Control	ubuntu	192.168.41.1	Independent Wi-Fi	Walker Tienkung/Walker Tienkung - Voice &

Board				Vision/Walker Tienkung - Embodied Intelligence
Orin1	nvidia	192.168.41.2	Independent Wi-Fi	Walker Tienkung - Voice & Vision/Walker Tienkung - Embodied Intelligence
Orin2	nvidia	192.168.41.3	Independent Wi-Fi	Walker Tienkung - Embodied Intelligence

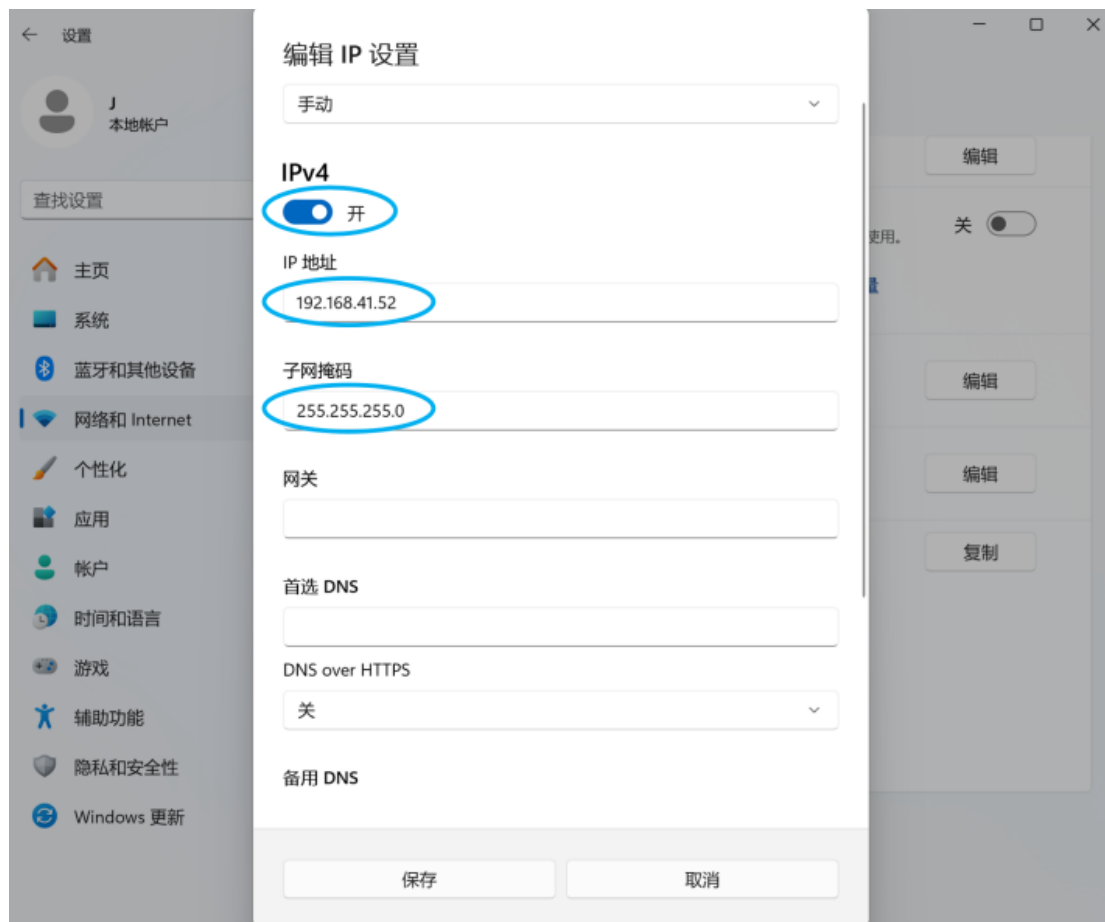
The specific steps for configuring Wi-Fi and logging in, taking the x86 motion controller as an example, are as follows:

- **Wi-Fi configuration steps:**

1. Connect the robot's debugging Ethernet port on its back to your computer using an Ethernet cable.
2. Configure your computer's Ethernet port address to 192.168.41.xx/255.255.255.0. For Windows systems, the specific steps are:
 - a. Open Settings, click 'Network & Internet', then 'Ethernet', and then 'Edit' next to the IP assignment.



3. Enable the IPv4 button as shown below and configure the IP address as 192.168.41.xx, and the subnet mask as 255.255.255.0.



4. Open any terminal and enter `ping 192.168.41.1`. If the display is as shown in the figure below, it indicates that the network connection with the x86 industrial computer server is normal, and you can proceed with login.

```
PS C:\Users\J> ping 192.168.41.1

正在 Ping 192.168.41.1 具有 32 字节的数据:
来自 192.168.41.1 的回复: 字节=32 时间=1ms TTL=64
来自 192.168.41.1 的回复: 字节=32 时间=1ms TTL=64
来自 192.168.41.1 的回复: 字节=32 时间=1ms TTL=64
来自 192.168.41.1 的回复: 字节=32 时间=1ms TTL=64

192.168.41.1 的 Ping 统计信息:
    数据包: 已发送 = 4, 已接收 = 4, 丢失 = 0 (0% 丢失),
    往返行程的估计时间(以毫秒为单位):
        最短 = 1ms, 最长 = 1ms, 平均 = 1ms
PS C:\Users\J>
```

5. Continue by entering `ssh ubuntu@192.168.41.1` in the terminal, then enter `yes`, and then the login password. If the display is as shown in the figure below, it

indicates successful login to the x86 industrial computer.

```
PS C:\Users\J> ssh ubuntu@192.168.41.1
The authenticity of host '192.168.41.1 (192.168.41.1)' can't be est
ED25519 key fingerprint is SHA256:x0HTXVckaFJUEd/gY/0JwLjVbfbkw1GGpP
SeHb+Y2eAI.
This host key is known by the following other names/addresses:
  C:\Users\J/.ssh/known_hosts:10: 192.168.160.183
  C:\Users\J/.ssh/known_hosts:13: 192.168.160.79
  C:\Users\J/.ssh/known_hosts:14: 192.168.160.201
  C:\Users\J/.ssh/known_hosts:15: 192.168.31.147
Are you sure you want to continue connecting (yes/no/[fingerprint])
? yes
Warning: Permanently added '192.168.41.1' (ED25519) to the list of
known hosts.
ubuntu@192.168.41.1's password:
Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 6.5.0-35-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

55 updates can be applied immediately.
40 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

23 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/es
m

Last login: Fri Jun 28 18:29:00 2024 from 192.168.160.91
ubuntu@ubuntu-22:~$
```

6. In the same terminal, continue by entering the following command to view available W-Fi hotspots and record the SSID of the Wi-Fi you want to connect to:

```
sudo nmcli device wifi list
```

7. Connect to the Wi-Fi network using the Wi-Fi SSID and its password:

```
sudo nmcli device wifi connect 'Wi-Fi SSID' password 'Wi-Fi password'
```

8. Enter the following command to check the current configuration and status of the wireless network interface to confirm if it has successfully connected to the specified Wi-Fi network: At this point, Wi-Fi configuration is complete, and you can unplug the

network cable.

```
ifconfig
```

- **After Wi-Fi configuration is complete (no need to configure each time), the steps to directly connect to the x86 industrial computer via Wi-Fi are as follows:**

1. On your computer, open any terminal and enter the command `ifconfig` to view the IP address configured for the wireless network interface, i.e., the IP address after the field under the 'wlan0/wlp2s0' interface.
2. Enter the command `ssh ubuntu@x.x.x.x` to directly connect to the x86 industrial computer server, where x.x.x.x is the IP address obtained in the previous step. Then enter `yes`, and then the login password. At this point, login is successful.

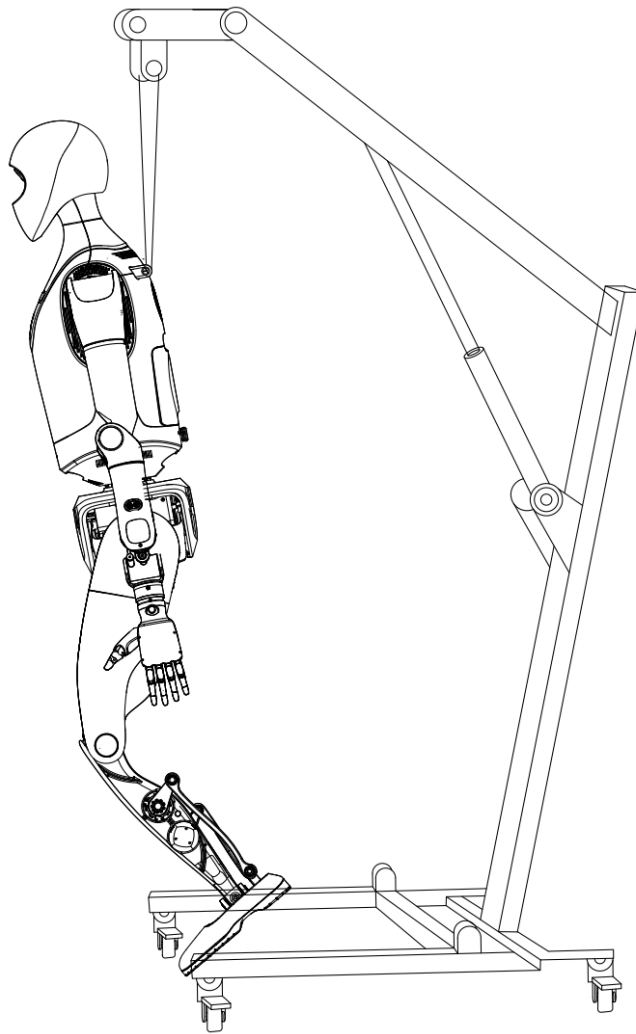
6.5 Landing and Standing

Operation steps:

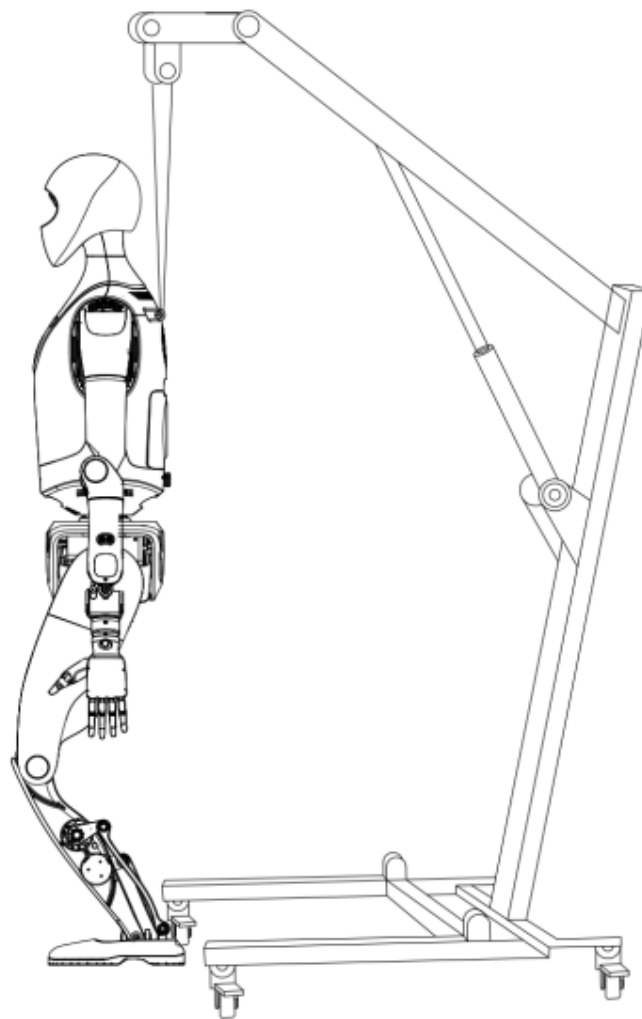
1. Press the 'D' button on the remote control to return to the initial state.



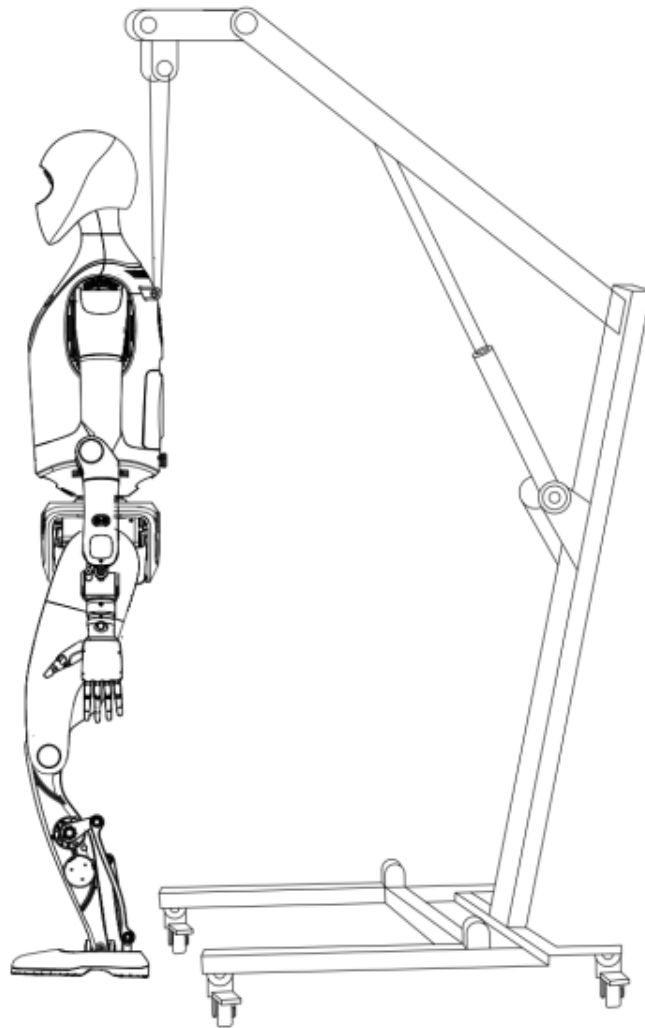
Note: Before pressing the 'D' button, the robot must be secured on a protective stand.



2. Slowly lower the protective stand, placing the robot on the ground. **Keep it vertical for 60s.**



3. Ensure the 'H' joystick on the remote control is in its initial middle (zero) position, then long press the 'A' button to make the robot stand. After the robot stands, observe whether it is balanced. It is balanced if there is no shaking, leaning forwards/backwards, or other anomalies. If unbalanced, repeat the above operations and try again.



6.6 Basic Action Operation Instructions



Note: We recommend using the robot with the support of a protective stand.

6.6.1 Function Operations in Reinforcement Learning Motion Control Mode

6.6.1.1 Walking Mode Switch

- **Activating Marching Mode**
 1. Ensure the robot is in a standing state.
 2. Move the 'H' joystick on the remote control from the middle position to the left, then return it to the middle position. The robot will enter stationary marching mode.
- **Switching to Running Mode**

- While the robot is stepping steadily, move the 'H' joystick on the remote control from the middle position to the right, then return it to the middle position. The robot will switch to stationary running mode.

6.6.1.2 Movement and Turning Control

In marching or running mode, users can control movement and turning using the joysticks on the remote control. The extent of the joystick movement determines the speed:

- Move the left joystick up or down: controls the robot to move forwards or backwards.
- Move the left joystick left or right: controls the robot to move left or right.
- Move the right joystick left or right: controls the robot to rotate anti-clockwise or clockwise.

6.6.1.3 Stopping and Returning to Standing State

- In Marching Mode:
 - Ensure the 'H' joystick on the remote control is in the middle (zero) position, then long press the 'A' button. The robot will stop moving and return to a standing state.
- In Running Mode:
 1. First, move the 'H' joystick on the remote control from the middle position to the left, then return it to the middle position to switch back to Marching Mode.
 2. Ensure the 'H' joystick on the remote control is in the middle (zero) position, then long press the 'A' button. The robot will stop marching and return to a standing state.



Note: Do not long press or long press the 'A' button directly while in running mode.

6.6.2 Emergency Stop Methods



Note: If a protective stand is not used, performing the following emergency operations may cause the robot to become unstable and fall. Please proceed with caution.

1. Immobilise:

In the following situations, promptly press the 'C' button on the remote control. All of the robot's joints will immediately immobilise. The robot will lose balance and require anti-fall protection. Try to support the robot as quickly as possible:

- The robot's movement becomes abnormal or does not match expectations, such as incorrect speed or direction.

- When there is a predicted risk, such as the robot approaching an obstacle or crowd and unable to stop in time.

2. **Disable Joints:**

In the following emergency situations, you need to promptly move the "G" lever on the remote control to the right and press the "C" key simultaneously, which will disable the robot's joints. At this time, the joints will be powered off, and the robot will be unable to maintain any posture. It will immediately go limp and fall down.:

- The robot experiences a sudden malfunction, such as abnormalities in sensors or electronic components, which may cause further damage.
- The robot's posture becomes unstable, such as being in an unsafe position or angle, potentially leading to falling or other hazards.

3. **Emergency Stop Button:**

In the following critical situations, immediately press the emergency stop button on the back of the robot, then press and hold the ON/OFF button for 6s and finally press the master power switch to cut off all power. At this point, the robot will be unable to maintain any posture, immediately going limp and falling.

After the robot completes the emergency power-off operation, it needs to be restarted from the beginning following [6.3 Starting the Robot](#).

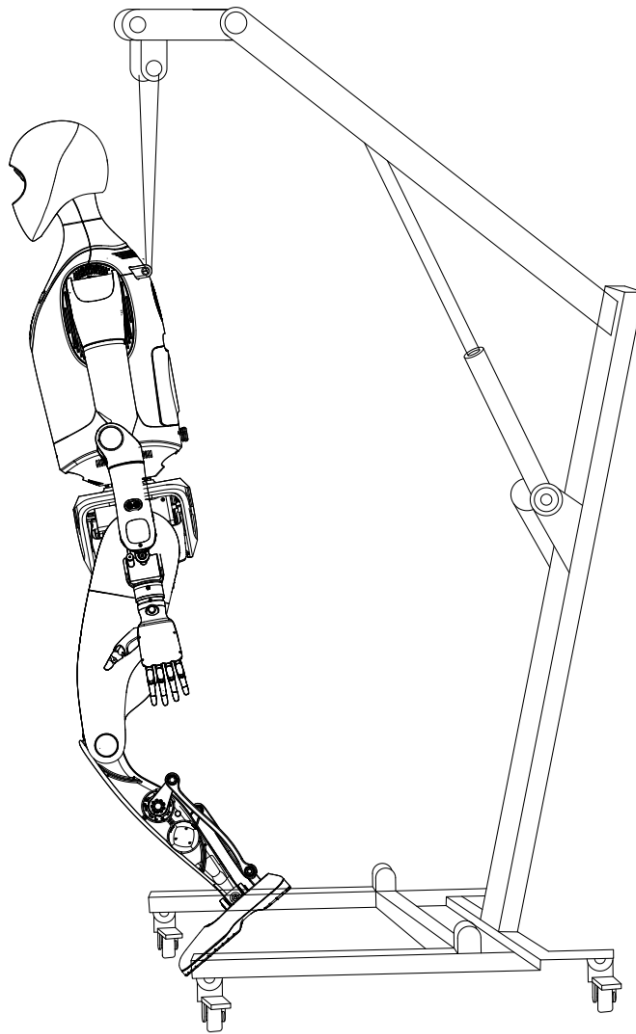
- The robot emits smoke or a burning smell.
- Water or other foreign objects have entered the robot.
- The robot is out of control and cannot be stopped using the remote control or other means.
- The robot is damaged and poses a potential danger.
- Emergency evacuation, such as loss of control during high-altitude operations or in hazardous environments.
- External environmental changes, such as earthquakes or fires.

By adhering to the emergency procedures outlined above, you can respond swiftly to ensure the safety of both the robot and its surroundings.

6.7 Shutting Down the Robot

To shut down the robot, follow these steps:

1. Ensure the robot has come to a complete stop and returned to a standing position.
2. Press the 'C' button on the remote control to immobilise the robot.
3. Place the robot on the stand and lift it securely.



4. Press the emergency stop button.
 - The ON/OFF button indicator light will turn **red**.
5. Press and hold the ON/OFF button for 6s.
 - The ON/OFF button indicator light will turn **blue**.
6. Press the master power switch. At this point, all indicator lights will turn off.
7. Turn off the remote control: first press the power button, then press and hold it to deactivate the remote control.

6.8 Packing the Robot

To pack the robot, follow these steps:

1. Ensure the robot is powered off and properly hoisted on the stand.
2. Position the flight case facing the same direction as the robot.
3. Lower the stand, place the robot's legs into the flight case, and ensure contact

with the protective foam.

4. Remove the safety rope, gently guide the robot's upper body and head into the flight case, ensuring contact with the protective foam padding. During this process, adjust the orientation of the arms and dexterous/decorative hands as needed.
5. After confirming everything is in place, close the flight case and rotate the butterfly latch to secure the square locks, locking the flight case.

6.9 Battery Charging

6.9.1 Charging Instructions

- This robot supports direct charging. Before charging, power off the robot and ensure it is disconnected from power. Unplug the charger promptly after fully charging to avoid prolonged connection.
- The charging environment temperature should be 0–30°C, and humidity should be below 75% RH.
- Use the original dedicated charger provided by the company for charging. Do not use third-party power devices.
- We recommend storing spare battery packs in a dedicated explosion-proof cabinet.
- We recommend charging only after the robot has cooled to room temperature.
- If any abnormalities such as smoke, strange odour, overheating, or deformation occur during charging, immediately unplug the charger and stop using it.
- If electrolyte comes into contact with eyes, immediately rinse eyes with clean water and seek medical attention promptly.

6.9.2 Charging Methods

6.9.2.1 Direct Charging

1. Connect the power adapter to a power socket.
2. Insert the power adapter's charging cable into the charging port.
3. When the power adapter indicator light shows red, it indicates that charging is in progress. When the power adapter indicator light turns green, it indicates that the battery is fully charged. At this point, charging should be stopped to avoid overcharging the battery.

6.9.2.2 Battery Swapping

1. Prepare the spare battery pack.
2. With the robot powered off, rotate the battery compartment latch to the right and pull out the battery pack.

3. Insert the replacement battery pack into the battery compartment. When inserting, rotate the latch to the right, push the battery pack into the compartment, and return the latch to the upright position. This indicates successful battery pack installation.

6.9.2.3 Battery Pack Charging

1. Connect the power adapter to a charging socket.
2. Connect the power adapter to the battery pack. When the red light on the adapter illuminates, it indicates that charging is in progress. When the power adapter indicator light turns green, it indicates that the battery is fully charged. At this point, charging should be stopped to avoid overcharging the battery.

7. Operation Diagnostics Guide

The Walker Tienkung features a comprehensive diagnostic management platform that enables remote monitoring and device operation via WebSocket connection. The platform displays status information for various robot components, including detailed content for joints, IMUs, power, and batteries, and also allows viewing of version and system information. In addition, users can view real-time topic data from the robot system and use convenient update buttons to keep information synchronised, ensuring the device remains in optimal operating condition.

7.1 Robot Status

- The Robot Status page indicates the status of each joint and the current battery level using colours. Refer to the status legend in the upper-right corner of the page for details.
- The data communication status indicator in the upper-right corner shows the WebSocket connection status: red indicates disconnection, while green indicates a normal connection.

7.2 Device

- The Device page displays basic robot information, the current version information of each component, and detailed system information for each main control board.
- You can connect to a Wi-Fi network by clicking the 'Connect' button and entering the SSID and password and can obtain IP addresses for each main control board.

7.2.1 Joints

- On the Joints page, you can view a detailed list of information for each joint. Click the 'Refresh' button to refresh the row data for a single joint. After selecting multiple items, click the 'Batch Refresh' button to refresh the row data for multiple

joints simultaneously.

7.2.2 IMU

- On the IMU page, you can view detailed information for each IMU. Click the corresponding 'Update' button to refresh the data for that IMU.

7.2.3 Power

- On the Power page, you can view detailed information for each power source. Click the corresponding 'Update' button to refresh the data for that power source.

7.2.4 Battery

- On the Battery page, you can view detailed information for each battery. Click the corresponding 'Update' button to refresh the data for that battery.

7.3 Topic

- On the Topic page, you can view detailed topic data. Click the 'Update' button to update data for a single topic. Click the 'Update All' button to refresh data for all topics.
- Clicking a topic row will display its detailed topic data in the panel on the right.

7.4 Remote Control

- On the remote control page, you can view the detailed information of the remote controller on the left side of the page. Click the "Update" button to refresh the data of the remote controller.
- The control interface on the right side of the page is expanded by default. Click the "Control Interface" button to close it. Click the corresponding action button to remotely control the robot to perform the corresponding action. When using this function, the robot needs to be in the standing state, and the "E" lever of the remote controller should be pushed up.

7.4.1 Sound Card

- On the sound card page, you can view the detailed information of the sound card and audio files.
- Click the "Play" or "Delete" button corresponding to each audio file to operate the robot to play or delete the audio.

7.4.2 Alarm

- On the alarm page, you can view the detailed information of each alarm. Click the "Clear All" button to clear all current alarm information.

7.4.3 Topic

- On the Topic page, you can view the detailed topic data. Click the "Update" button to update the data of a single topic; click the "Update All" button to refresh the data of all topics.
- Click on a topic row, and its detailed topic data will be displayed in the panel on the right.

7.4.4 Version

- On the version page, you can view the detailed device version information and the firmware upgrade status.
- Only the items with a blue "Upgradable" button displayed in the upper right corner can be upgraded. After clicking the "Upgradable" button, select or drag and upload the package to be upgraded (only.tar.gz format is supported), and then click the "Start Upload" button.
- After the upload is successful, click "Start Upgrade" to perform the version upgrade.
- When the interface displays the warning "waiting estop pressed", it means that you need to press the emergency stop button first and then turn it clockwise to continue the upgrade process.
- After the upgrade success prompt appears, it means the version upgrade is successful.

7.4.5 Log

- On the log page, click the "Get Log" button to download the system log, kernel log, application log, and bag log for the selected time period.
- After the loading is completed, you can download the selected log compression package from the last URL.

8. Tiengkung Walker App

The Tienkung Walker App provides operation assistance for the Tienkung Walker series of robots, supporting users to conveniently configure the network for the device, view the robot status information, and control the robot's actions.

8.1 Connect to the Robot

After ensuring that the mobile phone is connected to Wi-Fi and the Bluetooth permission is enabled, enter the App and click to connect to the robot. The App will

scan the surrounding powered-on robot devices; click the device you need to connect to, enter the robot control password (the default password can be provided by contacting the delivery personnel). After the control password verification is successful, enter the connection password of the Wi-Fi currently connected to the mobile phone. After the verification is successful, the robot connection can be completed.

The robot control password can be modified in Settings - Modify Robot Control Password.

8.2 Robot Status

Click on the robot status to enter the robot status page. You can manually turn on or off the robot voice service; you can view the current power of the robot's main battery and small battery and the online status of some sensors.

8.3 Robot Control

Click on the robot control to enter the robot control page. You can switch the robot status (motion mode), turn on the robot's head vision sharing and control the robot to perform actions. To turn on the robot control, the "E" lever on the remote controller must be pushed up. This function must be enabled when the robot is in the standing state.

Switching the robot status: The switchable states include standing, walking, running, returning to zero, and freezing.

Note: Do not operate the robot to enter the standing state when the robot is hanging off the ground.

Robot action control: You can click the action button to send an action command, and the robot will perform the corresponding action. After turning on the robot voice broadcast configuration, the robot will also perform voice broadcast when performing actions.

Note: During the action execution process, to ensure safety, please ensure that there are no obstacles within a 4m radius of the robot. At the same time, some actions involve full body movements. Please ensure that there is a certain amount of space redundancy when the safety rope is connected to the robot.

Robot vision sharing: The Tienkung Walker · Vision and Voice and Tienkung Walker · Embodied Intelligence models support the vision sharing of the head camera. After clicking to turn it on, you can view the real-time camera video stream of the head camera.

8.4 Chinese - English Switching

The App supports Chinese - English language switching. The setting path is Settings - General Settings - App Language Settings.

9. Voice Function

The Tienkung Walker · Voice and Vision, Tienkung Walker · Embodied Intelligence models provide basic voice capabilities (provided free of charge for a limited time). This voice is based on an online large - language model and must be used when the network can connect to the public network.

9.1 Wake - up and Conversation

After starting the voice service through the APP, the robot can be woken up by the wake - up word "Tienkung Tienkung". After waking up, the robot will reply "Yes". When waking up, please keep the user's face within the recognition range of the monocular camera on the chest to start the conversation normally.

After the voice interaction large - language model recognizes the user's question, it takes a few seconds to output an answer. Please wait patiently.

9.2 Corpus Broadcast

The corpus broadcast can be triggered by the remote controller. The storage paths of audio corpora are as follows:

Audio directory of Tienkung Walker (x86 main control board):

/home/ubuntu/data/speech/sbus

Audio directory of Tienkung Walker · Vision and Voice (orin computing board):

/home/nvidia/data/speech/sbus

Audio directory of Tienkung Walker · Embodied Intelligence (orin1 computing board 41.2): /home/nvidia/data/speech/sbus

After importing the corpus, modify the configuration item. The modification path (x86 main control board): /home/ubuntu/data/param, and update the audio_list with the name of the imported audio file.

10. Daily Maintenance and Management

10.1 Daily Inspection

- Check if the casing has any damage, deformation, or looseness.
- Ensure the battery and connectors are secure.
- Check if all sensors are clean.
- Ensure the motors are running normally, without abnormal shaking or noise.
- Check if all indicator lights are solid.
- Ensure the remote control functions normally.

10.2 Handling

- The robot is transported in a custom flight case designed specifically for the robot and its accessories.
- Before moving the robot, fully power it off and disconnect it from power, ensuring the emergency stop button is released.
- Be extra careful as the robot's joints may pinch fingers and other body parts, or catch loose clothing and long hair.

10.3 Cleaning

- Before cleaning the robot, fully power it off and disconnect it from power, ensure the emergency stop button is released, and that it is not connected to the charger.
- Do not use sprays, alcohol-based solutions, water guns, or similar substances on the robot.
- We recommend using a soft, dry cloth to wipe the casing and sensor areas, especially camera sensors.

10.4 Battery Maintenance

- Avoid overcharging/over-discharging the battery. Disconnect power promptly after use.
- We do not recommend leaving the charger plugged in for extended periods.
- For long-term storage, we recommended storing with a 50%–70% charge. The 30-Ah main battery should be charged every 2–3 months. For the 3-Ah battery, due to its smaller capacity, regular charging is essential (when fully charged, the maximum charging interval should not exceed 20 days). Regular charging can be done by connecting the main battery and powering on for about half an hour. Regular charging can effectively prevent capacity degradation caused by deep discharge and extend battery life.
- If the battery shows signs of aging, swelling, or a rapid decrease in battery life, contact technical support promptly for replacement.

10.5 Storage Recommendations

- The storage environment should be dry, ventilated, dust-free, with a recommended temperature of 0–30°C and humidity below 75% RH.
- Avoid contact with corrosive gases, flammables, or strong electromagnetic sources. Do not place in direct sunlight.
- We recommend storing the robot in its original transport case.

11. Troubleshooting

- If the product experiences any abnormalities during operation, refer to the table below for troubleshooting.

Fault Symptom	Possible Cause	Solution
Robot cannot power on normally	Battery depleted	Check if the battery level is normal.
Robot stands/walks unstably	IMU integration data needs balance calibration	1. Press the 'C' button on the remote control to immobilise the robot. 2. Raise the robot with the protective stand. 3. Press the 'D' button on the remote control to zero the robot. 4. Lower the protective stand, placing the robot on the ground, and keep it vertical for 1 minute to restore IMU data to a balanced state. 5. Ensure the 'H' joystick on the remote control is in the middle position and long press the 'A' button to make the robot stand. Observe if balance has been restored. If not, repeat the above steps and try again.
Incorrect zero-point posture of the robot	Original calibration data is lost, or zero point is shifted due to impacts during operation or handling	Contact the after-sales engineer for zero-point calibration.

- For other usage anomalies, contact the after-sales engineer for professional support.

12. After-sales Warranty

12.1 Warranty Policy

- The product is covered by warranty service from the date of receipt. The warranty scope is limited to performance failures not caused by human factors.
- During the warranty period, free repair or component replacement will be provided.

- The main warranty durations are as follows:

Type	Content	Warranty Period
Main unit	Robot and components	1 year
Actuators	Joint motors, etc.	1 year
Accessories	Batteries, power adapter, etc.	1 year
Protective parts	Casing, etc.	1 year

- If the user modifies, disassembles, or repairs without authorisation (including but not limited to disassembling the casing, adding/removing hardware, flashing non-official firmware), it will be deemed as automatic forfeiture of warranty qualification.

12.2 Non-warranty Clauses

- Issues arising beyond the warranty period.
- Damage caused by improper use or failure to operate according to the user manual.
- Damage caused by human or accidental factors such as misuse, drops, water damage, or impact.
- Issues caused by disassembly, repair, or component replacement by unauthorised personnel.

12.3 Repair Service Responsibility Statement

- If losses are caused by an incorrect address or recipient rejection, the user shall be responsible.
- If the company confirms a quality issue after inspection, it will bear the inspection fee, material fee, and return shipping costs.
- If the problem does not meet the warranty conditions, the user may choose:
 - Paid repair (including labour, inspection, material, and transportation fees).
 - Return of the original robot (return shipping costs at user's expense).
- Product repair may result in data loss. Please back up data in advance; the user shall be responsible for any consequences.
- System operations and log access may be involved during the repair process. By default, you authorise the company to access them.
- Within the warranty period, damaged parts that are replaced belong to the

company, and the new replacement parts belong to the user. Outside the warranty period, damaged parts that are replaced belong to the user.

- The company does not authorise any third party to provide repair services. For after-sales needs, contact the company directly.

Download Link for the Android Version of Tienkung Explorer App

Currently, the App only supports mobile devices running Android 10.0 or higher.



For detailed robot unpacking and packing procedures, refer to the online documentation.



Warranty Card

- Please keep this warranty card properly. It will not be reissued if lost.
-
- This warranty card must be provided when applying for warranty service.
-
- All information on this warranty card must be accurate; otherwise, it will be deemed invalid.
-

Customer Information

Product Model:	Product Number:
Customer Name:	Purchase Date:
Contact Phone Number:	

Warranty Record

Warranty Date	Fault and Solution	Completion Date	Customer Signature

Appendix — Acceptable Use Policy (AUP) for Walker Tienkung Products

I. Introduction

This Acceptable Use Policy (hereinafter referred to as 'AUP') aims to regulate the use of the company's Walker Tienkung Humanoid Robot series products (hereinafter referred to as 'Walker Tienkung Robot'), clarify the product's research purpose and commercialisation conditions, prevent abuse and misuse, and clearly define the responsibilities and obligations of users and deployers during use and development. This policy is formulated based on relevant laws, regulations, and common industry standards, and all relevant parties must strictly comply with it.

II. Definitions

Users: refer to individuals, research institutions, or other organisations that purchase, lease, or use Walker Tienkung Robot products.

Deployers: refer to individuals or organisations that install, configure, and operate the Walker Tienkung Robot in specific scenarios. The deployer may be the same entity as the user or different.

Secondary Development: refers to the act of users or deployers modifying, extending, or customising the robot's functions, programs, etc., based on the robot

provided by the company, using relevant tools, interfaces, etc., including using proprietary data to train models to enhance robot performance.

III. Scope of Application

This policy applies to all users and deployers of Walker Tienkung Robot products, regardless of their usage scenario.

IV. User's Duty of Care and Usage Responsibility

(I) Research Purpose and Commercialisation Restrictions

1. Users agree that the initial purpose of the robot is solely for scientific research, including academic research, technology development experiments, and scientific research project testing. Without legitimate and compliant secondary development and adherence to the legal and compliance requirements applicable to corresponding scenarios, it is strictly prohibited to use the robot directly for any commercial activities, such as product promotion, commercial service provision, or industrial production processes.
2. If users wish to use the robot for commercial purposes, it must be achieved through secondary development. Secondary development must comply with this policy and relevant laws and regulations, and should be proactively filed with the company before commencing.
3. If users participate in multi-party collaborative research projects, they must ensure that the overall project complies with the usage scope stipulated in this policy and supervise the use of the robot by cooperative parties.

(II) Safety Use Obligations

4. Before using the robot, users should carefully read and understand the user manual, operation guide, and relevant safety warnings, and familiarise themselves with the robot's functions and potential risks. Operate, start, and shut down the robot according to correct operating procedures to avoid accidents such as physical collisions, personal injury, or property damage due to improper operation. For example, when starting the robot, ensure it is in a stable standing position with no obstacles around; during operation, do not arbitrarily change the robot's operating parameters unless under professional guidance.
5. To prevent the robot from causing harm to surrounding personnel and the environment during operation, users should use the robot in appropriate venues, ensuring the environment has sufficient space, no obstacles or dangerous items hindering robot movement, and necessary warning signs are set up to remind unrelated personnel to maintain a safe distance. If the robot is used indoors, ensure the indoor space is open to prevent the robot from colliding with obstacles during movement or actions. If it is used outdoors, choose flat, solid ground, away from water bodies, traffic roads, and densely populated areas.

6. Users should regularly inspect and maintain the robot, including but not limited to battery level checks, mechanical component wear checks, and software system updates, to ensure the robot is in good operating condition. If any fault or safety hazard is found in the robot, stop using it immediately and contact the company's customer service for handling. Do not attempt to repair it without authorisation to avoid more serious problems. Update the robot's software system promptly as prompted by the company to obtain the latest functions and security patches.

(III) Data Use and Protection

7. Regardless of whether collected by the company, the company owns the right to hold data generated during the users' use of the robot (excluding proprietary data). Without written authorisation from the company, users only have the right to use this data within the scope permitted by this policy and may not arbitrarily disclose, sell, or share it with third parties.

8. Unless otherwise agreed, proprietary data collected by users based on their own research needs is owned by the user. However, users must ensure that the collection and use of proprietary data comply with relevant laws, regulations, and data security requirements.

9. For data involving user privacy, deployers should strictly comply with relevant privacy protection laws and regulations, and take measures such as encryption and access control to ensure data security and prevent privacy leakage. For example, encrypting biometric data (such as voiceprints, facial recognition, gait data, etc.) or setting strict access permissions to ensure that only authorised personnel can access this data.

(IV) Secondary Development Responsibility

10. If users undertake secondary development, they must ensure that the development activities comply with local laws and regulations and the requirements of this policy. During development, it is forbidden to maliciously tamper with the robot's safety protection mechanisms and function limitations, or to develop functions for illegal purposes, such as infringing on the privacy of others or conducting malicious attacks.

11. Users should file with the company before secondary development, providing necessary information such as development plans, objectives, expected results, and data usage. Filing materials should include information about development team members, tools and technologies used for development, development cycle, data sources, and scope of use, among other information. The company has the right to take measures to stop unfiled secondary development activities, including but not limited to restricting robot use, requiring users to stop development, and restoring the robot to its original state.

12. If the robot developed through secondary development needs to be used for commercial purposes, the user must complete the relevant compliance approvals and certification processes independently to ensure compliance with commercial

standards. All risks and liabilities arising from secondary development or commercial activities shall be borne by the user. In case of malfunction, safety accidents, or violations of laws and regulations, the company shall not be held liable, and the user shall compensate the company for all losses caused by such acts, including but not limited to reputational damage and legal dispute compensation.

V. Deployers' Monitoring and Deployment Responsibilities

(I) Deployment Compliance

13. Deployers shall ensure that the robot's deployment scenario complies with the requirements for scientific research and teaching purposes or the commercial conditions after secondary development. The robot must not be deployed in non-compliant commercial operating venues or used for military or terrorist activities. Before deployment, a comprehensive assessment of the deployment environment must be conducted to ensure the environment is safe, stable, meets the robot's operating requirements, and complies with relevant laws, regulations, and safety standards.

14. If the deployment scenario involves multiple users, the deployer shall formulate corresponding usage rules and management systems to ensure that every user is aware of and complies with this policy and relevant usage rules. Deployers shall supervise user behaviour and promptly correct any violations.

(II) Safety Monitoring

15. Deployers must establish effective safety monitoring mechanisms to monitor the robot's operating status in real-time, including but not limited to the robot's position, movement trajectory, and operating behaviour. Technical means should be used to provide early warnings for potential abnormal situations, such as the robot deviating from its preset operating area or exhibiting abnormal movement speed or behaviour.

16. Regularly analyse safety monitoring data to assess robot usage risks, promptly identify potential safety hazards, and take corresponding preventive and remedial measures. If signs of abuse or misuse of the robot are found, immediately stop the robot's operation, notify the user and the company, and cooperate in investigations and handling.

(III) Compliance with the EU Artificial Intelligence (AI) Act

17. If deployment activities occur in the EU region or involve EU-related business, the deployer must ensure that the robot and related deployment activities comply with all requirements of the EU AI Act. Assess the robot's risks. If the robot is identified as a 'high-risk AI system', relevant obligations must be fulfilled according to the Act.

VI. Handling of Violations

18. If a user or deployer violates the provisions of this policy, the company has the right to take the following measures:

- Issue a written warning, requiring the violating party to immediately cease the violating behaviour.
- Suspend or terminate the violating party's access rights to the robot.
- Require the violating party to bear all losses caused to the company by the violating behaviour, including but not limited to product recall costs, legal compensation fees, and reputation restoration costs.
- If the violating party is a developer, the company has the right to revoke their developer registration qualification and prohibit their subsequent use of the company's robots for development activities.

19. If the violating behaviour is suspected of violating laws and regulations, the company will report it to relevant law enforcement agencies in accordance with the law, cooperate with law enforcement agencies in investigations and handling, and the violating party shall bear the corresponding legal liabilities.

VII. Disclaimer

20. The company only undertakes product quality warranty responsibility when the robot is used normally in accordance with this policy and the product user manual. The company shall not be held responsible for any robot malfunctions, damage, safety incidents, or any losses and liabilities caused by users or deployers' abuse, misuse, or unauthorised secondary development in violation of this policy.

21. Although the company is committed to providing safe and reliable robot products, due to technical limitations and complex operating environments, unexpected situations may still occur during robot use. For robot malfunctions or unexpected events caused by unforeseen and unavoidable reasons, the company will actively assist users or deployers in handling them but will not bear full responsibility for the resulting consequences.

VIII. Policy Revision

The company reserves the right to revise this policy based on changes in laws and regulations, technological developments, market demands, and actual usage conditions. The revised policy will be published on the company's official website and relevant product channels and will take effect 30 days from the date of publication. The continued use of the robot by users and deployers after the policy takes effect shall be deemed as their acceptance of the revised policy. If users or deployers do not accept the revised policy, they should immediately stop using the robot and handle relevant return or termination procedures as required by the company.

IX. Contact Information

If users or deployers have any questions, suggestions, or need assistance regarding this policy, contact the company through the following methods:

Company Name: UBTECH ROBOTICS CORP. LTD.

Tel: +86-400-6666-700 (Monday to Friday, Beijing Time: 9:00–18:30)

Email: ucare@ubtrobot.com

Office Address: 22F, Building C1, Nanshan Smart Park, No. 1001 Xueyuan Avenue, Nanshan District, Shenzhen