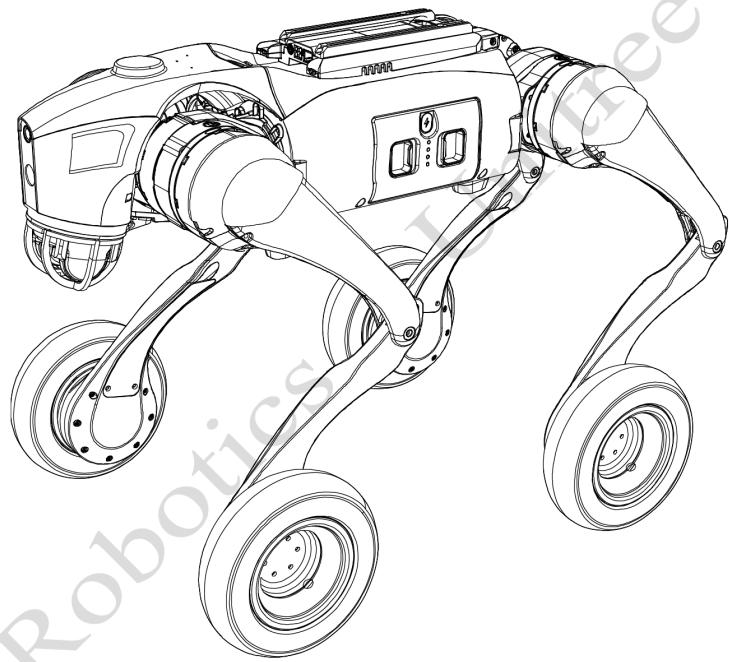


Go2-W

User Manual V1.0



Unitree

This product is a civilian robot. We kindly request that all users refrain from making any dangerous modifications or using the robot in a hazardous manner.

Please visit Unitree Robotics Website for more related terms and policies, and comply with local laws and regulations.

Safety Instructions

Go2-W is a globally high-performance, consumer-grade interactive quadruped wheel robot that requires practice to master the skills of manipulation.

- 1) This product is not a toy and is not intended for use by persons under the age of 14. Keep out of reach of children and be careful when operating in the presence of children.
- 2) It is your responsibility to be aware of the laws in your area and to comply with them.
- 3) This chapter is an introductory chapter for new users to manipulate robots. New users can quickly master how to use the handle to control the robot to show excellent movement performance by reading this section.
- 4) Do not lift the robot after it is powered up to avoid the robot performing unanticipated actions that could cause damage to itself !
- 5) Go2-W is a purely electric quadruped robot with certain anti-jamming, but the energy density of the motor is much lower than the hydraulic pressure. Do not push the robot suddenly and vigorously, nor to kick the robot, so if the robot falls and is damaged due to a sudden and strong push or kick, it will not be covered by the warranty.
- 6) Robot dog mounted with devices like docking station and LIDAR is prohibited to do side rolling. Side rolling can only be done in case there are no external devices on the back of the robot dog.

Requiring Environment:

- 1) Please do not run the robot in an electromagnetic interference environment. Sources of electromagnetic interference include but are not limited to: high-voltage power lines, high-voltage transmission stations, mobile phone base stations, and television broadcast towers.
- 2) Please do not run the robot in the Wi-Fi signal interference environment. Wi-Fi signal interference is usually caused by co-channel interference. In case of interference, be sure to turn off some or all Wi-Fi signal sources of other wireless devices before using the remote control to operate the robot.
- 3) Please keep it under control in the users' view when using the robot and keep the robot maintain a safe distance of at least 2 meters from obstacles, complex ground, crowds, water, and other objects.
- 4) Run the robot in 5°C -35°C with good weather condition. Do not run in inclement weather, such as fog, snow, rain, lightning, sandstorms, windstorms, tornado weather, etc.
- 5) The robot is not waterproof, so do not run it with water on the ground, in rain, snow, or wet conditions! The robot is not dustproof, please do not run it on gravel floors, dusty environments!
- 6) The wheel legged robot has certain requirements for the ground on which it walks. Do not use the robot on very low friction ground, such as ice. Do not use the robot on soft ground, such as thick spongy ground. If the robot is used on smooth ground, such as glass and ceramic tile, the users need to control the robot for movement carefully and smoothly, avoid violent movement, and reduce the walking speed of the robot to prevent the robot foot from slipping and falling.

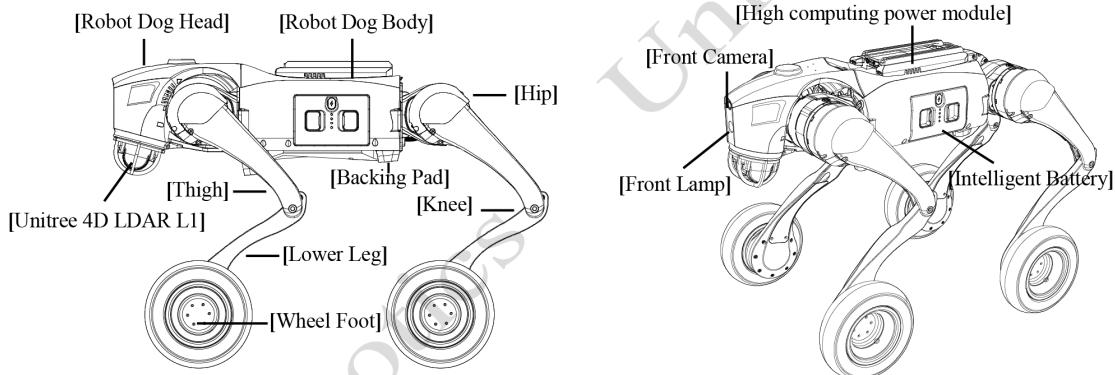


Understanding Your Go2-W

Introduction

The Unitree Go2-W Quadruped-Wheel Robot boasts 16 degrees of freedom (comprised of 16 precision aluminum alloy joint motors), employing force control technology to execute compound control of both force and position at each joint. This realizes force control over the entire machine, thereby achieving exceptional locomotive performance. Constructed with aluminum alloy and high-strength engineering plastics, the robot significantly enhances reliability. It boasts a top speed of 2m/s and is equipped with a 4D LiDAR L1, offering a $360^\circ \times 90^\circ$ hemispherical ultra-wide-angle sensing capability, enabling the Go2-W to achieve comprehensive coverage without blind spots. Supporting secondary development, it carries a computing power of 100Tops, facilitating faster and more efficient data processing capabilities. Compatible with multiple development frameworks, it paves the way for infinite possibilities in innovative applications.

Parts Name



Function Description

Function	Go2 AIR	Go2 PRO	Go2 EDU	Go2 W
Basic movement and actions	●	●	●	●
Condition Indication	●	●	●	●
Intelligent OTA Upgrades	●	●	●	●
Unitree Go App	●	●	●	●
Wi-Fi 6 / Bluetooth	●	●	●	●
Intelligent avoidance	●	●	●	○
4G Image Transmission	○	●	●	○
Intelligent Side-follow System	○	●	●	○
Voice Interaction	○	●	●	○
Auto Retractable Strap	○	●	●	○
Foot-end force sensor	○	○	●	○
Secondary development	○	○	●	●

1) Status Indication

Go2-W's head indicator light can emit different lights to show the current working status of the robot and the current operating system, please refer to the following table to learn more about the operating status indicated by different flashing modes and colors:

Color	Color and Flashing	Meaning
●	Flash in green	Switching on
●	Permanently on in green	Powered on
●	Low flash rate in blue	Motor & IMU calibration in progress
●	Low flash rate in yellow	Low battery warning, will automatically crouch down within 10 minutes
●	Low flash rate in red	System abnormality, boot failure, hardware failure, need to contact after-sales service.
●	Fast flash rate in red	Motor & IMU calibration failed
○	Permanently on in white	Head indicator light

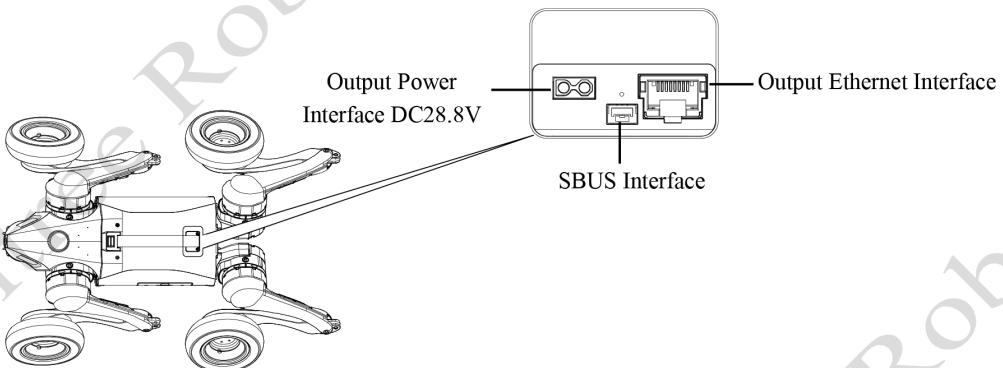
2) App remote image transmission

With the new Unitree Go App, it provides omni-directional ultra-wide image transmission, real-time viewing of shooting images, built-in 4G and eSIM for more stable connection and remote control. It intelligent OTA upgrades, which makes the operation in ultra-vision range as simple and convenient as being in the field.

3) Secondary Development

Standard equipped with an Nvidia Jetson Orin NX 16GB expansion dock, boasting 100Tops of computing power, it enables faster and more efficient computation and data processing capabilities. Supporting a variety of development frameworks, users can carry out secondary development tailored to their specific needs.

Go2-W Interface on the back:



Power Interface

DC 28.8V output, connected to Orin NX 8/16GB high computing power module BAT input.

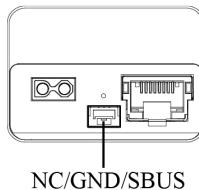


Ethernet Interface

Standard RJ45 interface, connected to User PC/Orin NX 8/16GB, RJ45 Ethernet interface.

SBUS Interface

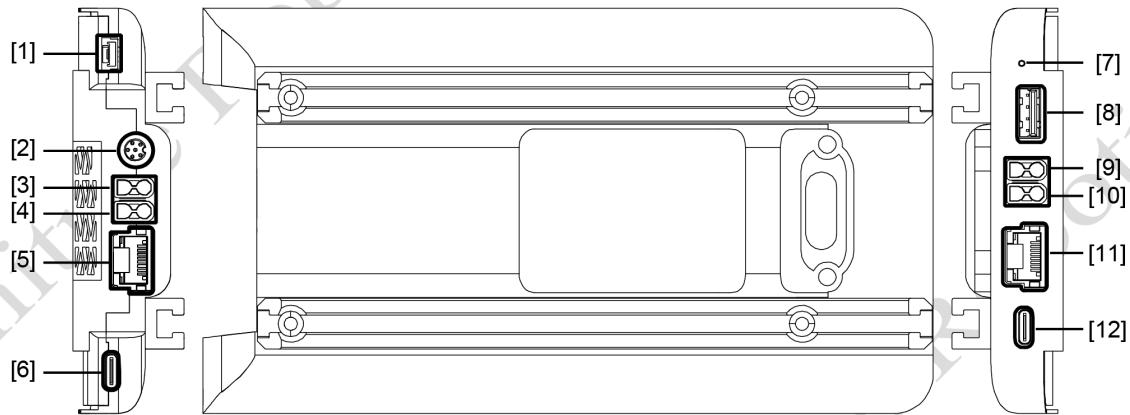
Used for communication connection on a universal remote control. This interface does not provide power output, and the interface definition (from left to right) is NC/GND/SBUS.



Jetson Orin NX 16GB		Notes
AI Performance	100TOPS	
GPU	1024-core NVIDIA Ampere architecture GPU with 32 Tensor Cores	
Maximum GPU Frequency	918 MHz	
CPU	8-core Arm® Cortex® A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3	
Maximum CPU Frequency	2 GHz	
DL Accelerator	2x NVDLA v2	
Maximum DLA Frequency	614 MHz	
Vision Accelerator	1x PVA v2	
Memory	8GB 128-bit LPDDR5 68 GB/s	
Storage	(Supports external NVMe)	
Video encoding	1x 4K60 (H.265) 3x 4K30 (H.265) 6x 1080p60 (H.265) 12x 1080p30 (H.265)	
Video Decode	1x 8K30 (H.265) 2x 4K60 (H.265) 4x 4K30 (H.265) 9x 1080p60 (H.265) 18x 1080p30 (H.265)	
Power consumption	10W – 25W	



The expansion dock provides SDK expansion interfaces for developers to continue developing more functions. The interface is illustrated as shown in the figure.



[1] GH1.25-4PIN 100M Ethernet port / Connect Small Servo Arm

[7] RORCE-RECOVERY

[2] M8 standard European aviation plug interface / Connect radar

[8] 5V/1A Type-A interface / User expansion

[3] 16-60V BAT input / Connect Go2-W / Small Servo Arm

[9] 12V/3A output / User expansion

[4] 16-60V BAT input / Connect Go2-W / Small Servo Arm

[10] 5V/3A output / User expansion

[5] RJ45 Gigabit Ethernet interface / Connect Go2-W

[11] RJ45 Gigabit Ethernet interface / User expansion

[6] USB3.2 Type-C interface / Connect depth camera

[12] Type-C Full-featured interface/ Connect the display screen.



Using your Go2-W

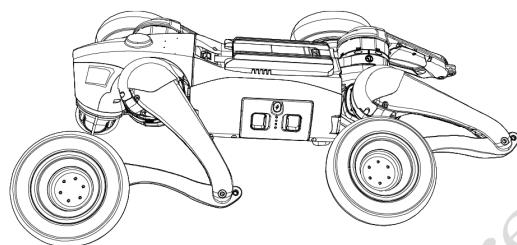
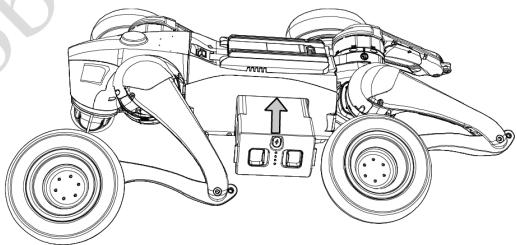
Instructions for use

Preparation before use

- 1) Only Use Unitree Robotics authentic parts and ensure that all parts are in good working condition.
- 2) Ensure that the firmware has been updated to the latest version.
- 3) The users ensures that he or she is not operating the robot while intoxicated, under the influence of drugs, and unable to concentrate.
- 4) Be familiar with the characteristics of each gait mode. Be familiar with the emergency braking method of the robot in case of instability / loss of control.
- 5) Ensure that there are no foreign matters (such as water, oil, sand, soil, etc.) inside the robot and its components.
- 6) Ensure that the surface of the robot's camera and LIDAR are free of dust and are not surrounded by obstructions.

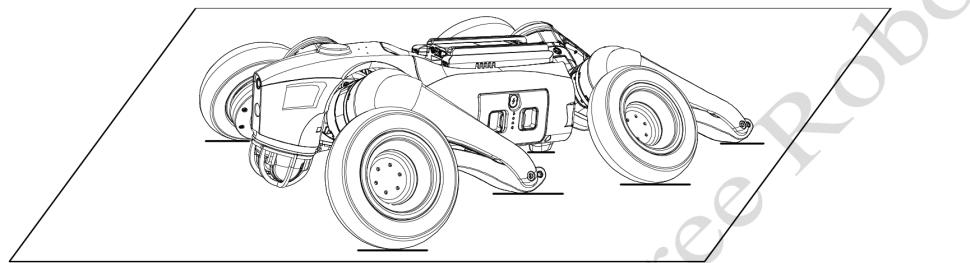
1) Installing Battery Packs

Lay Go2-W on a flat surface, insert the battery pack into the battery packs from the side of the robot, pay attention to the direction of installation, with the power switch button facing upwards. If the battery pack cannot be fully inserted, please adjust the direction of the battery packs and do not press forcibly to avoid damage to the battery interface and buckle. When you hear a "click" sound, the battery pack installation is complete.



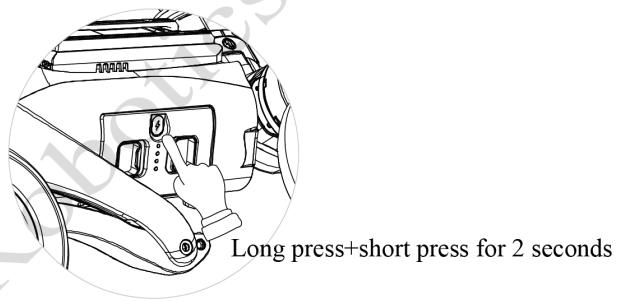
2) Body Placement (Important !)

Horizontal start-up: Please make sure that the robot is placed on a flat surface before start-up, that the robot's abdominal support pad is flat on the ground, that the robot's body is lying on the ground horizontally without any tilting, that the robot's lower legs are in a fully retracted state (as shown in the picture below), and that all four joints and the ends of the feet are placed on the ground flatly to make sure that the robot's thighs and lower legs are not pressed down by the robot's body.



3) Start up Go2-W

After the robot is placed according to the requirements, start it up according to the following steps: Firstly, press the Go2-W power switch button briefly for 1 time, then press the power switch button for 2 seconds or more, then Go2-W can be started up. During the startup process, the Go2-W head indicator light flashes in green. And wait for 2 minutes, the head indicator light is in green permanently, and the body is parallel to the ground, then the robot is started up.

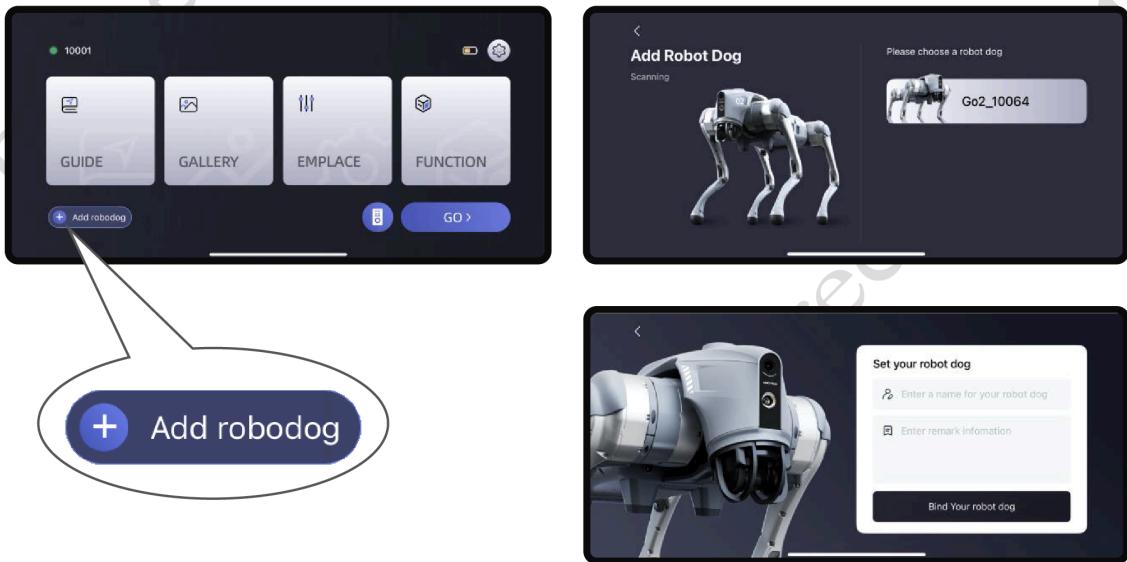


4) Bind Unitree Go App

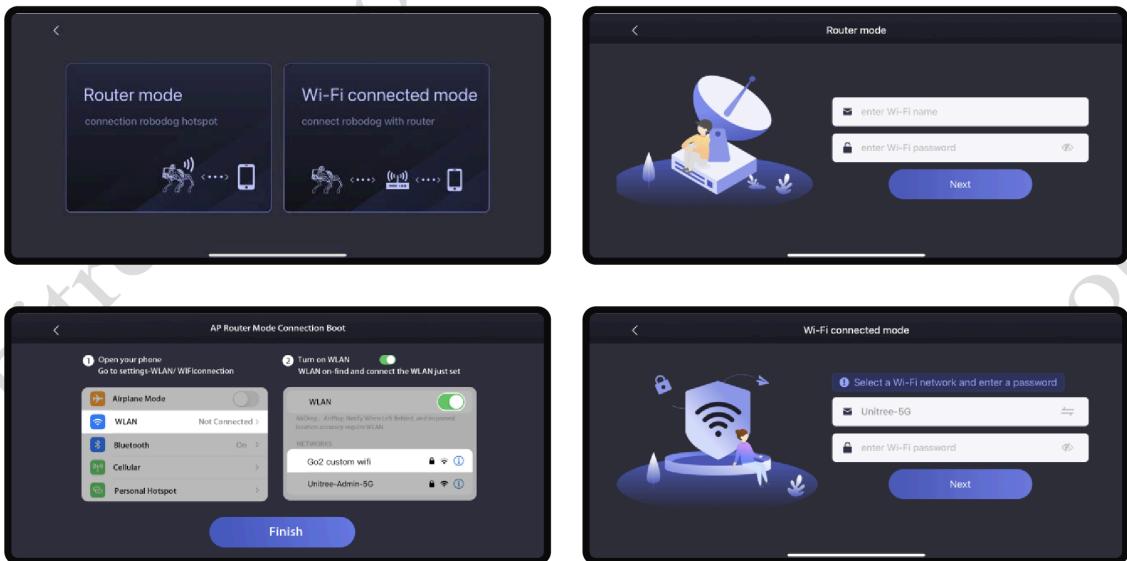
The first use requires binding. During the binding process, please turn on the phone's Bluetooth and bring the phone close to Go2-W to ensure real-time Bluetooth communication.

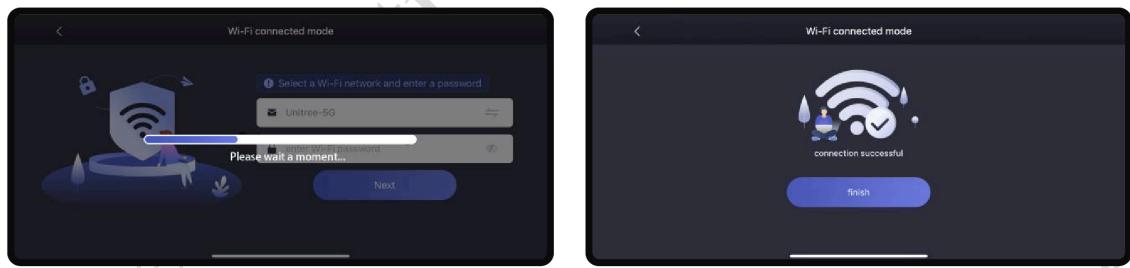
a) Download and install the Unitree Go App, complete the registration login sequence.

b) Add robot: Home page -add robot-open Bluetooth to connect your Go2-W-set robot information.



c) Bind the robot: you can choose AP router mode and Wi-Fi connection mode to connect, you can learn the built-in tutorial to quickly master the operation skills after successful connection .





How to change the account binding?

Home page- Settings - Robot Settings - Switch Connection, choose to click Unbind, you can unbind the bound robot dog. After the robot dog is unbound, it can be bound by other users.



- ⚠ a) Please keep your mobile phone's bluetooth on during connection!
- b) Bluetooth connection error: Unitree Go App needs to get Bluetooth permissions, please open Unitree Go Bluetooth permissions in the App.
- c) If you forget your bound account, or if you lose your account, please contact the relevant Unitree staff!

5) Operate your Go2-W

● Use the Unitree Go App to control

After completing the built-in tutorial in the Unitree Go App, you can use the app to control your robotic dog as you want.

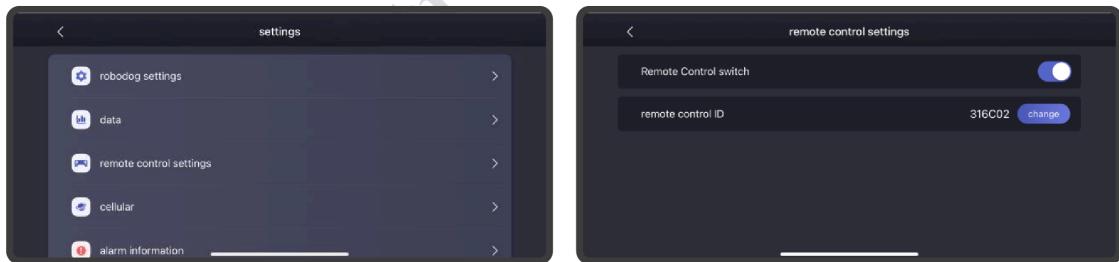


● Use voice control Go2-W

At present, Go2-W offline voice only supports Chinese conversations. If users want to have conversations in English, they can guide them to use App Benben Dog. By changing the phone system to English, the app can communicate with Benben Dog in English and issue commands.

● Use handheld remote control to control Go2-W

For the first time to use handheld remote control, you need to bind it on Unitree Go App, [Settings] -> [Remote Control Settings] - turn on the remote control switch, enter the corresponding remote control code, and then you can bind it with the digital transmission module on the robot dog.



The digital signal lights on the left side of the two handed remote control are all on, indicating a successful connection. At this point, you can use the instructions on the remote control to control the robot dog to complete the corresponding actions.

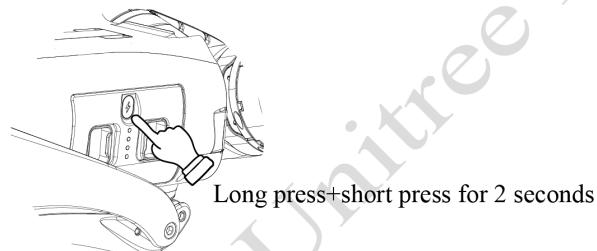
 Please visit Unitree Go App to trigger more athletic modes!

6) Switching off Go2-W

Before switching off, please make sure that the robot is standing on a flat surface, and make sure that the robot is in a static standing state (the robot body position is in the initial state on the power-up, the body is horizontal, and the state is in the static standing state).

- a) Operate the robot into the prone state;
- b) After the robot enters the prone state, short press the power button then long press the power button for 2 seconds to switch off the robot.

After switching off the robot, please follow the body placement requirements and position Go2-W's big and small legs and hip joints to prepare for the next start-up. If you do not use the Go2-W for a long time, please remove the battery pack and place the Go2-W in the designated luggage.



Please make sure that the robot turned off in a damping state, otherwise the robot will fall heavily on the ground after it is turn down and powered off, which may cause damage to the robot body and certain potential hidden dangers! If the power on fails, please check if the robot body is placed correctly.



Explanation of abnormalities

When using Go2-W quadruped wheel robot, robot abnormalities may occur. Most of the abnormalities are controllable (with solutions), customers should not panic when encountering these problems, read the following content and follow the following steps to solve the problem.

If you have any questions, please contact the official technical support of Unitree:
support@unitree.cc.

1) Go2-W does not stand up after switching on with head flashing red light

Go2-W head red light flashing slowly, this means power on failure, carefully check the robot power on placement, re-position and then reboot. If the robot still fails to stand up, there may be system abnormality or hardware failure, then you need to contact Unitree official technical support to troubleshoot the problems.

2) App connectionerror error

If using AP connection mode, please check whether the mobile phone is connected to the AP hotspot issued by Go2-W.

If using Wi-Fi connection mode, please check whether the connected Wi-Fi network is normal and can connect to the external network.

If using 4G connection mode, please check the current traffic situation under [Settings]->[Mobile Network] of the App to ensure that the 4G IoT card connects to the external network.

3) Abnormal standing posture after switching on

After Go2-W is switched on, if walking posture is abnormal and it is easy to fall down, etc, and restarting the robot cannot solve the problem, at this time, you need to re-calibrate the robot joints according to the relevant steps in Unitree Go App.

Note: Go2-W has been calibrated in factory default settings, please do not calibrate the joints for normal use! Please consult Unitree's official technical support to determine whether you need to re-calibrate the joints after Go2-W has an abnormal situation!

App joint calibration entrance is [Settings]->[Data]->[Machine Dog]->[imu Information]->[Calibration].

4) Radar stops rotating when meet external force

Normally, when relieving external force, the radar will automatically resume rotation. If it still can't work, you can try to make the radar roll by fiddling with your hand. If the problem still remain unsolved, please try to restart Go2-W. If it can't be solved after restarting, you can check the malfunction details on the app, and consult with Unitree's official technical support.



Cautions

- 1) Please make sure that the robot is lying down for switching off, otherwise the robot will fall heavily on the ground after switching off and powering off, which may cause damage to the body and remain certain hidden safety hazards!
- 2) When standing up, when the ground friction is insufficient or the robot's feet are not reliably supported, please do not operate the robot strenuously to adjust its posture (including pitching, rolling, yawing, fuselage height adjustments, etc.), otherwise it may cause the robot to fall down.
- 3) Please walk the robot on flat terrain. If you are walking on ground with low friction, do not operate the robot strenuously, otherwise it may cause the foot end to slip and fall.
- 4) The rated endurance of the robot is about 1-2 hours with no load static standing and upright walking alternately. It depends on the actual operating conditions of the robot, such as walking at a faster speed for a longer period of time, drastically adjusting the body attitude for a longer period of time while the robot is standing, standing with the robot legs bent, running with a load, walking at a lower body height, and terrain with appropriate undulations and slopes, etc., which will reduce the endurance time. (Lower body height and more knee bends place a greater burden on the motors and therefore increase power consumption significantly earlier and are accompanied by motor heating).
- 5) Because the levels of proficiency of the operator are different. To safety reasons, it is not currently recommended that robot walk stairs higher than 16cm, otherwise it is likely to trip over the foot due to improper operation. When encountering undulating ground, the operator should also be careful and reduce the speed of the robot. (AIR version has a maximum climbing drop height of 15cm).
- 6) Go2-W is rated for a positive climbing angle of less than or equal to 40°. When a larger climbing angle is used (approximately equal to or greater than 40°), the robot body is likely to drift sideways, and direct turns on slopes with a large gradient are likely to destabilise the robot; reduce walking speed when climbing; proper control by the operator is required. (Maximum slope is 30° for AIR version).
- 7) Go2-W can reach a maximum speed of 3.5m/s on flat terrain. (Maximum speed 2.5m/s for AIR version).
- 8) The robot foot end is a consumable item and a spare foot end will be included with the delivery. Especially walking on relatively rough ground, it will be worn out seriously. If there is obvious foot pad abrasion, damage, or loud noise when the robot walking on the ground, please replace the foot end in a timely manner, so as to avoid the damage to foot and malfunction of the robot movement.
- 9) It is forbidden to use the robot on the occasions where the terrain is complicated, the ground is wet, there are sundries on the ground, the terrain is undulating (steps higher than 18cm, etc.), and the slope is large (more than 40°) and there are sharp objects on the ground or in the periphery.
- 10) Hand may be pinched at the motion joints, such as at the knee joint, please be careful.



Disclaimer

To avoid violations against laws, possible injuries and damages, it is important to comply with all of the following:

- 1) This product is not a toy and is not intended for use by persons under the age of 14. Keep out of reach of children and be careful when operating in the presence of children.
- 2) Please be sure to read this article carefully before using the product, understand how to use the product correctly and your legitimate rights, responsibilities, and safety instructions. Once used this product, you are deemed to have carefully read, understood, recognized, and accepted all the terms and contents of this article. Users undertake to be responsible for their actions and all consequences therefrom. Users undertake to use this product only for legitimate purposes and agree with these terms and any relevant policies or guidelines that Unitree may establish.
- 3) To the fullest extent permitted by law, under no circumstances does Unitree provide any express or implied warranty with respect to this product, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, or non-infringement. To the fullest extent permitted by law, Unitree disclaims all liability for damages arising from the user's failure to use the product in accordance with this document. Unitree will not be liable for any indirect, consequential, punitive, incidental, special or exemplary damages, including those suffered as a result of your purchase of, use of, or inability to use the Product (even if Unitree has been advised of the possibility of such damages). To the fullest extent permitted by law, in no event will Unitree's total liability to you (whether in contract or otherwise) for all damages, losses and actions arising out of or in connection with the use of the Product exceed the amount paid by you to Unitree for the Product (if any).
- 4) Unitree Robotics does not guarantee that the products / services provided are completely free from defects and fully meet the customer's requirements.
- 5) This product is strictly prohibited from private disassembly, modification, prohibit informal maintenance, the above behaviour caused by all failures and damage, Unitree does not assume any responsibility.
- 6) This product is strictly prohibited in unconventional environments (such as high temperature, extreme cold, chemical corrosion, fire blisters) and other scenarios of operation and use, Unitree will not assume any responsibility for all failures and damages caused by the above.
- 7) Under normal use of this product, the normal natural wear and tear of the parts and components and battery aging caused by the failure and risk of the burden as the normal use of the product risk, Unitree will not bear the corresponding consequences and responsibilities.
- 8) The laws of some countries may prohibit the exclusion of warranty terms, so your rights in different countries may be different.



9) Unitree reserves the right to interpret the above terms and conditions in accordance with the laws and regulations. Unitree reserves the right to update, revise or terminate these Terms at any time without prior notice.

