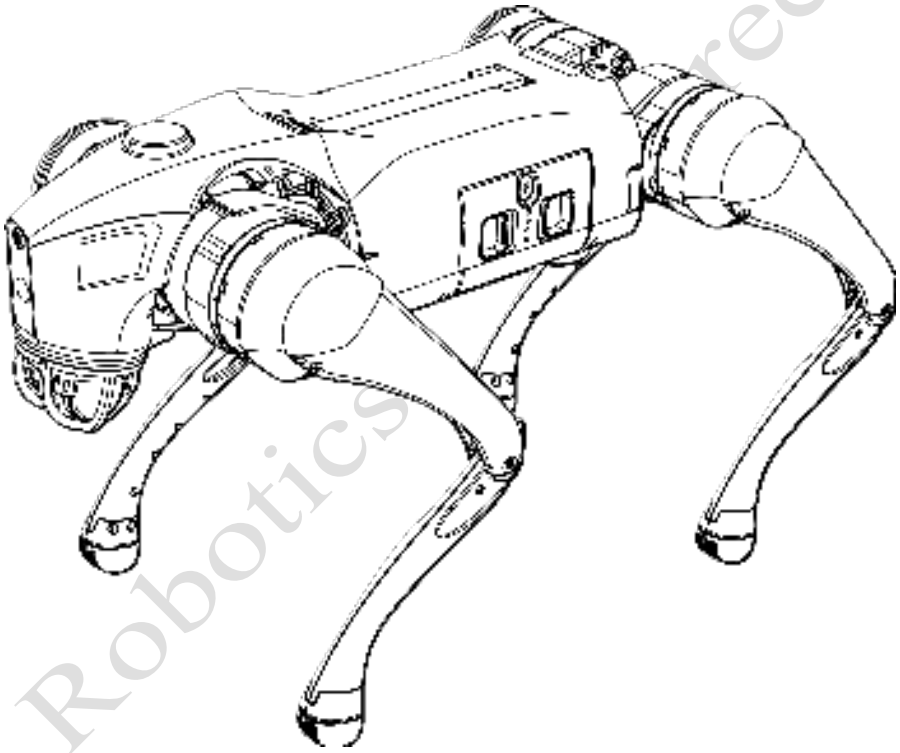
Go2

User Manual V1.0



Unitree

www.unitree.com

Safety Instructions

Go2 is a globally high-performance, consumer-grade interactive quadruped 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 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!

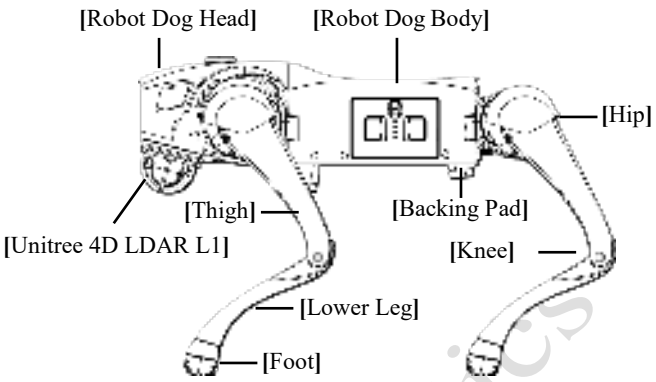
6) The legged robot has certain requirements for the ground on which it walks. Do not use the robot on very low friction ground, such as ice. Do not use the robot on soft ground, such as thick spongy ground. If the robot is used on smooth ground, such as glass and ceramic tile, the users need to control 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.

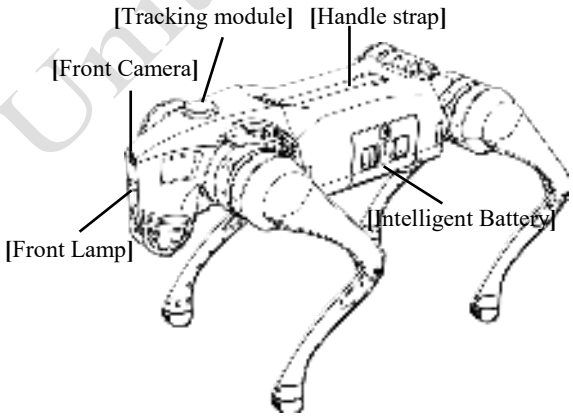
Understanding Your Go2

Introduction

Unitree's new upgrade interactive bionic quadruped robot Go2 has 12 degrees of freedom (composed of 12 aluminium alloy precision joint motors), and employs force-control technology to provide composite control of force and position for each joint, in order to achieve force-control of the whole machine to achieve excellent motion performance. The whole robot is made of aluminium alloy and high-strength engineering plastics, which greatly improves the stability and reliability of the machine dog; the maximum running speed can reach 5m/s (measured in the laboratory).Equipped with 4D LIDAR L1 with 360°×90° hemispherical super wide-angle sensing, which can help Go2 to achieve no blind area coverage. It reaches the leading level at home and abroad both in terms of structure, motion performance, environment perception, and side following.

Parts Name





Function Description

Function	Go2 AIR	Go2 PRO	Go2 EDU
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'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
	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 green	Powered on
	Flash in green	Switching 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
	Permanently on in white	Head indicator light

2) Intelligent Avoidance

Equipped with Unitree's self-developed 4D LiDAR L1 with 360°×90° hemispherical ultra-wide-angle perception, boasting ultra-low blind spot, the minimum detection distance is as low as 0.05m, which can help Go2 to achieve a blind spot-free coverage, real-time access to three-dimensional information about the surrounding environment, and in the process of travelling according to the radar data to carry out intelligent avoidance (only support forward obstacle avoidance), to avoid collision and ensure the safety of the robot and the surrounding environment.

3) Intelligent Side-follow System 2.0 (ISS2.0) (Not supported by AIR)

By adopting the new wireless vector positioning and control technology, the positioning accuracy is technically upgraded by 50%, the remote control distance is over 30m, and combined with the optimised obstacle avoidance strategy, it can make the robot better traverse complex terrain.

4) Voice Interaction (Not supported by AIR)

Supports voice interaction and commands and built-in voice recognition module, and converts human language into computer language to communicate with the main chip, so as to control the robot and achieve human-machine language interaction. Reaches voice interaction response at millisecond level, using the industry's advanced voice recognition technology with high recognition accuracy, fast literacy.

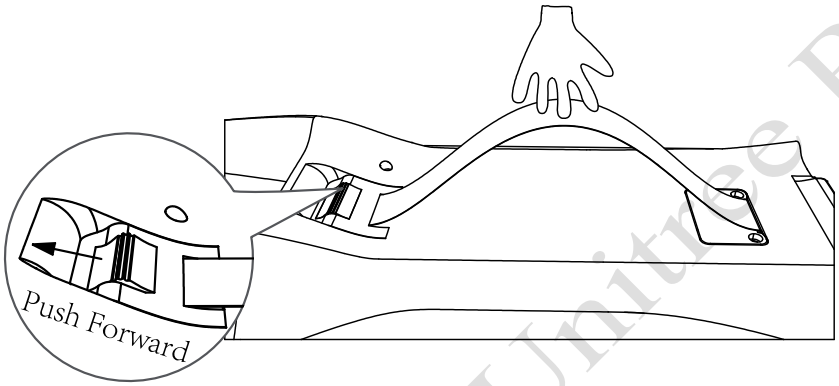
5) App remote image transmission

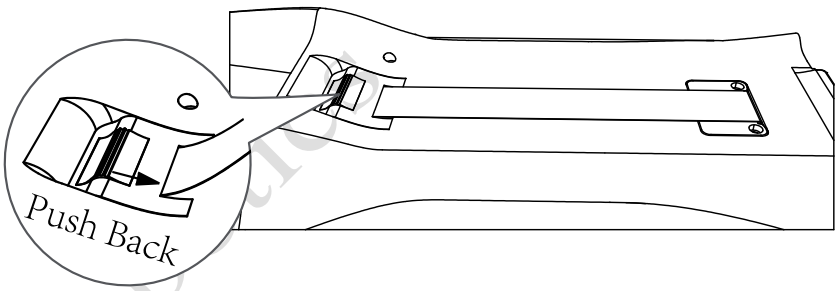
With the new Unitree Go App, it provides omni-directional ultra-wide image transmission, real-time viewing of shooting images, built-in 4G and eSIM (not supported by AIR) for more stable connection and remote control. It intelligent OTA upgrades, which makes the operation in ultra-vision range as simple and convenient as being in the field.

6) Auto Retractable Strap (PRO version only)

The Go2-PRO version has a new upgraded auto retractable strap with a built-in bi-directional tensile winder, through which the height of the hand strap can be adjusted according to the user's needs. The auto retractable carry handle belt is driven by motor to drive the carry handle belt to extend/contract, which makes Go2 more simple and beautiful in appearance.

How to use the auto retractable strap: After Go2 is powered on, push the retractable button forward, you can pull the strap out to the right position to fix it, push the retractable button backward, the strap will be automatically retracted.

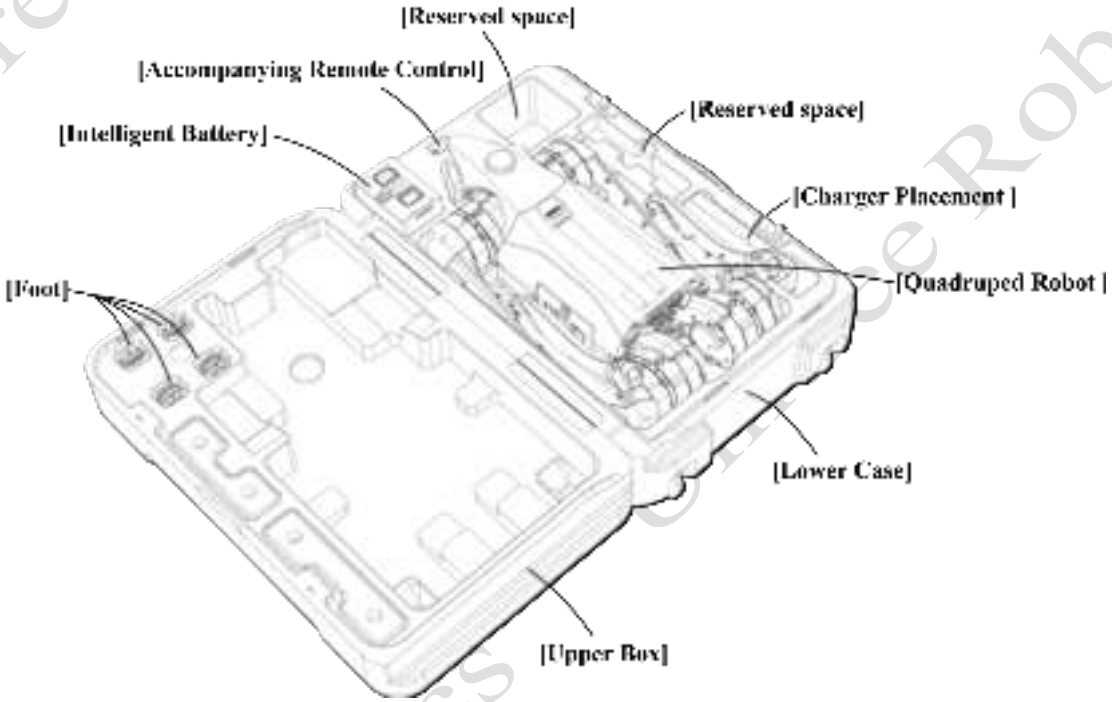




Using your Go2

Transportation Box Description

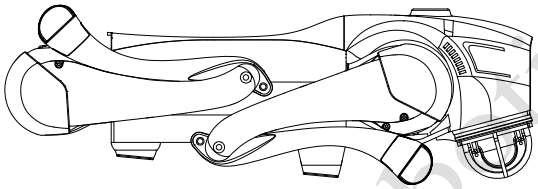
The picture is only used to illustrate the placement of parts, please refer to the received content. The accessories of different models will be different, please refer to the actual model.



Unpacking

Place the box face up on a flat surface, then open the upper box. Lift the robot out of the box by using the strap, and remove the accessories from the box in order. After learning how to use the robot correctly, place the quadruped robot flat on a level surface and prepare it for power-up.

Packing



Preparation for packing: Rotate the legs of the quadruped robot to the position shown in the picture (rear leg retracted step: rotate the rear leg hip motors so that the rear thighs are placed in the position as the picture shows, and at the same time retract the rear lower legs to the position shown in the picture.

After completing the preparatory work fpr packing, load the quadruped robot into the lower box in the direction shown in the picture (pay attention to the head of the quadruped robot to be stuck into the head placement in the process). After the quadruped robot is loaded, put the battery and charger that come with the shipment into the corresponding positions in the transport box to ensure that none of the above parts will fall off when the upper box is closed.

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.

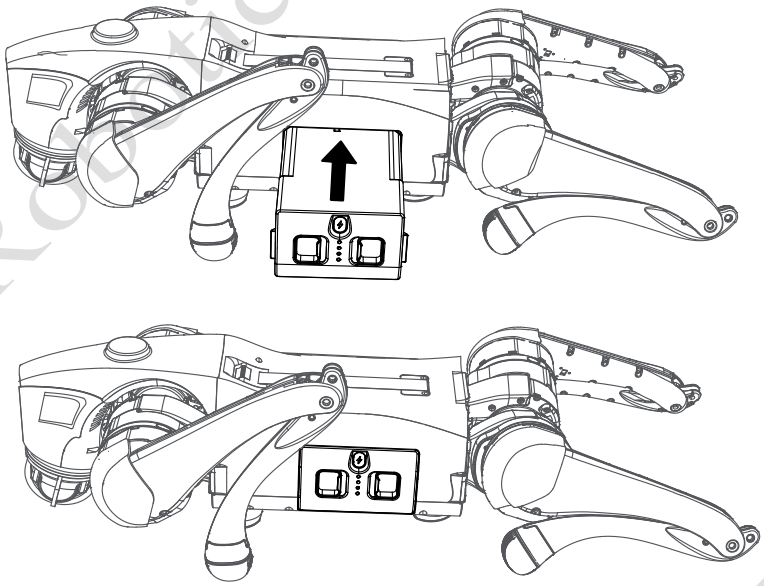
4) Be familiar with the characteristics of each gait mode. Be familiar with the emergency braking method of the robot in case of instability / loss of control.

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.

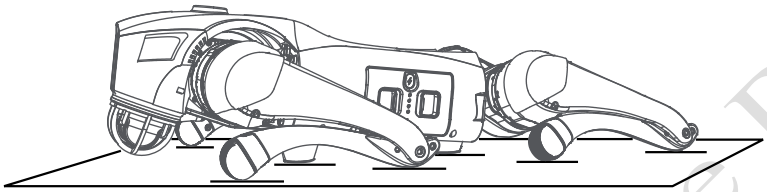
1) Installing Battery Packs

Lay Go2 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.



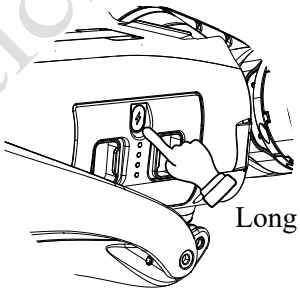
2) Body Placement (Important !)

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

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



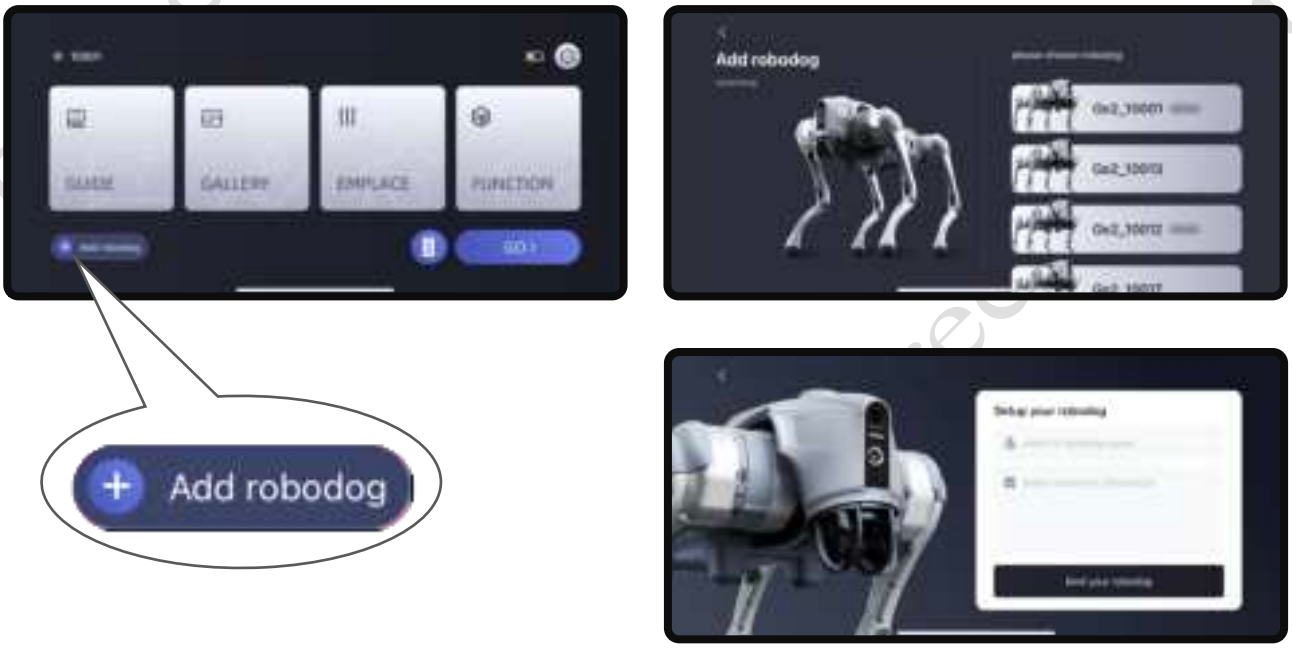
Long press+short press for 2 seconds

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 to ensure real-time Bluetooth communication.

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

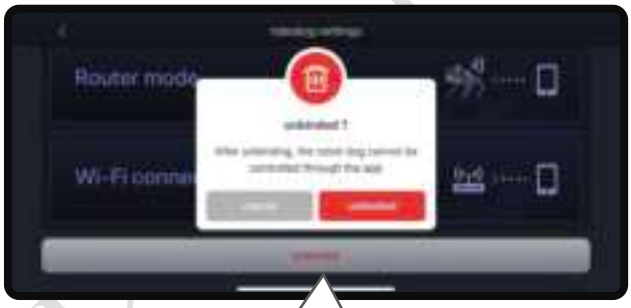
b) Add robot: Home page -add robot-open Bluetooth to connect your Go2-set robot information.



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) Go2 Operate your Go2

- **Use the Unitree Go App to control your Go2**

After completing the built-in tutorial in the Unitree Go App, you can use the app to control your Go2 as you want.

- **Use voice control Go2**

Go2-EDU has a built-in voice module. You can use the following voice commands to control Go2 to complete the corresponding actions.

Type	Phrase	Voice response	Corresponding action
Wake up	Hey Benben	I'm here.	
Command word	Turn up the sound	Yes sir.	Adjust volume.
Command word	Turn down the sound	OK sir.	Adjust volume.
Command word	Show me a dance	OK, let's dance!	Dance.
Command word	Wiggle Butt	As you wish.	Perform a wiggle.
Command word	Bow with hands	Wish you good luck!	Stand up and bow.
Command word	Lock	Yes, sir. It's done.	Stop the movement and get locked.
Command word	Unlock	OK, now I can move.	Get Unlocked.
Command word	Move forward	No problem.	Unlock and start motion mode to advance for 2s.
Command word	Climbing mode	I'm climbing now.	Start stair climbing mode.
Command word	Running mode	I'm the Flash.	Start run mode.
Command word	Turn on obstacle avoidance	Yes sir.	Start obstacle avoidance.
Command word	Turn off obstacle avoidance	No problem	Stop obstacle avoidance
Command word	Roll over	I'm rolling	Stop rolling.
Command word	Stretch yourself	What a sunny day!	Stretch
Command word	Shake hand	OK sir	Stop moving and lift the front legs to shake hands
Command word	Lie down	I'm tired/I'm sleepy	Stop moving, first switch to standing low, then enter damping mode
Command word	Stand up	Let's go!	Stand up and lock on

.....

Visit the Unitree Go App-Go2 Voice Phrase for more !

- **Use handheld remote control to control Go2 (Optional)**

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, which means that the connection is successful. Then you can use the remote control to control the robot dog to complete the corresponding action.

Button		**Effect**
Left Rocker	Push Forward/Backward	Move back or forth
	Push Left/Right	Sideways movement
Right Rocker	Push Fforward/Backward	Head up or down
	Push Left/Right	Left or right turn
Switch Mode		
START		Get Unlocked
		Walking Mode
		Keep Walking Mode(double click)
SELECT		Make a pose
L2 (Long Press) + A (Click)		Locking Posture 1: lock joints when standing
		Locking Posture 2: Press again to go prone
L2 (Long Press) + B (Click)		Damping Mode (soft emergency stop)
L2 (Long Press) + START (Click)		Running Mode
L2(Long Press) + START (double Click)		Keeping Running Mode
RIGHT (Long Press) + START (Click)		Stair Climbing Mode 1: go upstairs forwards and downstairs backwards.
LEFT (Long Press) + START (Click)		Stair Climbing Mode 2: go downstairs forwards
L1 (Long Press) + SELECT (Click)		Endurance Mode

Customised Movements	
L2 (Long Press) + X (Click)	Back to stand up after falling down
R2 (Long Press) + A (Click)	Stretch
R2 (Long Press) + B (Click)	Shake hands
R2 (Long Press) + Y (Click)	Cheer
R1 (Long Press) + X (Click)	Punch
R1 (Long Press)+ A (Click)	Jump Forward
R1 (Long Press)+ B (Click)	Sit down
L1 (Long Press)+ A (Click)	Dance 1
L1 (Long Press) + B (Click)	Dance 2
Function	
X (Click)	Avoidance on (Default)
Y (Long Press for 3s)	Avoidance off
L2 (Click) + SELECT (Click)	Searchlight Switch - Default Off
Arrow keys left and right	Light switch-default green
Parameter settings	
L1 +Arrow keys up/down	Adjust leg lift height
Arrow keys up and down	Adjust body height

Please visit Unitree Go App to trigger more athletic modes!

a) Moon walk: Can only be triggered by the App, not supported by handheld remote control.

b) Side Step Mode: Can only be triggered by the App, not supported by handheld remote control.

c) Cross step mode: Can only be triggered by the App, not supported by handheld remote control.

d) Parallel leg running mode: Can only be triggered by the App, not supported by handheld remote control.

- **Go2 Use the companion remote control to control Go2**

Step1: Turn on the ISS in the mobile phone App

a) Open Unitree Go App to connect Go2.

b) Open the manipulation interface -settings on upper right corner - motion status adjustment - side following.

c) Press OFF to turn on the side-following function.

Step2: Wear and start the companion remote control.

a) Buckle the remote control to the right side of the human body on the belt, stand on the left side of the robot, and keep your torso facing the same direction as the robot.

b) Short press the power button of the companion remote control, when the indicator light is on steadily the startup is finished, at this time the remote control is in rocker mode.

Step3: Start the side-following mode (Important step!)

a) Short press the M button twice to start the slow auto-following mode, the maximum speed at 1.5m/s.

b) In slow auto-following mode, short press M button twice to enter fast auto-following mode with maximum speed at 3.0m/s.

Step4: Turn on/off obstacle avoidance function

Short press L2 button twice to turn on the obstacle avoidance; short press once to turn off the obstacle avoidance.

Step5: Switch off the auto-following function

a) Short press M button once: stop following and enter the rocker control mode.

b) Switch on the rocker: Toggle the rocker to stop the follow mode immediately and enter the rocker mode.

c) Switch off: Long press the power button of the companion remote control for 2 seconds to switch off.

d) Horizontal Placement: Place the companion remote control horizontally.

Other operating instructions (For adjusting the machine)

a) Rocker control: When the companion remote control enters the rocker mode, the robot movement can be controlled by the rocker. Using the rocker control mode, the remote control can be taken off the belt for control. If you need to continue to use auto-follow after the remote control is taken off, you need to put the remote control on and then turn on the accompaniment.

b) Stand up, Down, Damped Mode:Short press 2 times consecutively, the robot switches cyclically between Down, Damped and Stand up modes.

c) Side roll: When the robot rolls over on its side, press and hold for 1 second to resume standing.

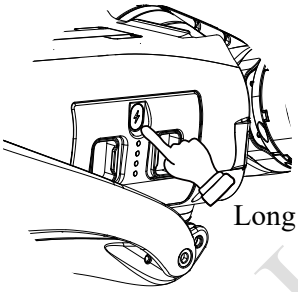
6) Switching off Go2

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's big and small legs and hip joints to prepare for the next start-up. If you do not use Go2 for a long time, please remove the battery pack and follow the packing steps to put Go2 into the dedicated luggage.



Long press+short press for 2 seconds

⚠ 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 quadruped 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 does not stand up after switching on with head flashing red light

Go2 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.

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) Can't use the App to control Go2?

Go2 cannot be controlled by companion remote control and App can't control Go2 at the same time. If you want to use App to control Go2, please exit the side-following mode first. Press the power button for 2 seconds to switch off the remote control. Then you can use the App to control Go2.

4) Abnormal standing posture after switching on

After Go2 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 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 has an abnormal situation!

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

5) 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. 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.

6) Restore Factory Settings

The reset button is on the back of Go2, which can complete the factory setting of Go2. The operation method is as follows: press the reset button (long press, do not release) in the power off state, power up the Go2 battery (short press + long press for 2 seconds), then you can reset the factory settings. Wait for the yellow light blinking after powering up Go2, at this time you can release the reset button and wait for the green light on the head of Go2, the system reset is successful, it takes about 30 minutes. When reset, please make sure that robot dog still has 3 or more bars of battery power!

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 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 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 16cm, 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 untaken 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.

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