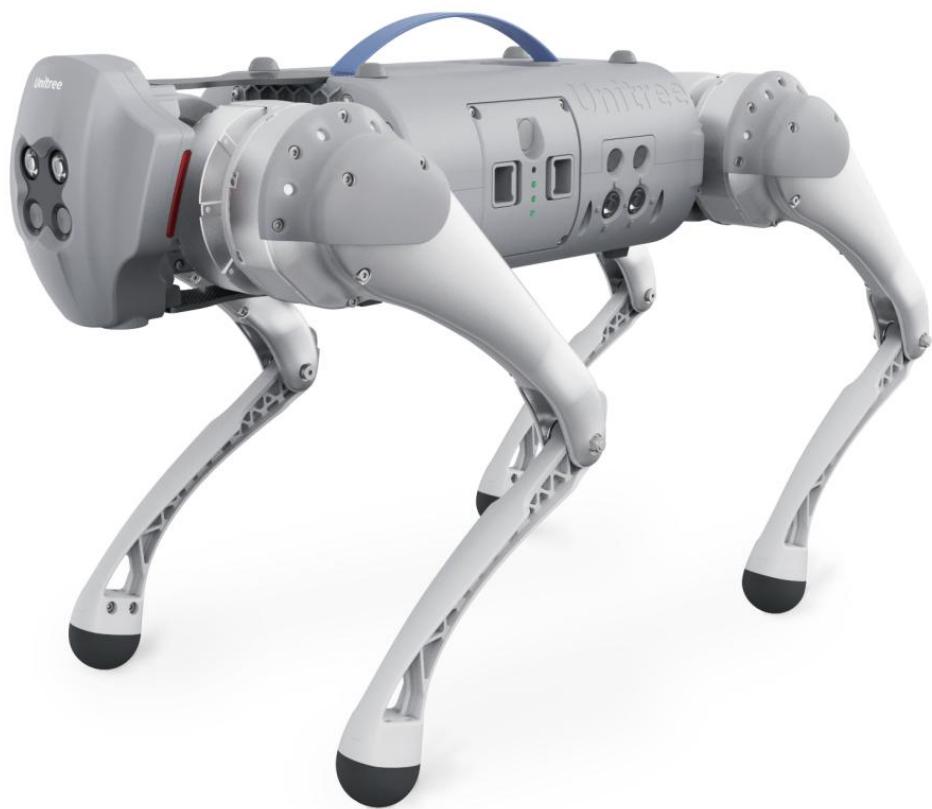


# Go 1

## Go Wherever You Will Go



Unitree

## Physical Characteristics

### Basic information

|                             |  |                     |
|-----------------------------|--|---------------------|
| Dimensions                  | LxWxH(Stand)   | 0. 645*0. 28*0. 4m  |
|                             | LxWxH(Folded)  | 0. 54*0. 29*0. 13m  |
| Machine                     | (with battery)   | 12 kg               |
| Load                        | 5kg (EDU version)  | 3kg (other version) |
| Maximum speed               | 3. 7 m/s (Air version 2. 5m/s)                           |                     |
| Operating time              | 1-2 h  |                     |
| Maximum angle climb         | 35°  |                     |
| DOF                         | Total 12, one leg 3                                      |                     |
| Power Outputs               | 5V, 12V, 24V etc.  |                     |
| Abundant External Interface | HDMI*3; Gigabit Ethernet port*1; USB*3; Integration      |                     |
| Interface                   | Interface *1   |                     |
| Protected Mode              | Fall protection, overheat, emergency stop protection     |                     |
| Warning                     | Low voltage, High temperature, Short circuit, overcharge |                     |
| Foot Force sensor           | 4 (only EDU)   |                     |
| Control                     | Remote/slave-follow/autonomous                           |                     |

## Brain System

### Main board

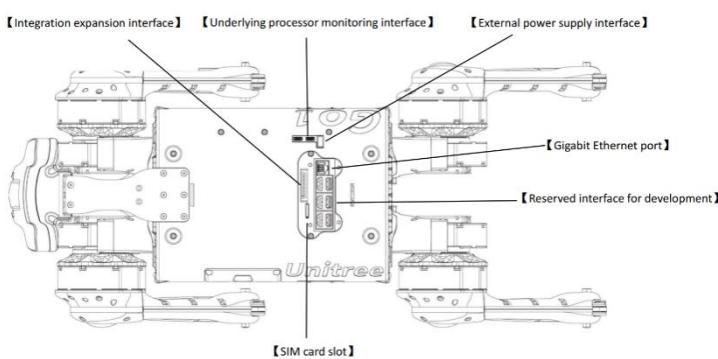
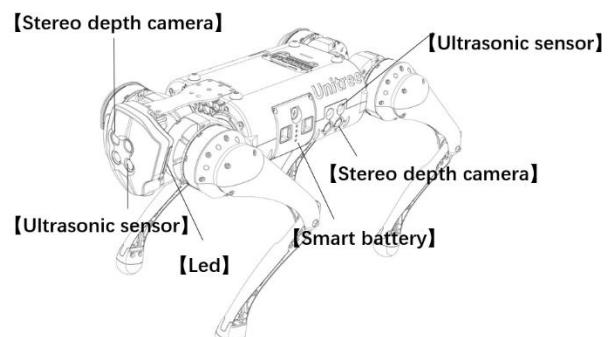
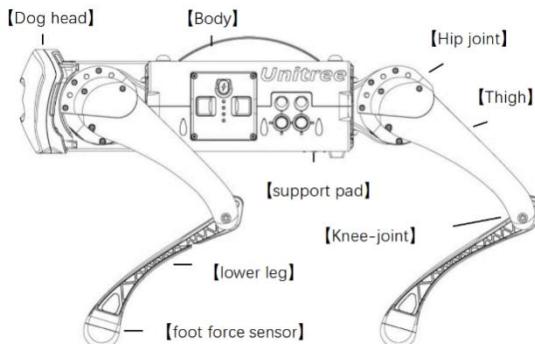
|                         |   |  |     |  |  |
|-------------------------|---|--|-----|--|--|
| Controllers             | Basic   | Motion   | × 1 |  |  |
|                         | Motion  | × 1, 4core@1.5GHz, memory DDR4L 2GB, flash memory 32GB |     |  |  |
|                         | Sensory controller                              | × 1 or × 3, Nano                                       |     |  |  |
| Processor upgrade       | EDU version machine support changing Nano to NX |  |     |  |  |
| Heat-dissipating method | cooling fin +fan                                |  |     |  |  |

### software

|                             |  |
|-----------------------------|--|
| Real-time operating systems | Motion control: Ubuntu                 |
|                             | Environmental Perception: Ubuntu-ROS   |
| Framework                   | ARM                                    |
| Programming                 | C++or C, Python, Graphical programming |

### Connect

|         |         |                          |
|---------|---------|--------------------------|
| Network | GE/WiFi | 4G or 5G                 |
| Data    | USB     | Integration Interface    |
| Others  | HDMI    | Bluetooth transfer image |



## HUMAN-MACHINE interaction

### Remote control handle

|                   |                                   |
|-------------------|-----------------------------------|
| Type              | Unitree Go1                       |
| Detachable rocker | 2                                 |
| Charging port     | Type C                            |
| LED               | Power display and charging status |
| Battery life      | 4 h                               |

### Smaller controller (UWB)

|                              |                               |
|------------------------------|-------------------------------|
| Angular positioning accuracy | ±5°                           |
| Positioning distance         | 0.1-3m                        |
| Sampling rate                | 50 Hz                         |
| Control mode                 | rocker*1, button*4, antenna*1 |
| Battery life                 | 4h                            |

### Speaker

|                       |             |
|-----------------------|-------------|
| Sound track           | left& right |
| Rated resistance      | 4 Ω         |
| Diameter              | 23.7 mm     |
| Scope of influence    | 380Hz-10KHz |
| Power rating          | 2 W         |
| Sensitivity           | 82 DB       |
| Quantity              | 1           |
| secondary development | Support     |

### Mobile phone APP

|                          |  |
|--------------------------|--|
| Virtual joystick buttons | Support                                |
| Image Retransmission     | Wifi/4G/5G                             |
| Simulator                | immersive robot dog simulator features |
| Function                 | RGB, depth map switch                  |

### Light

|                       |                        |
|-----------------------|------------------------|
| Secondary development | support                |
| LED                   | 64-color ambient light |

## Environmental sensor

### Fish-eye Stereo Depth Cameras

|                                |                   |
|--------------------------------|-------------------|
| Sets                           | 5                 |
| Totally Units                  | 10                |
| Single depth camera lens angle | 150*170           |
| Fish-eye AI Perception         | Human Recognition |

### Ultrasonic sensory

|                          |                          |
|--------------------------|--------------------------|
| Mileage                  | 5-200cm, 20-200cm (tail) |
| Measurement accuracy     | ± (1+S*3%)               |
| Temperature compensation | Support                  |

### Foot force sensor

|                  |    |
|------------------|----|
| Dimension        | 1  |
| Quantity         | 4  |
| Resolution ratio | 5g |

### High precision laser radar

|                             |             |                      |
|-----------------------------|-------------|----------------------|
| Radar type                  | 2D lidar    | 3D lidar<br>(16line) |
| Measuring distance          | ≤40m        | Reach 100m           |
| Operating voltage           | 5v          | 9-18V                |
| Operating temperature range | -5°C ~ 45°C | -10 °C ~ +60°C       |
| Weight                      | 165g        | 830g                 |

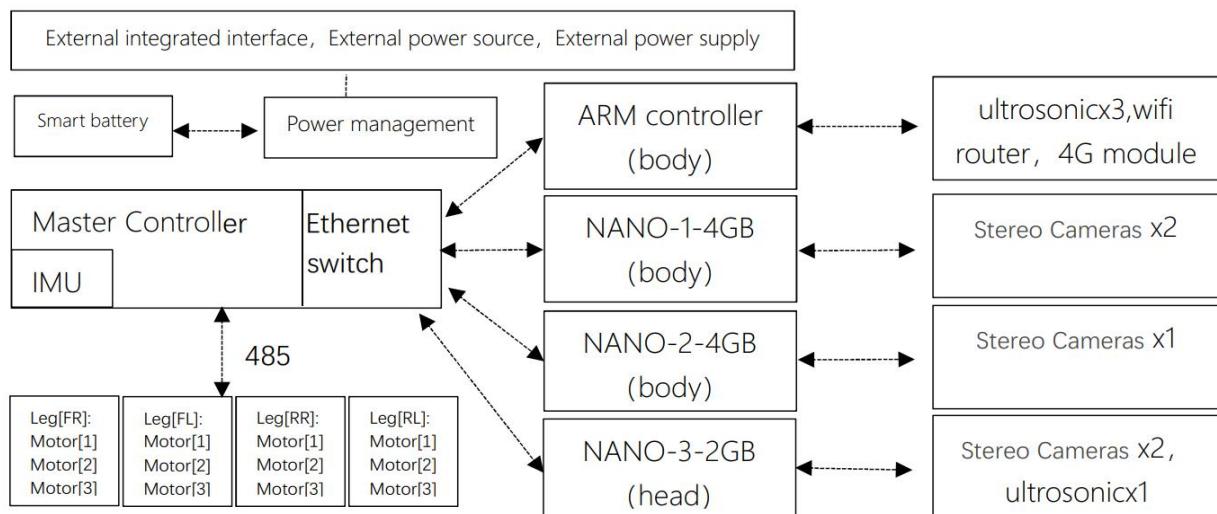
Navigation planning, dynamic obstacle avoidance, autonomous positioning, map construction and other functions. Support secondary development

### Inertial measurement unit (IMU)

|                   |    |
|-------------------|----|
| Body IMU quantity | 1  |
| DOF               | 6  |
| Dynamic accuracy  | 1° |

## User-friendly interface

- User PC could use ethernet to connect directly to the robot's built-in motion controller, sensory controller and underlying controller
- The robot base controller, robot on-board controller and user PC can communicate freely with each other to facilitate real-time transfer of visual perception and other data.
- Robot on-board sensors are fully open, available for secondary development
- Develop the underlying control: All motors and sensors of the robot can be read and controlled in real time, facilitating the direct use of open source robot algorithms
- Develop high-level control: could send high-level motion commands such as backward, forward, left, right and left movement directly to the robot



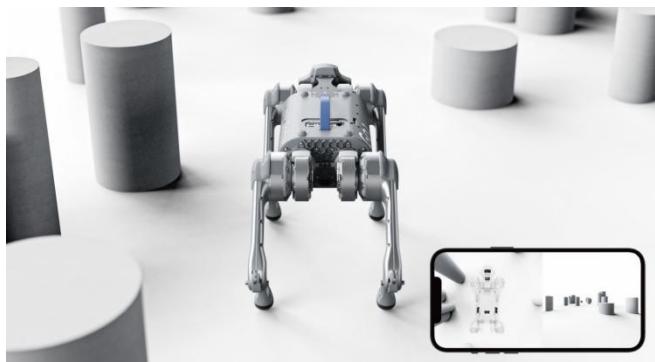
Unitree official Github link: [github.com/unitreerobotics](https://github.com/unitreerobotics) 3D model download/Simulation/Abundant Demo/ Forums

Break global speed record in same class



Powerful and reliable power system





### Intelligent Side-follow System

#### Adopt Patented Wireless Vector Positioning and Control Technology

- Robot walks alongside its human master, which is much better than the conventional following mode. Besides, the human-machine interaction is both harmonious and safe.
- No need to worry about the robot since it's right beside you.
- Capable of helping robot choosing better route in complex environment

### Super Sensory System

#### Full View Coverage

- 5 Sets Fish-eye Stereo Depth Cameras + Ai Post-processing + 3 Sets Hypersonic Sensors
- 1 set fish-eye stereo Depth deception angle  $\approx 150 \times 170^\circ$
- 1set fish-eye stereo depth perception  $\approx$  4 sets intel real sense perception angle
- So: 5 sets fish-eye stereo Depth perception  $\approx$  20 sets intel real sense perception angle
- Fish-eye AI perception: body recognition etc.

### Go 1 built-in Powerful AI

#### 16 core CPU+ GPU (384Core, 1.5TFLOPS)

- For comparison, the Nvidia TX2 only has CPU (4 cores) +GPU(256Core, 1.3TFlops)

## Parameter

### (I) Hardware platform

- weight (with battery) 12kg±1.5kg
- L\*W\*H 0.645\*0.28\*0.4m
- Load capacity: 5kg
- Sufficient range of motion in all joints:
  - Lateral hip swing joint: -40~+40°
  - Anterior hip swing joint: -218~+45°
  - Knee joint: +24~+132°
- Equip foot force sensor: provide foot force sensor feedback interface
- Equip HDMI\*3; Gigabit Ethernet port\*1;、USB\*3;、2 TYPE-C、1 SIM card slot、1 back Integration Interface
  - \*1. Abundant Teaching and research development interface
- fastest running speed 3.7m/s
- Built-in super Ai ( 16 cores CPU+ GPU (384Core,1.5TFLOPS))
- Equipped with abdominal power interface, supporting the expansion of wireless or touch autonomy charging function
  - Legs and body connection with omnidirectional flexible cushioning structure, can absorb the impact from all around

### (II) Motion control hardware and software

- built-in ARM controller : motion controller 4cores @1.5GHz。memory DDR4L 2GB, flash memory 32GB
- fastest funning speed 4.7m/s (world record)
- With jumping air turn 90 ° / tap dance / space step / double leg stand and other functions
  - Machine dog with good buffering function, owning the ability that to fall from a height of 1 meter without damage and to continue walking within 2 seconds

### (III) Perception module

- Super Dynamic side-follow Autonomous Obstacle Avoidance System
- Built-in wireless vector positioning system
- Built-in 3 Nano controller
- Built-in 4 ultrasonic probe
- Built 5 Sets Fish-eye Stereo depth camera , Open 5 groups of fisheye binocular depth camera RGB map and

point cloud map. Single group camera perception angle about 150°\*170°

- built-in 1 3W loudspeaker
- built-in 4G module(include GNSS) : 4G remote control/image transformation/shout-out , GPS/BeiDou data acquisition
- God's eye view, APP immersion robot dog simulator function

## Support Events

- RoboCom (national games, A class event)
- World Robot Contest (national games , A class event)
- CHINA ROBOT COMPETITION (national games)
- International Youth AI Competition (national games)
- Various Education Department provincial competitions.