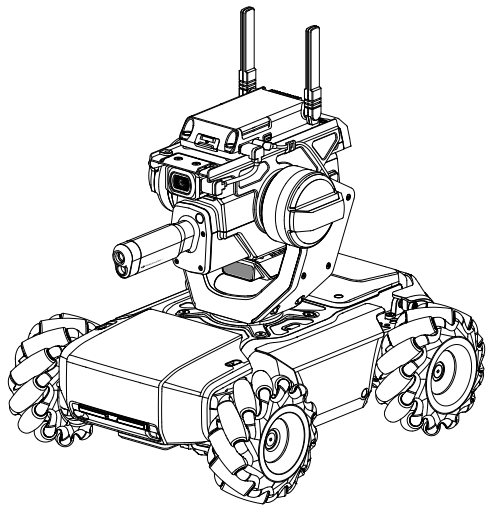
ROBOMASTER S1

User Manual v1.8

2020.02



Searching for Keywords

Search for keywords such as “battery” and “install” to find a topic. If you are using Adobe Acrobat Reader to read this document, press Ctrl+F on Windows or Command+F on Mac to begin a search.

Navigating to a Topic

View a complete list of topics in the table of contents. Click on a topic to navigate to that section.

Printing this Document

This document supports high resolution printing.

Using this User Manual

Legends

Warning Important Hints and Tips Reference

Before Use

The following tutorials and manuals have been produced to ensure you make full use of your ROBOMASTER™ S1.

1. Safety Guidelines and Disclaimer
2. Quick Start Guide
3. User Manual

Check to make sure all parts are included and prepare for assembly by reading the RoboMaster S1 Quick Start Guide. Refer to this user manual for more information. Watch all tutorial videos and read the RoboMaster S1 Safety Guidelines and Disclaimer before using for the first time.

Watching the Video Tutorials

Visit the official DJI website https://www.dji.com/robomaster-s1/video or go to the app and enter the Videos page to watch the tutorial videos for assembly and use. You can also assemble the S1 according to the assembly guide in the RoboMaster S1 Quick Start Guide.

Referring to the RoboMaster S1 Programming Guide

The RoboMaster S1 Lab offers hundreds of programming blocks that allow you to access features such as PID control. The RoboMaster S1 Programming Guide provides instructions and examples to help users quickly learn programming techniques for controlling the S1.
https://www.dji.com/robomaster-s1/programming-guide

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Product Profile

Introduction

The RoboMaster S1 is an educational robot inspired by the DJI™ RoboMaster competition. The S1 offers comprehensive control and an immersive driving experience thanks to the omnidirectional chassis, agile Mecanum wheels, flexible gimbal, and stable, low-latency image transmission in first person view (FPV). Users can also target objects and battle other robots with the blaster.

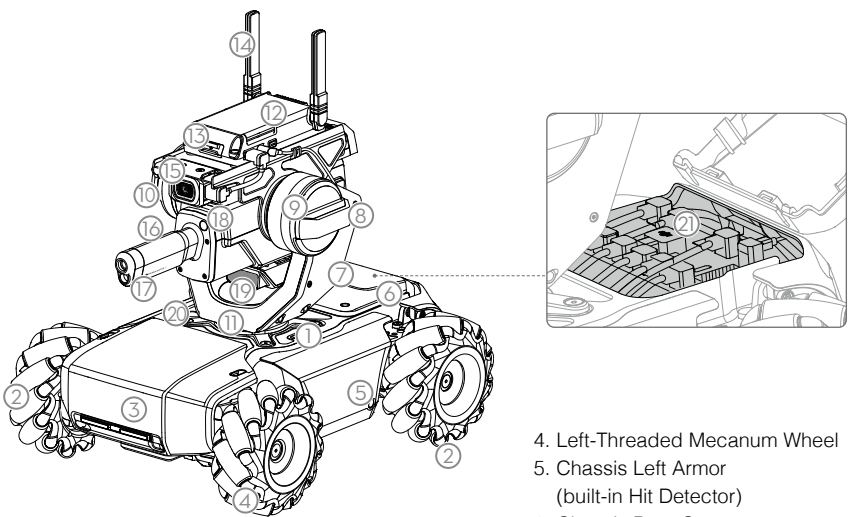
The body of the S1 is covered in armor, and each piece has a hit detection module that can instantly detect physical hits and feed back to the intelligent controller. The blaster provides high-level accuracy and stability thanks to the 2-axis gimbal while the launch trajectory light gives users a realistic and immersive experience.

The intelligent controller is integrated with multiple systems including a video transmission system, game system, and Scratch programming system. It includes six smart modules, including line recognition, vision marker recognition, person recognition, clapping recognition, gesture recognition, and S1 robot recognition.

The S1 supports Scratch and Python programming. With DJI's project-based tutorials, users can gradually master programming theory and robotics knowledge.

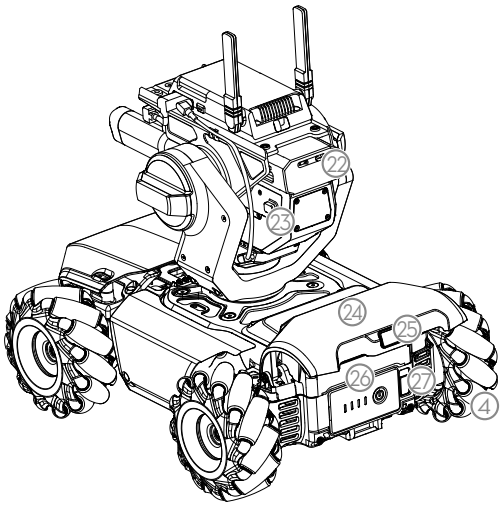
The S1 also features Solo mode and Battle mode, where users can practice their skills and compete against others. To control the S1, the RoboMaster app can be used on a mobile device, the gamepad, or with a keyboard and mouse.

S1 Diagram



1. Chassis
2. Right-Threaded Mecanum Wheel
3. Chassis Front Armor (built-in Hit Detector)
4. Left-Threaded Mecanum Wheel
5. Chassis Left Armor (built-in Hit Detector)
6. Chassis Rear Cover
7. Gimbal
8. Wide Infrared Unit
9. Gimbal Armor (built-in Hit Detector)

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10. Pitch Motor
11. Yaw Motor
12. Intelligent Controller
13. microSD Slot
14. Intelligent Controller Antenna
15. Camera
16. Blaster
17. Launch Trajectory Light
18. Narrow Infrared Unit
19. Speaker
20. Chassis Right Armor (built-in Hit Detector)
21. Chassis Motion Controller
22. Gel Bead Container
23. Container Eject Button
24. Chassis Rear Armor (built-in Hit Detector)
25. Rear Armor Release Button
26. Intelligent Battery
27. Battery Eject Button

Preparing

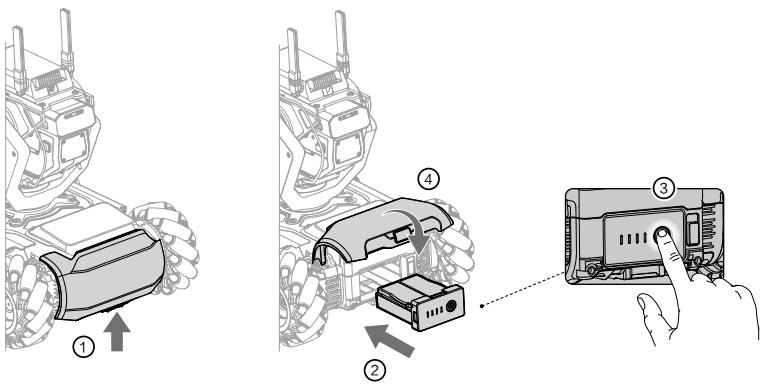
Assembling the S1

Refer to the RoboMaster S1 Quick Start Guide.

Powering On the S1

Follow the steps below to power on the S1:

1. Press the rear armor release button to open the chassis rear armor.
2. Install the intelligent battery into the battery compartment.
3. Press and hold the power button to turn on the battery.
4. Close the chassis rear armor.



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Downloading the RoboMaster App

A. Search for the RoboMaster app in the App Store or on Google Play or scan the QR code to download the app on your mobile device.

B. Users can also download the RoboMaster software for Windows or Mac from the official DJI website to control the S1 with a keyboard and mouse.
Windows: https://www.dji.com/robomaster_app
Mac: https://www.dji.com/robomaster_app

- Use your DJI account to log in to the RoboMaster app.
- The RoboMaster app supports iOS 10.0.2 or later or Android 5.0 or later.
- The RoboMaster app supports Windows 7 or later or MacOS 10.13 or later.
- Before using the RoboMaster app with cellular mobile data, contact your mobile device data provider for the latest data information.

Connecting the S1 and the App

The S1 must be connected to the RoboMaster app in order to use. Users can learn how to connect via Wi-Fi or via a router in the Connection Mode page. Follow the prompts to connect the S1 to the app. Refer to the Connecting section for more information.



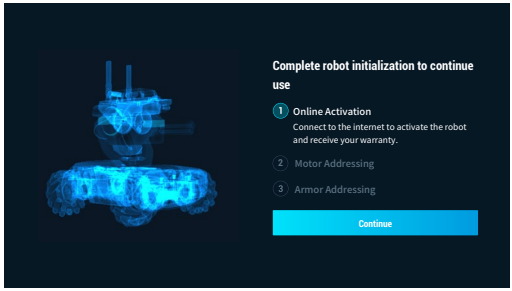
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Initializing the S1 with the App

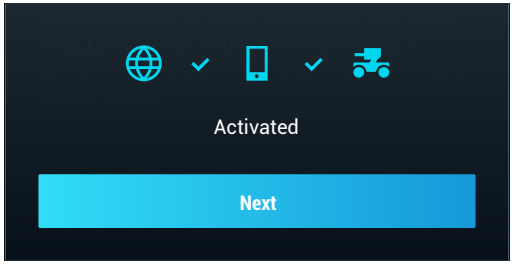
Activating the S1

After connecting, use your DJI account to activate the S1 in the RoboMaster app. Activation requires an internet connection.

1. Start activation.



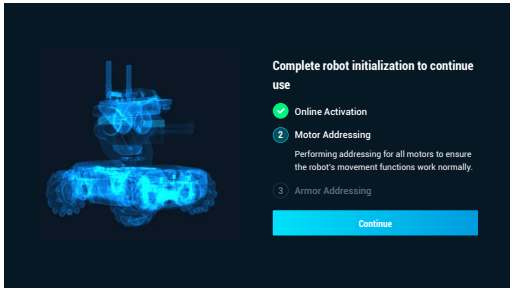
2. Follow the prompts to complete activation.



Motor Addressing

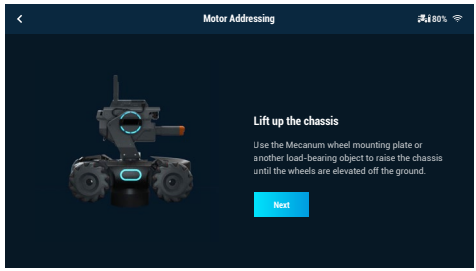
Motor addressing is required in the app before using for the first time. Follow the prompts to complete motor addressing.

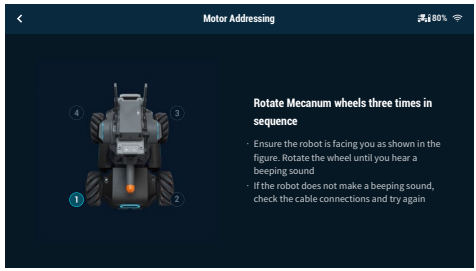
1. Start Motor Addressing.



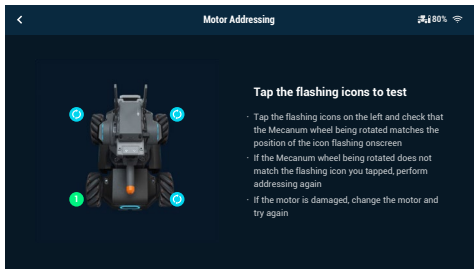
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2. Lift the chassis and follow the prompts to rotate the Mecanum wheels in the order shown onscreen until all wheels have been rotated.

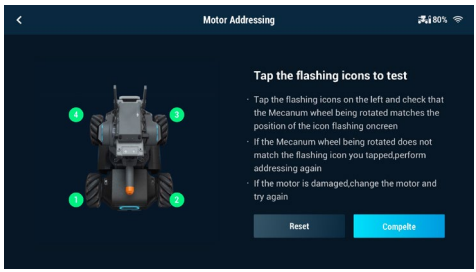




3. Tap to test the Mecanum wheels one by one until all wheels have been tested.



4. Motor addressing completed.



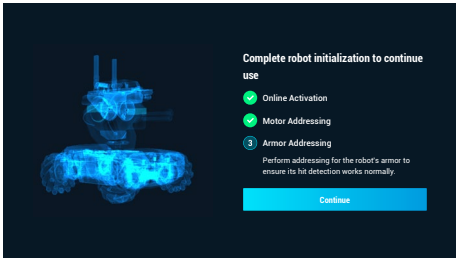
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Motor addressing is required when a motor is replaced. Open the RoboMaster app, click Settings then System, and select Motor Addressing.

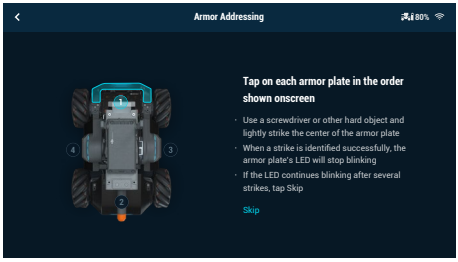
Armor Addressing

Armor addressing is required in the app when using the S1 for the first time. Follow the prompts to complete armor addressing.

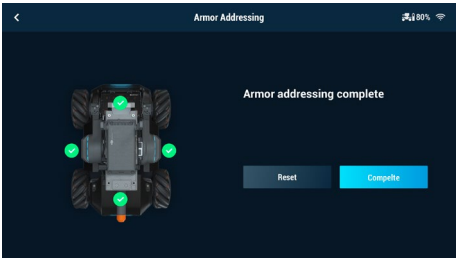
1. Start Armor Addressing.



2. Follow the prompts to tap on the armor plates in the order shown onscreen.



3. Armor addressing completed.



Armor addressing is required when an armor module is replaced. Go to the RoboMaster app, click Settings, then System, and select Armor Addressing.

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Modules and Functions

Using the RoboMaster App

With the dedicated RoboMaster app, users can access rich educational resources and several gameplay modes. The app can be used with a touchscreen or a gamepad and is available on iOS, Android, Windows and Mac. Users on different platforms can even play together at the same time. Users can also write programs easily and apply them or share with friends instantly using the RoboMaster app. This section uses the RoboMaster app on iOS as an example. The specific interface may vary depending on the device used.

RoboMaster App Main Page



1. Account

   Tap to log in and log out of your account, modify your avatar, name, and gender information. An internet connection is required in order to log in.

   Check your total driving distance, total driving time, written code, coding time, the number of completed courses in “Road to Mastery”, and the highest points in Target Practice.

   Tap MasterBoard to view the top 100 users for total driving distance, total driving time, total code written, total coding time, and target practice score.

   ⚠ Update the RoboMaster app to version 1.0.8 or later.

2. Media Library

   Tap to view videos and photos.

3. Guide

   a. Product Support: Tap to enter the official DJI product support page.
   b. Maintenance Support: Tap to enter the official DJI Repair Center page.
   c. User Manuals: Tap to enter the official DJI user manual download page.
   d. Vision Markers: Tap to enter the official Vision Marker download page.
   e. Online Support: Tap to talk to the official RoboMaster Series Online Assistance service.
   f. Feedback: Tap to fill out a feedback form.

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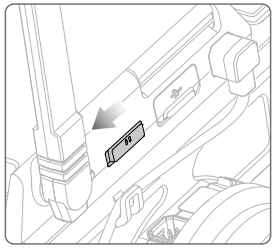
4. Connect

The S1 must be connected with the app. Tap to see a guide on how to connect via Wi-Fi or router.

Connection via Wi-Fi

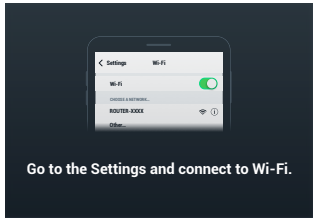
Users can enter both Solo and Battle mode when connecting via Wi-Fi.
Follow the steps below to connect:

(1). Power on the S1 and slide the mode switch on the intelligent controller to .



(2). Run the RoboMaster app, go to Wi-Fi settings on the mobile device, select the Wi-Fi name (RMS1-XXXXXX) shown on the sticker on the body of the S1, and enter the password. The default password is 12341234.

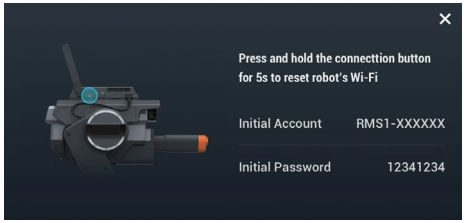




(3). Wait for the S1 and the app to connect. The S1 will emit a sound once connected.

Reseting the Password

Make sure the mode switch on the intelligent controller is slid to the Connection via Wi-Fi position, and press and hold the connect button for five seconds to reset the password.

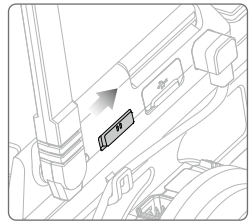


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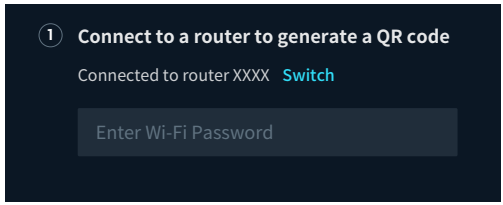
Connection via Router

Users can enter both Solo and Battle mode when connecting via router.
Follow the steps below to connect:

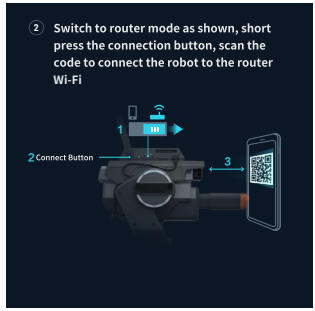
(1). Power on the S1, and slide the mode switch on the intelligent controller to .



(2). Open the RoboMaster app, go to Wi-Fi settings on the mobile device, connect to a router, and input the Wi-Fi password of the router to generate a QR code.



(3). Press the connect button on the intelligent controller and use the camera of the S1 to scan the QR code. The S1 will connect to the router automatically.



5. Settings

Robot, Connect, Display, Control, and System can be found in the Settings page.

a. Robot

Users can check the status of each individual component of the S1. When a component is abnormal, the corresponding part will be displayed in red with more detailed information provided on the right side of the screen.

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b. Connect

Displays the connection status of the S1. When connected, users can also check the Channel Display, Wi-Fi Name, Wi-Fi Password, and also modify Wi-Fi information.

c. Display

Users can set the LED Display Color, FPV Hit Point Bar, FPV Screen Adaptation, FPV Gimbal Angle Readout, Video Resolution, Anti-Flickering, and 3D Quality.

d. Control

Users can set the Speed, Firing Mode, Sight Type, Sight Calibration, Control Mode, Control Sensitivity, Gimbal Gyro Control, Gyro Sensitivity, and Vibration.

e. System

The following can be found under System settings:
Check App Version and set App Language.
Set Voice Language and Robot Volume.
Perform Firmware Update, check Firmware Downloaded, and Firmware Version.
Perform Armor Addressing, Motor Addressing, and Gimbal and Chassis Calibration.
Replay Beginner Guide.
Check SD Card Space Remaining and perform Format SD Card.
Enable GPS Information, DJI Device Information, DJI Product Improvement, and read Terms of Use.

6. Solo

Tap to enter Solo mode. Users can connect either via Wi-Fi or router. Refer to the Gameplay section for more information.

7. Battle

Tap to enter Battle mode. Users can connect either via Wi-Fi or router. When using multiple S1s, users must connect via the same router. Refer to the Gameplay section for more information.

8. Lab

Road to Mastery: Road to Mastery offers project-based courses that enhance users' understanding of programming languages, from robotics applications to AI technology, with different projects for both beginners and experts.

DIY Programming: Both Scratch and Python are available for programming.

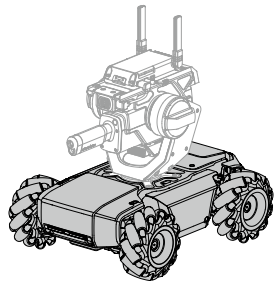
RoboAcademy: RoboAcademy offers a curriculum of videos and programming guides. In-depth videos introduce robotics in simple but fascinating ways, giving users insightful and relevant scientific knowledge. The RoboMaster S1 Programming Guide offers detailed explanations of various blocks and modules, making it easier for users to understand the fundamentals of S1 programming.

Omnidirectional Chassis

Introduction

The S1 chassis is an omnidirectional motion platform based on the Mecanum wheels, which can be used to move forward, traverse, skew, rotate, or a combination of movements at once.

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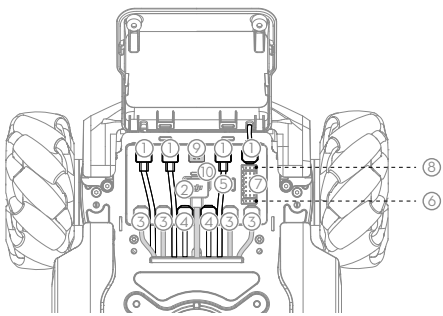


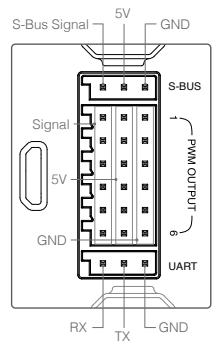
⚠ Avoid crashing into any objects at high speed.

Motion Controller

Overview

The motion controller is the core module for the S1 chassis movement, providing a rich external module interface for video transmission and connecting the gimbal, battery, armor, and motors. It also integrates an omnidirectional wheel motion control algorithm, power management system, motor management system, and a chassis management system.





1. CAN Bus Port
   CAN Bus port used for armor module connection.
2. Power Port
   Power port used for intelligent battery connection. Note that this interface contains the battery management system. Avoid unplugging the power port unless necessary.
3. M BUS Port
   Motor port used for motor connection.
4. CAN BUS Port
   Gimbal port used for gimbal connection.
5. Micro USB Port
   Reserved port.
6. UART Port
   Reserved port.

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7. PWM Output Port

The S1 motion controller enables the duty cycle to be set through the Scratch or Python program using the PWM output port.

8. S-Bus Port

Reserved port.

9. M0 Port

Reserved port.

10. LED indicator

Used to indicate the status of the S1 motion controller.

LED indicator		Motion controller status
Blinks blue slowly	Ⓑ ·····	Working normally
Blinks yellow slowly	Ⓨ ·····	Running autonomous program
Blinks green quickly	Ⓖ ·····	IMU calibration successful
Blinks red quickly	Ⓡ ·····	IMU calibration failed
Solid yellow	Ⓨ ——	IMU is calibrating
Solid white	Ⓦ ——	Firmware updating
Blinks red, green, and blue alternatively	Ⓡ Ⓖ Ⓑ ·····	No attitude information input
Blinks red slowly	Ⓡ ·····	Stop Mode* Stop mode may occur in the following situations: a. Motion controller is disconnected from or cannot communicate with motor. b. S1 cannot move due to the motor hardware abnormality. c. Motion controller cannot communicate with the gimbal. d. Motion controller cannot communicate with the remote controller. e. Abnormal motion controller attitude. f. Motion controller cannot communicate with the battery.

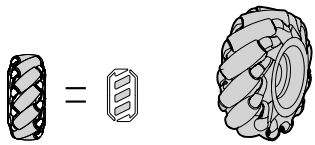
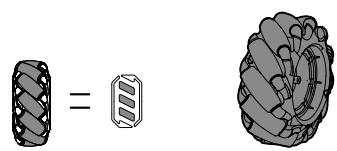
* Stop mode warning prompts will display in the app, go to Settings then System to check the corresponding error.

⚠
- Connect the black and orange cables to the ports of the corresponding color.
- Make sure the motion controller is properly installed before use and the screws on the chassis rear cover are locked.
- After each reinstallation of the motion controller, calibrate the S1 if prompted to do so in the RoboMaster app. Refer to the Gimbal and Chassis Calibration section for more information.
- To avoid dislodging the motion controller when removing the rear chassis cover, lift the cover carefully before removing.

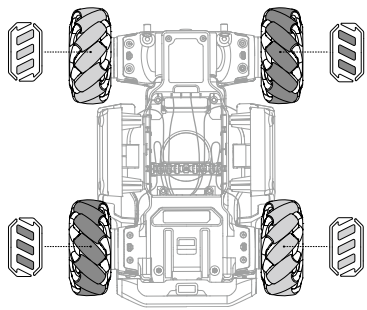
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Mecanum Wheel

The Mecanum wheel is a commonly used robotic omnidirectional chassis moving solution, which is divided into two types: left-threaded and right-threaded. The four-wheeled chassis requires two pairs of Mecanum wheels.

			
Left-threaded Mark	Left-threaded Mecanum Wheel	Right-threaded Mark	Right-threaded Mecanum Wheel

When installing, you can check the left-threaded mark or right-threaded mark on the bottom of the chassis, and install the left-threaded or right-threaded Mecanum wheel accordingly.



Motors and ESCs

The S1 features an M3508I brushless motor and ESC with a maximum speed of 1000 rpm for brushless motors.

⚠
- Make sure the connections between all motors and motion controller are stable.
- If the motor does not rotate freely, immediately power off the S1 and check the motor.
- DO NOT touch or let your hands or body come into contact with the motors, motors mounting plate, or inside of Mecanum wheel immediately after powering off the S1.

Armor Modules

A total of four armored modules are installed on the four sides of the S1 chassis, which protect the internal structure of the S1.

All armor is equipped with a hit detector, which is used to detect where the S1 is struck by the gel beads and sends feedback to the intelligent controller to deduct hit points from the corresponding hit point bar.

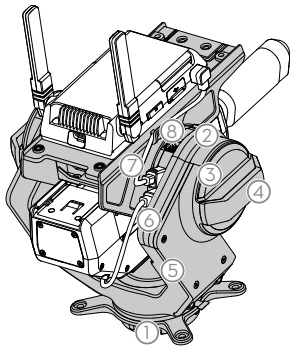
Each hit detector module is represented by an LED light and is visible under the armor module.

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Gimbal

Introduction

The S1 is equipped with a 2-axis gimbal to provide a stable platform for the blaster and the camera. When the S1 is in motion, the blaster remains stable and can launch gel beads or emit an infrared beam, and at the same time provides a smooth FPV experience for the user.



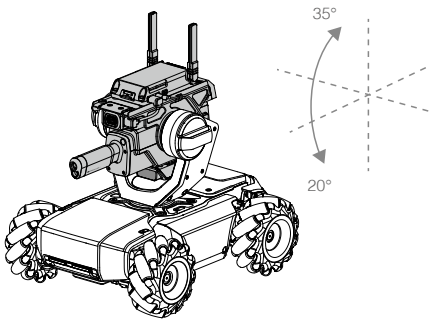
1. Yaw Motor
   Controls the yaw of the gimbal and works in conjunction with the pitch motor to help the blaster aim at targets and achieve stabilization.
2. Pitch Motor
   Controls the pitch of the gimbal and works in conjunction with the yaw motor to help the blaster aim at targets and achieve stabilization.
3. Gimbal Armor
   Includes built-in LEDs, the color of which can be customized in the app.
4. Wide Infrared Unit
   Emits wide-angle infrared beams and detects infrared beams emitted by other S1s.
5. Gimbal Arm Shaft
   Supports the blaster and the intelligent controller.
6. CAN BUS Port
   Connected to the blaster.
7. CAN BUS Port
   Connected to the intelligent controller.
8. CAN BUS Port
   Reserved port. Make sure the unused port on the side of the gimbal arm shaft is covered. Otherwise, it may become filled with foreign objects and short-circuit.

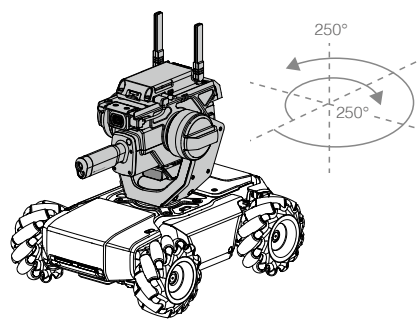
Using the Gimbal

After powering on the S1, DO NOT cover or touch the gimbal and avoid moving the chassis so that the self-test can be completed smoothly. DO NOT apply external force to the gimbal after the gimbal is powered on.

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The default mode of the S1 is Chassis Lead mode. The user can control the angle of the gimbal on both the pitch and yaw axes. The pitch axis control range is -20° to +35° and the yaw axis control range is ±250°. The maximum rotation speed of the gimbal is 540°/s.

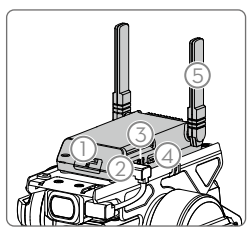


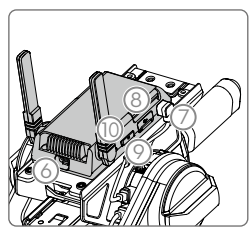


⚠
- The gimbal and gimbal connector are delicate. Handle with care and DO NOT touch the gimbal connector.
- When powering on the gimbal, DO NOT touch the gimbal to avoid being injured by the rotating shaft.
- When the gimbal is in use, DO NOT touch the metal parts on the inner side of the pitch motor as it may become hot.

Intelligent Controller

The intelligent controller is integrated with multiple systems including a video transmission system, game system, and Scratch programming system. It supports six smart modules, including line recognition, vision marker recognition, person recognition, clap recognition, gesture recognition, and S1 robot recognition.





1. microSD Slot
   Compatible with a microSD card that can read and write faster than 10 MB/s, supporting up to 64 GB.
2. Camera Port
   Used to connect to the camera.
3. Speaker Port
   Used to connect to the speaker.

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4. Autonomous Program Button
   Scratch programs written by the user can be set as autonomous programs, which can be loaded directly onto the S1. Press the Autonomous Program Button to run the program.
5. Antennas
   For optimal Wi-Fi connection, set the intelligent controller antennas at 90°.
6. Reserved Port
   Unused port.
7. CAN Bus Port
   Used to connect to the gimbal.
8. Micro USB Port
   Used to connect to the computer.
9. Connect Mode Switch
   Used to switch between connecting via Wi-Fi or a router.
10. Connect Button
    The connect button functions differently when connecting via Wi-Fi or router.
    Connection to Wi-Fi: Once the Wi-Fi password is forgotten, press and hold this button for five seconds to reset the Wi-Fi password.
    Connection to Router: When scanning the QR code with the S1 to join a network, press this button first.

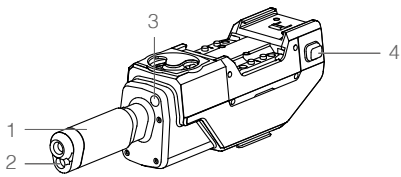
⚠
- DO NOT pull on the antenna.
- If the intelligent controller antenna is damaged, the performance of the S1 will be affected. Contact DJI if the antenna is damaged.

Blaster

Introduction

Before using the blaster, make sure to wear the safety goggles provided by DJI.
The S1 Blaster must be mounted onto the gimbal and can be used in two applications:

1. With a gel bead container to launch gel beads. The launch speed of the gel beads from the blaster is about 26 m/s, the controllable launch frequency is 1-8 rounds/s, and the maximum launch frequency is up to 10 rounds/s.
2. The S1 Blaster integrates a narrow infrared unit with an effective range of up to 6 m in indoor lighting. Within the effective range, the effective angle gradually decreases with increasing distance, and the effective shot width varies from 40° to 10°.



1. Trajectory
2. Launch Trajectory Light
3. Narrow Infrared Unit
4. Container Eject Button

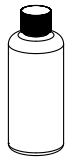
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- DO NOT aim the blaster at people or animals when launching the gel beads.
- DO NOT point the launch trajectory light at the eyes of people or animals.

Preparing the Gel Beads

The S1 Blaster can launch gel beads. The gel beads must be soaked in water in advance. Follow the steps below to soak the gel beads.

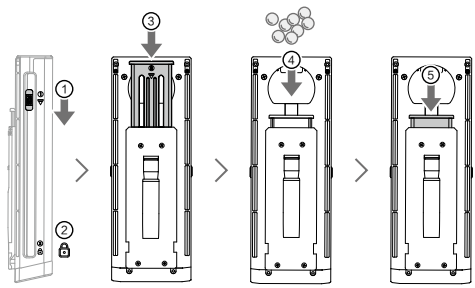
1. Use the gel bead bottle cap to measure the number of gel beads. One gel bead bottle cap holds approximately 500 rounds.
2. It is recommended to soak the gel beads in 1000 ml of purified water for four hours at room temperature before use. The soaked gel beads have a diameter of 5.9-6.8 mm and a mass of 0.12-0.17 g.



The size of soaked gel beads may vary if water of different quality is used. Soak according to the specifications to avoid blocking the Blaster.

Loading the Gel Beads

Follow the steps below to load the gel beads. The loading capacity of the gel bead container is approximately 430 rounds. Load the required number of gel beads according to the usage.

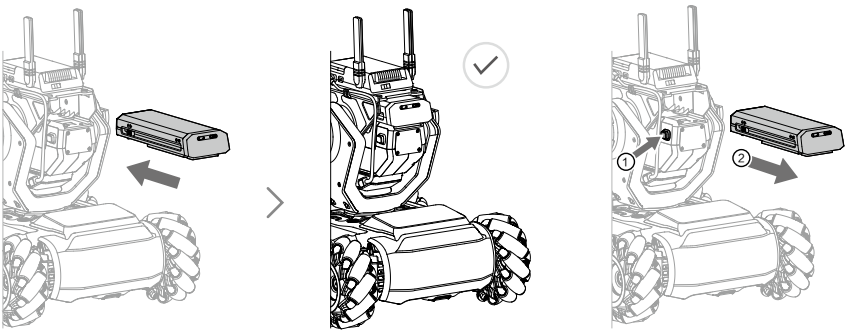


- After each use, make sure to clear the gel beads in the gel bead container to prevent accidental injury.
- DO NOT swallow the gel beads.
- Make sure to keep the gel beads out of reach of children and animals.
- Do not freeze gel beads that have been soaked during use. Otherwise, the gel beads will harden and block the blaster or may cause injury.

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Installing/Removing the Gel Bead Container

Follow the steps below to install or remove the gel bead container.

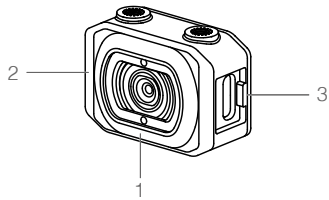


⚠ Press the container eject button before removing the gel bead container.

Camera

Designed for S1 robots, the S1 camera features a 1/4-inch sensor with 5 million pixels and a FOV of 120°, allowing users to control the S1 from a first-person perspective.

Clean the lens regularly to avoid blurring or halos. Use a special lens cleaner to make sure that there is no foreign matter on the lens after cleaning and that it does not damage the lens.



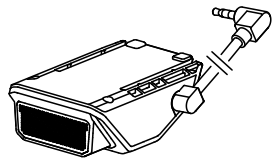
1. Camera Lens
2. Microphone
3. Camera Port
   Used to connect the camera to the intelligent controller.

⚠
- DO NOT expose the camera to liquids or immerse in water.
- DO NOT store the camera in a humid place.
- DO NOT touch the lens.
- If the camera is wet, wipe it with a dry soft cloth.

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Speaker

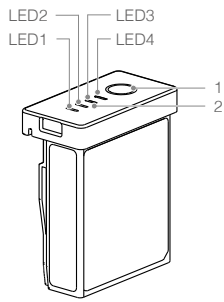
The S1 speaker is compatible with a 2.5 mm device with a power rating of 2 W. The speaker provides users with a more immersive experience with sound effects such as when the S1 launches gel beads or is hit by another S1.



⚠ Make sure the speaker is properly installed and does not obstruct gimbal movements.

Intelligent Battery

The Intelligent Battery has a capacity of 2400 mAh, a voltage of 10.8 V, and a variety of power management functions.



1. Power Button
2. Battery Level Indicator

Intelligent Battery Functions

1. Battery Level Display: LEDs display the current battery level.
2. Auto-Discharging Function: The battery automatically discharges to below 70% of total power when it is idle for more than 10 days to prevent swelling. To exit the idle state, press the power level button to check the battery level. It takes approximately one day to discharge the battery to 60%. It is normal to feel moderate heat emitting from the battery during the discharge process.
3. Balancing Function: Automatically balances the voltage of each battery cell when charging.
4. Overcharge Protection: Charging stops automatically when the battery is fully charged.
5. Temperature Protection: The battery only charges when the temperature is 5 to 45° C (41 to 113° F).
6. Overcurrent Protection: Battery stops charging when high amperage is detected.
7. Over-Discharge Protection: To prevent serious damage to the battery, the current output will be cut off when the battery cell is discharged to 2.5 V and not in use. To extend operating times, overcharging protection is disabled as batteries discharge during usage. In this instance, a battery voltage below 1 V may cause a safety hazard such as a fire when charged. To prevent this, the battery will not be able to charge if the voltage of a single battery cell is below 1 V. Avoid using any batteries matching this description. Always be alert to avoid over-discharging to prevent permanent battery damage.

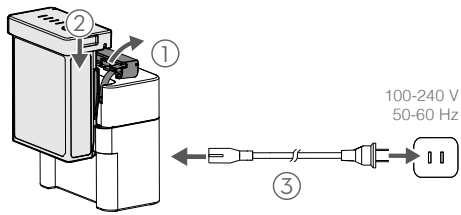
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8. Short Circuit Protection: Automatically cuts the power supply when a short circuit is detected.
9. Battery Cell Damage Protection: The RoboMaster app displays a warning message when a damaged battery cell is detected.
10. Sleep Mode: Sleep mode is entered to save power when the battery is not in use. If the battery is turned on without being connected to the S1, the battery will turn off after five minutes. When the battery power is less than 5%, it will automatically enter sleep mode after six hours to prevent over-discharging. If this occurs, press the battery power button once, and the battery can be charged to wake up.
11. Communication: Battery voltage, capacity, current, and other relevant information is provided to the gimbal.

Read the user manual, disclaimer, and descriptions on the battery before use. Users take full responsibility for all operations and usage.

Charging the Intelligent Battery

The S1 Battery Charger is designed for charging batteries for the S1. Lift the battery charger cover and insert the intelligent battery. Connect the battery charger to a power outlet (100-240 V, 50/60 Hz).



Charging Time: Approx. 1 hour and 30 mins

- Before using for the first time, charging is required to wake up the battery.
- Make sure the battery is fully charged before each use.
- When the charger is not in use, keep the battery charger covered in order to prevent the metal terminals from being exposed.

Status LED Descriptions

Battery Level Indicators while Charging (Battery)				
LED1	LED2	LED3	LED4	Battery Level
☼	☼	▭	▭	0%~50%
☼	☼	☼	▭	50%~75%
☼	☼	☼	☼	75%~100%
▭	▭	▭	▭	Fully Charged

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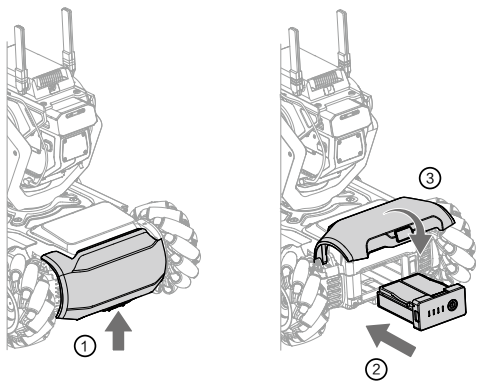
Battery Level Indicators for Battery Protection					
LED1	LED2	LED3	LED4	Blinking Pattern	Battery Protection Item
▭	☀	▭	▭	LED2 blinks twice per second	Over current detected
▭	☀	▭	▭	LED2 blinks three times per second	Short circuit detected
▭	▭	☀	▭	LED3 blinks twice per second	Over charge detected
▭	▭	☀	▭	LED3 blinks three times per second	Over-voltage charger detected
▭	▭	▭	☀	LED4 blinks twice per second	Charging temperature is too low (<0°C)
▭	▭	▭	☀	LED4 blinks three times per second	Charging temperature is too high (>40°C)

After any of the above-mentioned protection issues are resolved, the Battery Level Indicator will power off. Unplug the Intelligent Battery from the charger and plug it back in to resume charging. Note that you do not need to unplug and re-plug the charger in the event of a charging temperature error. Charging will resume when the temperature falls within the normal range.

⚠ DJI is not responsible for damage caused by third-party chargers.

Mounting the Intelligent Battery

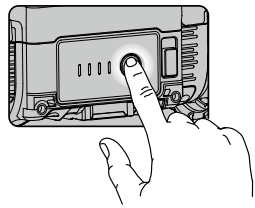
When in use, open the rear armor cover and insert the battery into the battery compartment.



⚠
- Make sure the battery is securely installed. Otherwise, the battery may fall out or have insufficient contact, which can lead to loss of battery information.
- Make sure to press the battery eject button before removing the battery.

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Using the Intelligent Battery



Checking the Battery Level

Press the battery level button once to check the battery level.

The Battery Level Indicators will also show the current battery level during discharging. The indicators are defined below.

LED is on. LED is flashing.

LED is off.

Battery Level				
LED1	LED2	LED3	LED4	Battery Level
▬	▬	▬	▬	88%~100%
▬	▬	▬	✳	75%~88%
▬	▬	▬	▭	63%~75%
▬	▬	✳	▭	50%~62.5%
▬	▬	▭	▭	38%~50%
▬	✳	▭	▭	25%~38%
▬	▭	▭	▭	13%~25%
✳	▭	▭	▭	0%~13%

Turning On/Off

Press and hold the power button for more than two seconds to turn on or off.

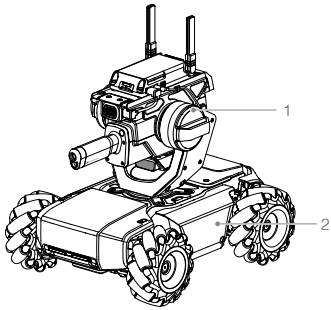
Low-Temperature Notice

1. The performance of the Intelligent Battery is significantly reduced at temperatures below 5° C (41° F). Make sure that the battery is fully charged and the cell voltage is at 4.2 V before use.
2. In extremely cold weather, the battery temperature may not be high enough even after warming up. In these cases, insulate the battery as required.
3. To ensure optimal performance, keep the core temperature of the Intelligent Battery above 20° C (68° F) when in use.

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S1 LED Indicator Description

The S1 features LED indicators on the four armor modules of the chassis body and on both sides of the gimbal, which indicate the current status of the S1.



1. Gimbal LED indicator, eight on each side.
2. Chassis LED indicator, one for each armor.

LED Indicator Description

S1 Status	Gimbal LED Indicator	Chassis LED Indicator
Battery Power		
Power on S1	Blinks cyan counterclockwise	Solid cyan
Power off S1	Custom color powers off	Custom color powers off
Connect		
S1 operating normally, not connected to app	Pulses white	Pulses white
S1 and app connecting	Blinks cyan	Blinks cyan
S1 operating normally, connected to app	Solid custom color	Solid custom color
Firmware update		
Updating firmware	White bars indicating progress	Solid white
Firmware update failed	Solid red	Solid red
Firmware update successful	Solid cyan	Solid cyan
Solo mode		
Entering Solo mode	Custom color blinks counterclockwise and then solid default color	Solid custom color
Entering Follow mode	Custom color blinks counterclockwise continuously	Solid custom color
Battle mode		
Entering Battle mode	Custom color blinks counterclockwise and then solid team color	Solid custom color
Hit detected	Blinks red once	Blinks red once
Defeated	Custom color blinks randomly and then powers off	Custom color blinks and then powers off

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Revived	Custom color blinks randomly and then solid custom color	Custom color blinks and then solid custom color
Victory	Solid custom color	Solid custom color
Hit Point Bar fully restored	Custom color blinks counterclockwise and then solid custom color	Custom color blinks and then solid custom color
Used Mystery Bonus	Custom color blinks counterclockwise three times	Solid custom color
Hit by Mystery Bonus	Custom color blinks until Mystery Bonus effect ends	Custom color blinks until Mystery Bonus effect ends

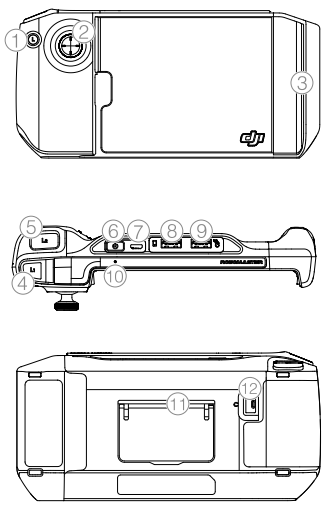
* The custom color is set under LED Display Color in the Display settings in the app. In Battle mode, the custom color is assigned automatically. The user who is the host is assigned purple.

When changing the custom color, the LEDs on both the chassis and the gimbal will change color.

Gamepad (Not Included)

Introduction

The RoboMaster S1 Gamepad is designed for the RoboMaster S1. By connecting to a mobile device running the RoboMaster app, users can control the S1 and perform multiple tasks with the gamepad and app. Additionally, a mouse can be connected to the gamepad for more precision control of the S1.



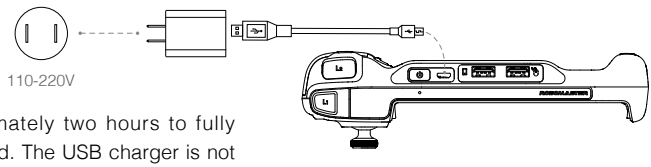
1. Custom Skills Button
2. Control Stick
3. Mobile Device Clamp
4. Cooldown Button
5. Launch Button
6. Power Button
7. Charging Port (Micro USB)
8. Mobile Device Port (USB)
9. Mouse Port (USB)
10. Status LED
11. Gamepad Stand
12. Mystery Bonus Button

Note that there are two USB ports available on the gamepad. The mobile device port cannot be used as the mouse port, and vice versa.

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Charging the Gamepad

It is recommended to fully charge the gamepad before using for the first time.



It takes approximately two hours to fully charge a gamepad. The USB charger is not included in the package.

Firmware Update

The firmware of the gamepad can be updated using the RoboMaster app. When there is a firmware update available, the RoboMaster app will send a prompt after the gamepad is connected. Follow the prompts to update the firmware.

Internet Make sure the mobile device is connected to the internet when downloading the firmware.

Status LED Description

The status LED indicates the working status and current battery level of the gamepad.

Status LED	Description
Blinks green slowly	The gamepad is charging
Blinks red quickly	The gamepad's battery level is 0%
Solid red	The gamepad's battery level is between 1% to 29%
Solid yellow	The gamepad's battery level is between 30% to 69%
Solid green	The gamepad's battery level is between 70% to 100%
Solid blue	The gamepad is initializing

Specifications

Model	GD0MA
Built-in Battery Type	3.6 V, 2600 mAH, 1S1P
Working Hours*	Approx. 2 hours
USB Port	500 mA / 5 V
Operation Temperature Range	-10° to 45° C (14° to 113° F)
Charging Temperature Range	0° to 45° C (32° to 113° F)
Charging Hours*	Approx. 2 hours

* The working hours were tested using an Android device, and the charging hours were tested using a 10 W USB charger at a temperature of 25° C (77° F). Both the working hours and the charging hours were tested in a lab environment, and should be taken as a reference only.

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Operating Your S1

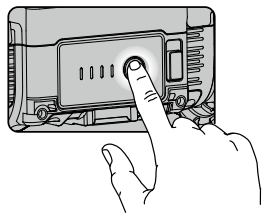
Checking Before Use

Check the following each time you use the S1:

1. Make sure the motion controller is properly installed, all cables are connected, and the screws on the chassis rear cover are tightened.
2. Make sure the intelligent controller, blaster, camera, and speaker are connected.
3. Make sure the microSD card is inserted.
4. Make sure the intelligent battery is fully charged and properly inserted.
5. For optimal Wi-Fi connection, set the intelligent controller antennas at 90°.

Turning on the Battery

Press and hold the power button for more than two seconds to turn on or off.



Operating the S1 Using a Mobile Device

Connecting to the App

The S1 must be connected to the RoboMaster app in order to use.

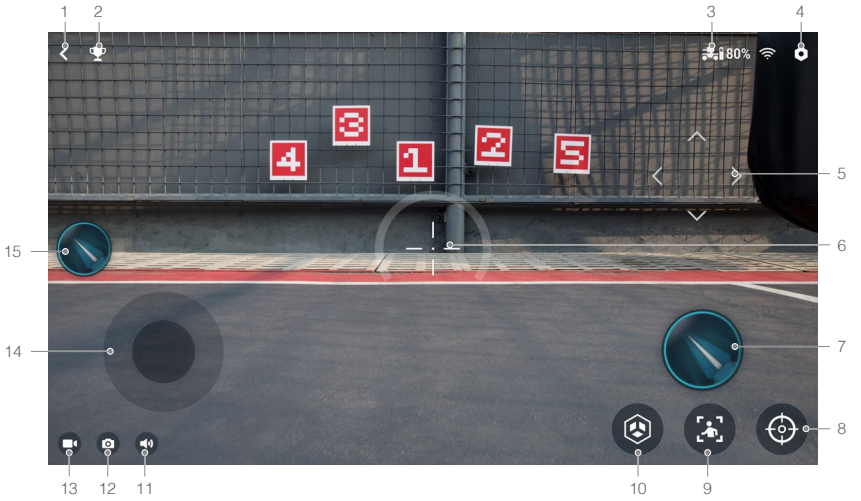
Selecting a Location

It is recommended to use the S1 on flat surfaces such as wooden floors and carpets. Uneven surfaces such as sand or rocks may damage the wheels or motors.

Using Solo Mode

Enter Solo mode to see the page below.

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1. Back button: Tap to return to the home page.
2. Solo mode games button: Tap to enter Target Practice or Target Race.
3. Connection status button: Tap to see how to connect the S1 and the app.
4. Settings button: Tap to enter the Settings page.
5. Gimbal slider: Tap and slide on this area of the screen to control the rotation of the gimbal.
6. Sight: Used to aim at targets.
7. Launch button: Tap to launch gel beads or emit an infrared beam.
8. Zoom button: Tap to zoom in or out 4x.
9. Follow mode: Tap to enter Follow mode.
   Note that the Follow mode will be affected in the following situations:
   a. The person being followed is partly or completely obstructed.
   b. The person being followed suddenly changes their movement dramatically.
   c. The environment suddenly changes from light to dark, or vice versa.
   d. The color or pattern of the person being followed is similar to the environment.
10. Custom skills button: Tap to perform preprogrammed custom skills.
11. Mute button: Tap to mute or unmute the sound on the mobile device.
12. Shutter button: Tap to capture a photo.
13. Record button: Tap to record a video.
14. Chassis control button: Tap to move the chassis.
15. Launch button: Tap to launch gel beads or emit an infrared beam.

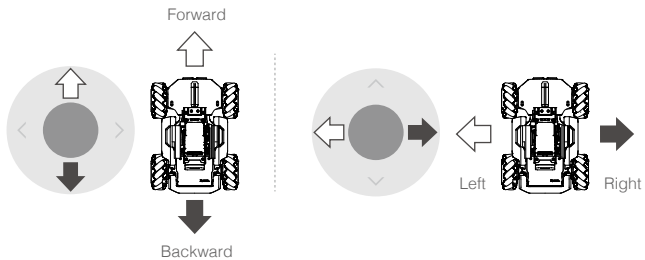
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Operating the S1

The camera view is mainly used to control the chassis, gimbal, and blaster of the S1.

Controlling the Chassis

Tap the chassis control button to move the S1 forward, backward, or sideward. The launch button can be tapped at the same time to launch gel beads or emit infrared beams while moving the chassis.



Controlling the Gimbal

Tap on the right side of the screen to rotate the yaw and pitch of the gimbal. The launch button can be tapped at the same time to launch gel beads or emit infrared beams while rotating the gimbal.



⚠ DO NOT aim the blaster at people or animals when launching the gel beads. DO NOT point the launch trajectory light at yours or other people's eyes.

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Gameplay

Solo Mode

Introduction

In Solo mode, users can enter Follow mode and explore single-player Target Practice and Target Race. Users can enter the Solo mode games from the camera view.

The intercom function is supported in the first person view. Audios can be recorded in real time and played via the S1. Recorded files in the RoboMaster app can also be played.

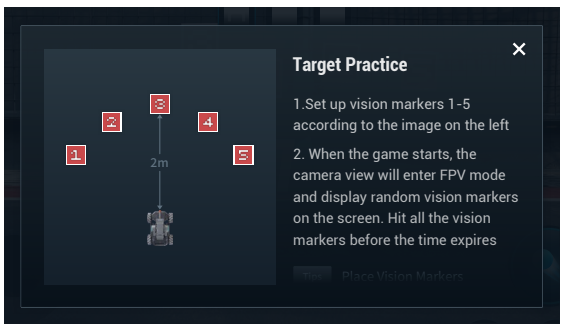
The app can only save 10 recorded files at a time and each recording can be no longer than 60 seconds.

⚠ Update the RoboMaster app to version 1.0.8 or later and the firmware to version 00.05.0046 or later.

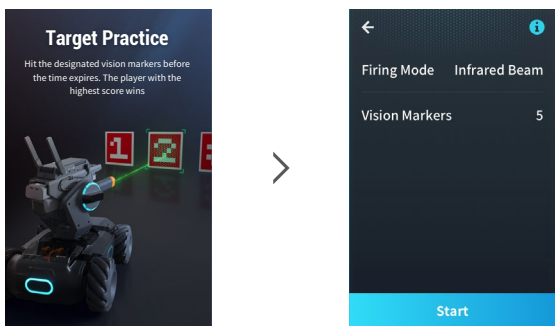
Target Practice

In Target Practice, users hit the visions markers as fast as possible before the time expires. High scores can be compared with other users. Users can set the vision markers beforehand.

1. Set up Vision Markers. Refer to the AI Modules section for more information about installing vision markers.



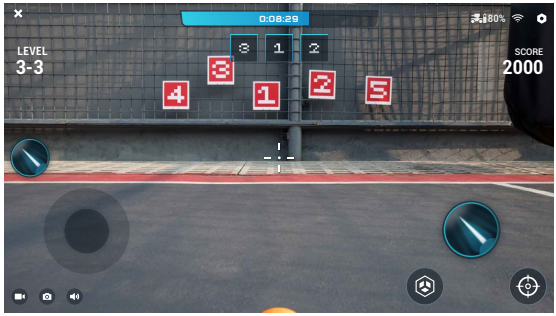
2. Tap to enter Target Practice.



Tap ⓘ on the upper right corner to read the game rules.

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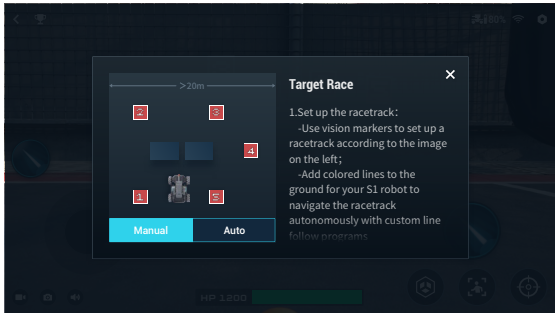
3. Start Target Practice.



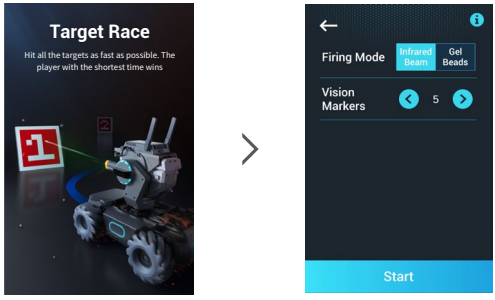
Target Race

In Target Race, users race to vision markers and hit them as fast as possible before the time expires. High scores can be compared with other users. Users can set the vision markers beforehand. Target Race is available in Manual and Auto mode. In Manual mode, the user drives the S1 manually. In Auto mode, the user creates a Line Recognition program to use in the race.

1. Set up Vision Markers.



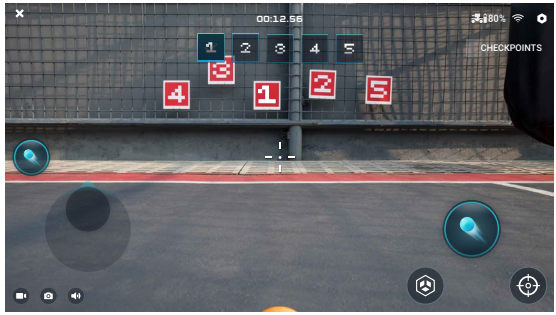
2. Tap to enter Target Race, then select the Firing Mode and the number of Vision Markers.



Tap ⓘ on the upper right corner to read the game rules.

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3. Play Target Race.



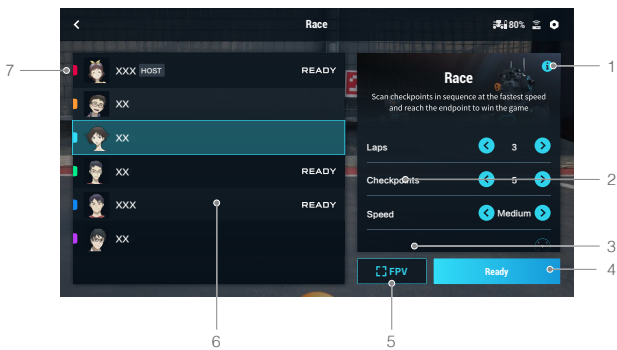
Battle

Introduction

In Battle mode, users can experience a variety of multi-player games, including Race, Free-For-All and Conquest. Refer to the Connect section for more information on how to enter Battle mode.

Race Mode

In Race mode, users arrange Vision Markers as checkpoints and scan them as fast as possible to win the game. The markers must be scanned in sequence to complete the race.



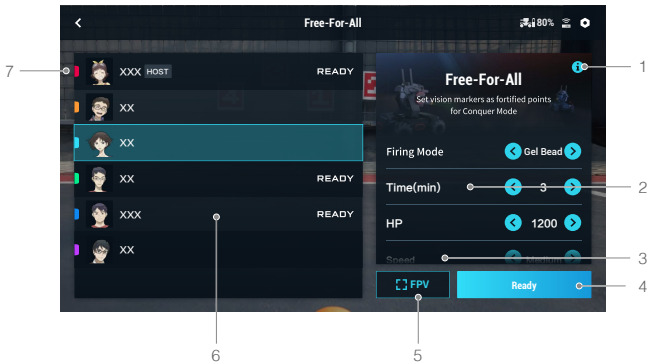
1. Tap to read the game rules. Arrange Vision Markers as checkpoints according to the rules.
2. Set the Laps, Checkpoints, and Speed.
3. Tap to read the Mystery Bonus descriptions. Bonuses include Dizziness, Electromagnetic Interference, Extreme Speed, and Invincibility.
4. Tap to start the game.
5. Tap to enter FPV.
6. All players in the game room.
7. The host of the game room.

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- All players are required to connect to the same game room through the same router.
- To ensure fair play, all players are required to use the same firmware version.

Free-For-All Mode

In Free-For-All, users launch gel beads or emit infrared beams at opponent S1s. If an S1 is hit, the Hit Point Bar is reduced. If the Hit Point Bar of the S1 is reduced to zero, the S1 is defeated. Defeated S1s can be revived by scanning . Users receive points by hitting or defeating opponent S1s. At the end of the time limit, the user with the most points is the winner.



1. Tap to read the game rules. Arrange vision markers as checkpoints according to the rules.
2. Set the Firing Mode, Time, HP, and Speed.
3. Tap to read the Mystery Bonus descriptions. Bonuses include Dizziness, Electromagnetic Interference, Extreme Speed, and Invincibility.
4. Tap to start the game.
5. Tap to enter FPV.
6. All players in the game room.
7. The host of the game room.

- All players are required to connect to the same game room through the same router.
- To ensure fair play, all players are required to use the same firmware version.

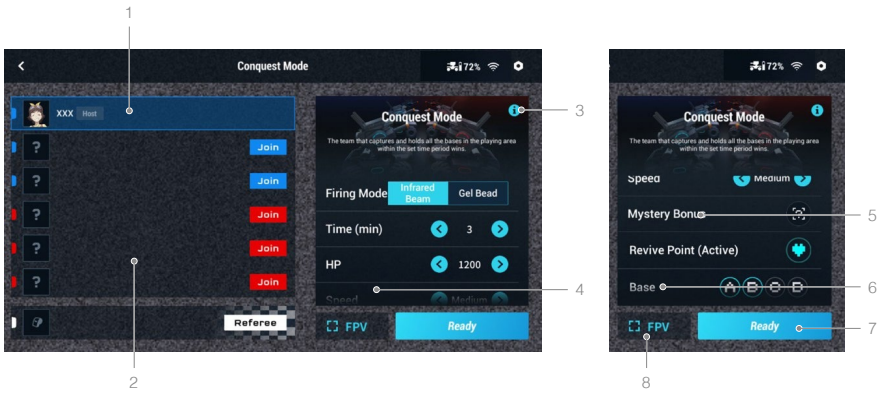
Conquest Mode

Conquest mode is a game where users are divided into red and blue teams that compete to occupy the most bases and score the most points. Users launch gel beads and emit laser beams at opposition S1 to help defeat the other team and win the game.

If an S1 is hit, the Hit Point Bar is reduced. If the Hit Point Bar of the S1 is reduced to zero, the S1 is defeated. A defeated S1 can be revived by scanning an active revive point or base occupied by their team. The blue team's revive point is marked with [1]+[♥] and the red team [2]+[♥].

Points are gained by hitting or defeating opponent S1 or occupying bases.

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1. The host of the game room.
2. All players in the game room.
3. Tap to read the game rules. Arrange Vision Markers as checkpoints according to the rules.
4. Set the Firing Mode, Time, HP, and Speed.
5. Tap to read the Mystery Bonus descriptions. Bonuses include Dizziness, Electromagnetic Interference, Extreme Speed, and Invincibility.
6. Tap to set the active state of revive point and base.
7. Tap to start the game.
8. Tap to enter FPV.

The parameters of the firing mode, time, and active state of revive points and bases are set by the referee by default. Any player can serve as referee and if no one does, the aforementioned parameters are set by the host of the game room.

⚠
- Update the RoboMaster app to version 1.0.8 or later and the firmware to version 00.05.0046 or later.
- All players are required to connect to the same game room through the same router.
- To ensure fair play, all players are required to use the same firmware version.

Mystery Bonus

In Battle mode, scan to receive a Mystery Bonus in the game. The bonuses include:
Dizziness: Target opponent S1, trigger the skill, and cause the S1 to spin uncontrollably for 1.5 seconds.

Electromagnetic Interference: Trigger the skill and cause all opponent S1s within a 3-meter radius to experience screen interference for 2.5 seconds.

Extreme Speed: Triggering this skill allows your S1 to drive at a higher speed for 3 seconds.

Invincibility: Triggering this skill gives your S1 a virtual shield that prevents it from being hit for 3 seconds.

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Operating the S1 Using a Gamepad

Introduction

You can also use the S1 Gamepad connected to a mobile device to control the S1 in the following ways.

1. Using the gamepad connected to a mobile device.
2. Using the gamepad connected to a mobile device with a mouse attached.
3. Using the gamepad connected to a mobile device with a mouse and keyboard attached.

Connecting the Gamepad

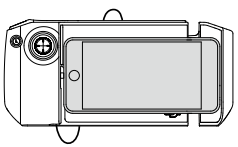
- Connect the mobile device to the mobile device port on the gamepad using a micro USB cable (not included).
- Adjust the mobile device clamp to secure it to the gamepad. Make sure the mobile device is connected with the cable facing toward the control stick as shown in the figure below.
- Press the power button to power on the gamepad. Press and hold the power button to power off the gamepad.

Gamepad Basic Operation

- When the gamepad is connected to a mobile device, the control stick on the gamepad is used to move the S1 forward, backward, and sideward. The app cannot be used to control the chassis.
- The buttons on the gamepad can be used to perform actions on the S1. Users can also continue use the app to perform these actions.

Using the Gamepad

The control stick on the gamepad is used to control the chassis. The app is used to control the gimbal and blaster. When the gamepad is connected, it is not possible to move the chassis using the app.

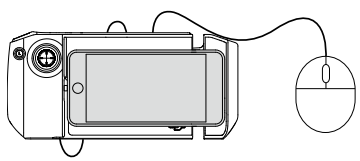


Control Stick Movement	S1 Movement	Control Stick Movement	S1 Movement
			

The control stick on the gamepad is used to move the S1 forward, backward, and sideward.

Using the Gamepad and Mouse

After the gamepad is connected to a mobile device, a computer mouse can also be connected to the gamepad. The control stick on the gamepad is used to control the chassis. The mouse actions are listed below. The app can still be used to control the gimbal and gamepad, but the mouse is the primary controller.



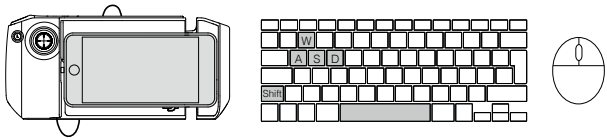
Mouse Action	S1 Action
Left click	Launches gel beads
Right click	Zooms in
Scroll mouse wheel	No action
Move mouse	Adjusts gimbal angle

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Using the Gamepad, Mouse, and Keyboard

A wireless mouse and keyboard is required. After the gamepad is connected to a mobile device, attach the wireless connector of mouse and keyboard to the gamepad. The control stick on the gamepad and the keyboard is used to control the chassis. The mouse actions are listed below. The app can still be used to control the gimbal and blaster, but the mouse is the primary controller.

The A, W, S, and D keys are used to control the chassis. The actions that can be performed with the mouse are listed below.



Keyboard Keys	S1 Action
W	Forward
A	Left
S	Backward
D	Right
Shift / Space key	Accelerate

Mouse Action	S1 Action
Left click	Launches gel beads
Right click	Zooms in
Scroll mouse wheel	No action
Move mouse	Adjusts gimbal angle

⚠ Most Logitech and Rapoo keyboard and mouse devices are supported. It is recommended to use the following models:
Rapoo: 8200P, 9300P, 1800, 8100M
Logitech: M310t, MK850

Using a computer and RoboMaster

Install the Windows or Mac version of the RoboMaster app to a computer and control the S1 directly via a mouse and keyboard.

Installing the Windows or Mac Version of RoboMaster

1. Users can download the RoboMaster app for Windows or Mac from the official DJI website on a computer to control the S1 with a keyboard and mouse.
   Windows: https://www.dji.com/robomaster_app
   Mac: https://www.dji.com/robomaster_app
2. Run installation and follow the prompts to complete the RoboMaster app installation.
3. Run the RoboMaster app to enter the homepage. The Windows or Mac version of the RoboMaster app is similar to the version for iOS and Android.

- Use your DJI account to log in to the Windows version of RoboMaster.
- The RoboMaster app supports Windows 7 or later.

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Using a Mouse and Keyboard to Control the S1

When using RoboMaster for Windows, the S1 is controlled with a mouse and keyboard. The corresponding actions are shown below.



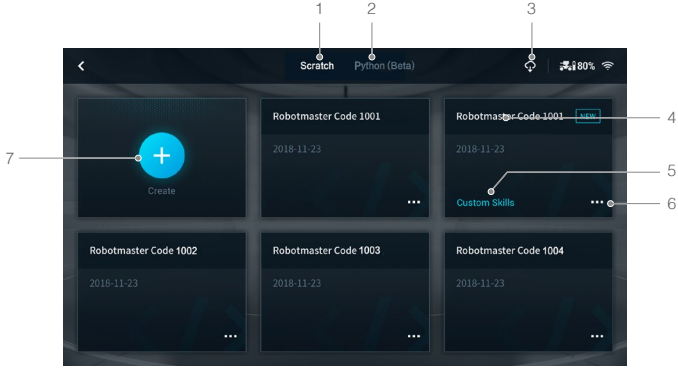
Lab

The RoboMaster S1 Lab offers hundreds of programming blocks that allow you to access features such as PID control. The RoboMaster S1 Programming Guide provides instructions and examples to help users quickly learn programming techniques for controlling the S1.

Users can study project-based courses in Road to Mastery to enhance their understanding of programming languages, from robotics applications to AI technology, with different projects for both beginners and experts.

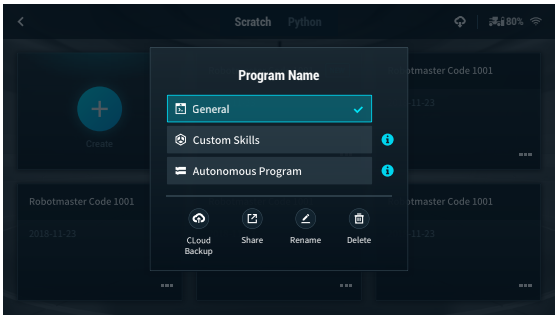
Scratch Programming

In Lab, go to the Scratch page and then DIY Programming to write programs.
In the Scratch page, users can write their own Python programs, which can be set as Autonomous Programs or Custom Skills and run on the S1.
Refer to the RoboMaster S1 Programming Guide for more information.

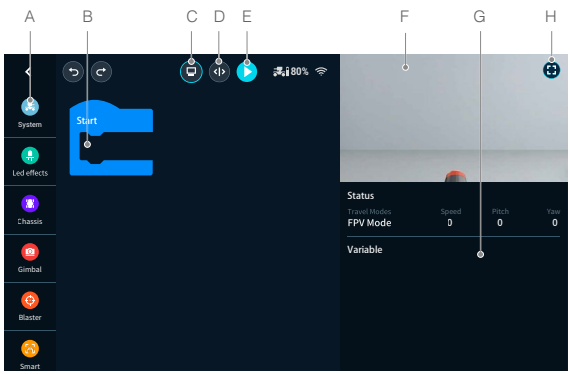


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1. Scratch page: Tap to view Scratch programs.
2. Python page: Tap to view Python programs.
3. Cloud space: Tap to view programs in the cloud space.
4. Program name: Displays the name of the program.
5. If the program is set as a general program, the program type is not displayed. The program type is only displayed if it is set as a custom skill or autonomous program.
6. Program settings: Tap to select the program type, set the program as a custom skill, set the program as an autonomous program, backup on the cloud space, share with other users, and rename or delete the program.



7. Tap ⊕ to create a new program.
   A. Programming modules button: Tap the corresponding icon to program System, LED Effects, Chassis, Gimbal, Blaster, Smart, Armor, Mobile Device, Media, Commands, Operators, and Data Objects.
   B. Programming window button: Drag programming blocks into the window to create a program.
   C. Display button: Tap to turn the FPV on or off.
   D. Switch button: Tap to switch to view the programming block as Python code.
   E. Run button: Tap to run the program.
   F. FPV window: See the current FPV.
   G. Status information: View the current status information of the S1.
   H. FPV button: Tap to enter the FPV in full screen



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AI Modules

There are six AI modules that can be programmed by entering Lab then DIY Programming then Scratch. Refer to the Smart section of the RoboMaster S1 Programming Guide for more programming examples.

Note that the AI module will be affected in the following situations:
a. The object is partly or completely obstructed.
b. The environment is dark (less than 300 lux) or bright (greater than 10,000 lux).
c. The environment suddenly changes from light to dark, or vice versa.
d. The color or pattern of the object is similar to the environment.

Person Recognition

The S1 is able to identify and track any individual selected in the FOV of the S1.

Line Recognition

When in Target Race, the user can program the S1 to automatically follow a line on the ground. Line Recognition supports red, green, and blue lines. The S1 cannot recognize lines of other colors.

Gesture Recognition

The user can program the S1 to perform unique responses when identifying physical gestures.

Clapping Recognition

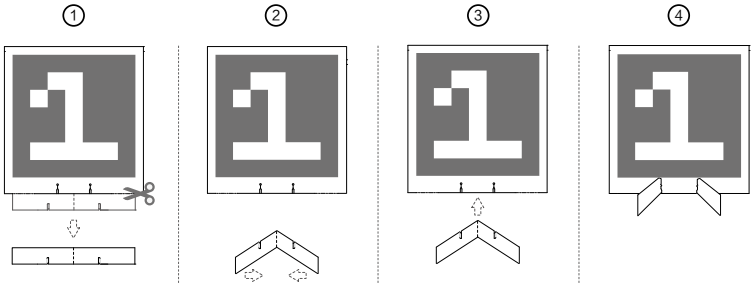
The user can program the S1 to perform unique actions in response to clapping. Only claps within an effective distance of 2 meters can be identified. Identified clapping sequences include two consecutive claps and three consecutive claps.

S1 Robot Recognition

The user can program the S1 to perform unique responses when other S1s are recognized.

Vision Marker Recognition

The user can program the S1 to perform unique responses when identifying vision markers, which include numbers, letters, and special characters. Vision markers must be within an effective distance of three meters and only official vision markers can be identified. Refer to the instructions on the packaging of the vision markers for more information.



⚠ DO NOT block the red area. Otherwise, recognition will be affected.

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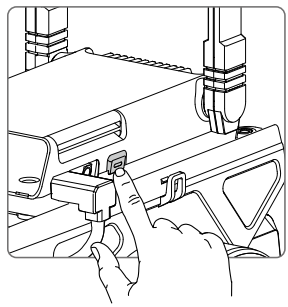
If you need to use more vision markers, tap in the app to enter the guide page. Select the vision markers you wish to download and print.

⚠ Vision Marker Recognition only supports red markers. The S1 cannot recognize vision markers of other colors.

Autonomous Program

A program can be set as an autonomous program and can be run independently on the S1.

1. If the S1 is not connected to the app, the program can be launched by pressing the autonomous program button on the intelligent controller. Press the button again to stop the program.



2. If the S1 is connected to the app, the autonomous program can only be launched in the following locations:
   (1) App homepage
   (2) Solo mode FPV
   (3) Lab

Custom Skills

A program can be set as a custom skill, which can be used in the FPV in both Solo and Battle mode. Tap in the FPV to use a custom skill.

Python Programming

In Lab, go to the Python page then DIY Programming to write programs.

In the Python page, users can write their own Python program, which can be set as an Autonomous Program or a Custom Skill and run on the S1.

Users can also convert Scratch programs into Python code and use the source code display to help get started with programming with Python. Refer to the RoboMaster S1 Programming Guide for more information.

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Appendix

Specifications

RoboMaster S1	
Dimensions (L×W×H)	320×240×270 mm
Weight	Approx. 3.3 kg
Chassis Speed Range	0-3.5 m/s (forward) 0-2.5 m/s (backward) 0-2.8 m/s (sideward)
Max Chassis Rotational Speed	600°/s
M3508I Brushless Motor	
Max Rotational Speed	1000 rpm
Max Torque	0.25N·m
Max Output Power	19 W
Operating Temperature Range	-10 to 40 °C (14 to 104 °F)
Driver	Field-oriented control (FOC)
Control Method	Closed-loop speed control
Protection	Overvoltage protection Overheating protection Soft-starter Short-circuit protection Chip and sensor anomaly detection
Gimbal	
Controllable Range	-20° to +35° (pitch); ±250° (yaw)
Mechanical Range	-24° to +41° (pitch); ±270° (yaw)
Max Rotational Speed	540°/s
Vibration Control Precision (on a flat surface, blaster idle)	±0.02°
Blaster	
Controllable Launching Frequency	1-8/s
Max Launching Frequency	10/s
Initial Launching Speed	Approx. 26 m/s
Average Load	Approx. 430 gel beads (soaked)
Intelligent Controller	
Latency[1]	Connection via Wi-Fi: 80-100 ms Connection via Router: 100-120 ms (unobstructed, free of interference)
Live View Quality	720p/30fps
Max Live View Bitrate	6 Mbps
Operating Frequency[2]	2.4 GHz, 5.1 GHz, 5.8 GHz

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Transmission Power (EIRP)	2.400-2.4835 GHz FCC: ≤30 dBm SRRC: ≤20 dBm CE: ≤19 dBm MIC: ≤20 dBm 5.150-5.250 GHz FCC: ≤30 dBm SRRC: ≤23 dBm CE: ≤20 dBm MIC: ≤23 dBm 5.725-5.850 GHz FCC: ≤30 dBm SRRC: ≤30 dBm CE: ≤14 dBm
Operating Mode	Connection via Wi-Fi, Connection via Router
Max Transmission Distance[3]	Connection via Wi-Fi: FCC, 2.4 GHz 140 m, 5.8 GHz 90 m CE, 2.4 GHz 130 m, 5.8 GHz 70 m SRRC, 2.4 GHz 130 m, 5.8 GHz 130 m MIC, 2.4 GHz 130 m Connection via Router: FCC, 2.4 GHz 190 m, 5.8 GHz 300 m CE, 2.4 GHz 180 m, 5.1 GHz 70 m SRRC, 2.4 GHz 180 m, 5.8 GHz 300m MIC, 2.4 GHz 180 m
Transmission Standard	IEEE802.11a/b/g/n
Camera	
Sensor	CMOS 1/4″; Effective pixels: 5MP
FOV	120°
Max Still Photo Resolution	2560×1440 pixels
Max Video Resolution	FHD: 1080p/30fps HD: 720p/30fps
Max Video Bitrate	16 Mbps
Photo Format	JPEG
Video Format	MP4
Supported SD Cards	Supports microSD cards with a capacity of up to 64 GB
Operating Temperature Range	-10 to 40 °C (14 to 104 °F)
Narrow Infrared Units	
Effective Range[4]	6 m (in indoor lighting conditions)
Effective Area	Varies from 40° to 10° (effective area decreases as the distance from the target increases)

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Wide Infrared Units	
Effective Range[4]	3 m (in indoor lighting conditions)
Effective Width	360° (in indoor lighting conditions)
Hit Detector	
Detection Requirements	For the hit detector to be activated, the following conditions must be met: Gel bead diameter ≥ 6mm, launching speed ≥20 m/s, and the angle between the hit direction and hit detector plane is no less than 45°.
Maximum Detection Frequency	15 Hz
Intelligent Battery	
Capacity	2400 mAh
Maximum Charging Voltage	12.6 V
Nominal Charging Voltage	10.8 V
Battery Type	LiPo 3S
Energy	25.92 Wh
Battery Life (in use)	35 mins (measured at a constant speed of 2.0 m/s on a flat surface)
Battery Life (on standby)	Approx. 100 mins
Weight	169 g
Operating Temperature Range	-10 to 40 °C (14 to 104 °F)
Charging Temperature Range	5 to 40 °C (41 to 104 °F)
Maximum Charging Power	29 W
Charger	
Input	100-240 V, 50-60 Hz, 1 A
Output	Port: 12.6 V=0.8 A or 12.6 V=2.2 A
Voltage	12.6 V
Rated Voltage	28 W
Gel Bead	
Diameter	5.9- 6.8 mm[5]
Weight	0.12-0.17 g[5]
App	
iOS	iOS 10.0.2 or later
Android	Android 5.0 or later
Others	
Recommended Routers	TP-Link TL-WDR8600; TP-Link TL-WDR5640 (China) TP-Link Archer C7; NETGEAR X6S (International)
Recommended outdoor power supply solution for routers	Portable laptop charger (with the same input power of the router)

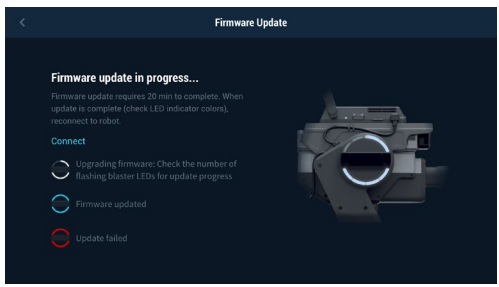
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[1] Measured in an interference-free and unobstructed environment with a distance of approximately one meter between the mobile device, the router, and the S1. The iOS device used was an iPhone X. The results of testing with different Android device may be different.
[2] Outdoor use of the 5.1 GHz and 5.8 GHz frequency bands is prohibited in some areas. Always follow all local laws and regulations in your country or region.
[3] Measured in an interference-free and unobstructed environment.
For Connection via Wi-Fi, the mobile device used for testing was a sixth-generation iPad (released in 2018). For Connection via Router, several router models were used for testing. FCC: TP-Link Archer C9; SRRC: TP-Link WDR8600; CE: TP-Link Archer C7; MIC: WSR-1160DHP3.
[4] Use of the infrared units will be affected in outdoor or infrared-intensive environment.
[5] The gel beads will swell to a usable size after being soaked in water for four hours.

Firmware Update

Check the S1 firmware version in Settings, then System, and then Firmware Update. If there is a new firmware version, use the RoboMaster app to update the firmware of the S1.

1. Make sure that all parts are connected, power on the S1, and check to make sure the battery level is above 50%.
2. Tap App, then System, and then Firmware Update. Follow the onscreen instructions to update the firmware. Make sure the mobile device is connected to the internet when downloading the firmware.
3. The S1 tracks the progress of the update using audio prompts. Wait until the update is complete.



⚠
- The battery firmware is included in the S1 firmware. Make sure to update the firmware of all batteries if you have several.
- Only start a firmware update if the battery level is above 50%.
- Note that while updating the firmware of the S1, the gimbal may go limp, the status indicators may blink abnormally, and the S1 may reboot.
- The S1 and app may disconnect after updating. If this occurs, reconnect them.
- If you receive a prompt that newer firmware version is out of date, update and try again.
- When in Battle mode, make sure that all the S1s are using the same firmware version.

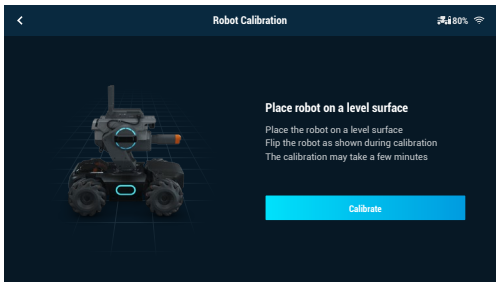
Calibrating the S1

If any of the following scenarios occur, recalibrate the S1 in the RoboMaster app:
a. The pitch angle is not horizontal after performing the gimbal self-test.
b. The gimbal attitude cannot be controlled precisely.

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c. The pitch cannot rotate horizontally when the yaw is controlled separately.
d. The gimbal drifts when there is no operation or when the operation is stopped.
e. The S1 moves involuntarily while rotating.
f. The chassis is uncontrollable and the gimbal goes limp when warning prompts appear in the app.
g. The motion controller has been installed or reinstalled.

The specific calibration steps are as below:
1. Open the RoboMaster app, tap on Settings, then System, and select Calibration.
2. Follow the steps in the app to calibrate.

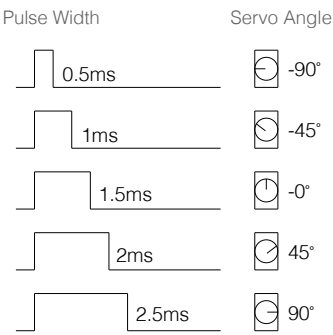


Setting the PWM Ports

PWM (pulse width modulation) controls the duration of a high level of output during a certain period, and is broadly used to control LEDs, navigation gears, and more. The S1 PWM port has a default duty cycle of 7.5% and a fundamental frequency of 50 Hz.

For LEDs, the PWM output rate ranges from 0% to 100%, with 0% corresponding to an LED's lowest brightness and 100% to its highest brightness. For navigation gears, the PWM output rate ranges from 2.5% to 12.5%.

You can set the navigation gear PWM output percentage based on the rotation angles you wish to control.



⚠ Each time the custom program or Python program finishes running, the PWM port output signal will be set to its default setting, which is 50 Hz and the duty cycle is 7.5%.

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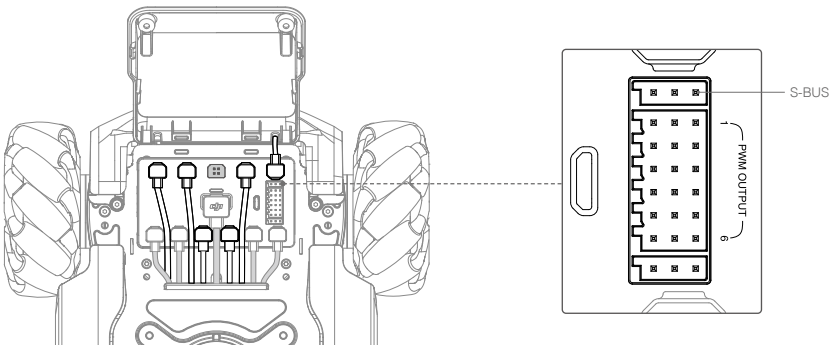
Using S-Bus Port

S1 firmware v00.05.0046 or later is required to use the S-Bus port.

A remote controller that supports the S-Bus protocol can be used to control the S1 by connecting to the S-Bus port of the S1 Motion Controller. Users must prepare their own receiver and remote controller. It is recommended to use a Futaba R6303SB receiver.

Connection

Connect the S-Bus port of the S1 Motion Controller to the S-Bus port of the receiver by using the 3-pin servo cable.

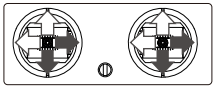
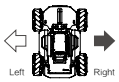
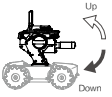
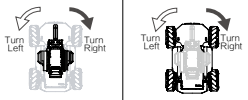
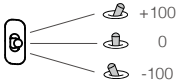
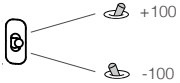
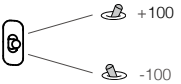


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Usage

Make sure the remote controller has been linked with the receiver before use. Refer to the manual documents of the receiver for more information on linking methods.

The correspondence of control channels of the S-Bus port of the S1 Motion Controller are shown below. Refer to the manual documents of the remote controller to complete the channel mapping between the receiver and remote controller.

<table>
<tr><th rowspan="2">S-Bus Port Control Channels</th><th rowspan="2">Chassis Lead Mode</th><th rowspan="2">Free Mode</th><th colspan="3">Recommended Remote Controller Channel</th></tr>
<tr><th>Remote Controller Channel</th><th>Offset</th><th>Status</th></tr>
<tr><td>Channel 1</td><td>Move the chassis sideward</td><td>Move the chassis sideward</td><td rowspan="3">Control Stick Channel
  </td><td></td><td>  </td></tr>
<tr><td>Channel 2</td><td>Move the chassis forward and backward</td><td>Move the chassis forward and backward</td><td></td><td>  </td></tr>
<tr><td>Channel 3</td><td>Control the pitch of the gimbal</td><td>/</td><td>  </td><td>  </td></tr>
<tr><td>Channel 4</td><td>Control the yaw of the gimbal</td><td>Control the yaw of the chassis</td><td></td><td>  </td></tr>
<tr><td>Channel 5</td><td colspan="2">Control the movement speed of the chassis and there are three optional speeds:
Fast
Medium
Slow</td><td colspan="2">3-Position Switch Channel
  </td><td>Fast
Medium
Slow</td></tr>
<tr><td>Channel 6</td><td colspan="2">Switch the chassis mode and there are two optional modes:
Chassis Lead mode
Free mode</td><td colspan="2">2-Position Switch Channel
  </td><td>Chassis Lead mode
Free mode</td></tr>
<tr><td>Channel 7</td><td colspan="2">Control the release of the chassis and there are two statuses:
Chassis is set when it produces output torque
Chassis is released when it not producing output torque</td><td colspan="2">2-Position Switch Channel
  </td><td>Set
Release</td></tr>
</table>

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