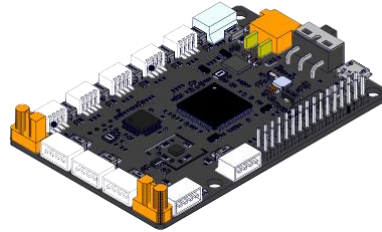


MAKE ><

Competition Kits

Instructions (Electronics)



1. Overview

As a new generation competition platform mainboard, NovaPi consists of one M7 high-performance processor (ATSAMS70N20A-AN), one STM32 co-processor (STM32F030CCT6), five 5 V universal ports, and six smart motor interfaces. The 5 V universal ports communicate using serial ports and output 5 V voltage. The smart motor ports communicate using serial ports and output 12 V voltage. NovaPi has a 6-axis motion sensor that can measure the acceleration velocity and angular velocity along the X, Y, and Z axes. NovaPi can be used with a power shield to provide a greater variety of ports and resources.

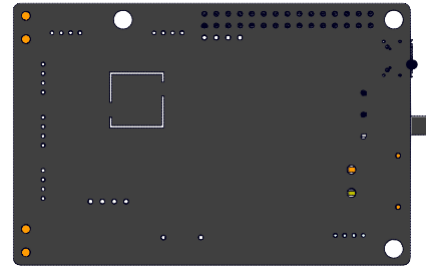
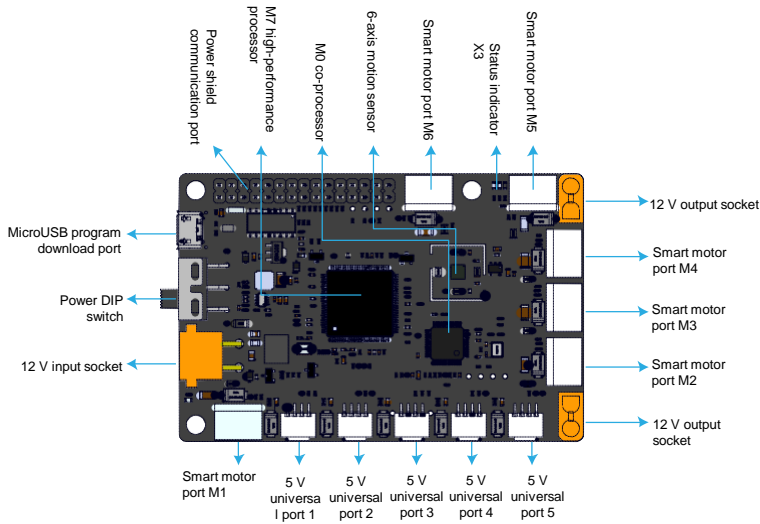
2. Features

- Support the Makeblock metal parts
- Five 5 V universal ports
- Six smart motor ports
- 6-axis motion sensor
- Support power shields
- M7 high-performance processor

3. Technical Specifications

- Module dimensions: 85 mm x 56 mm x 13 mm
- Operating voltage: 6 V - 13 V (If a motor is used, the input voltage must meet the minimum operating voltage requirement of the motor.)
- Operating current: 60 mA
- Communication port and protocol: serial port/dedicated protocol

4. Device Appearance



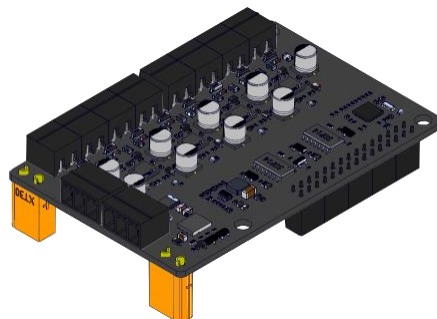
5. Cautions

- NovaPi must be connected to other structural components and fastened using a dedicated support. (See “Mainboard and Shield Housing Installation Methods”.)
- During installation, keep space (using a gasket) between NovaPi and the bracket to avoid pin pressure and short circuit.
- Do not mount or unmount NovaPi when the power is on. Check all connections before powering it on.
- Prevent conductive objects such as copper wires and tin dross from contacting NovaPi.
- Status indicator description

Green LED: slow flash - The co-processor is working properly.

Blue LED: slow flash - NovaPi is working properly; fast flash - NovaPi firmware must be upgraded.

Red LED: slow flash - NovaPi is faulty.



1. Overview

The power shield contains an MCU with the ARM Cortex-M4 core, uses serial interfaces to communicate with NovaPi, and uses eight DC output ports and two brushless motor ports to control the powered devices such as DC motors, mechanical grabbers, electromagnetic valves, and brushless motors.

2. Features

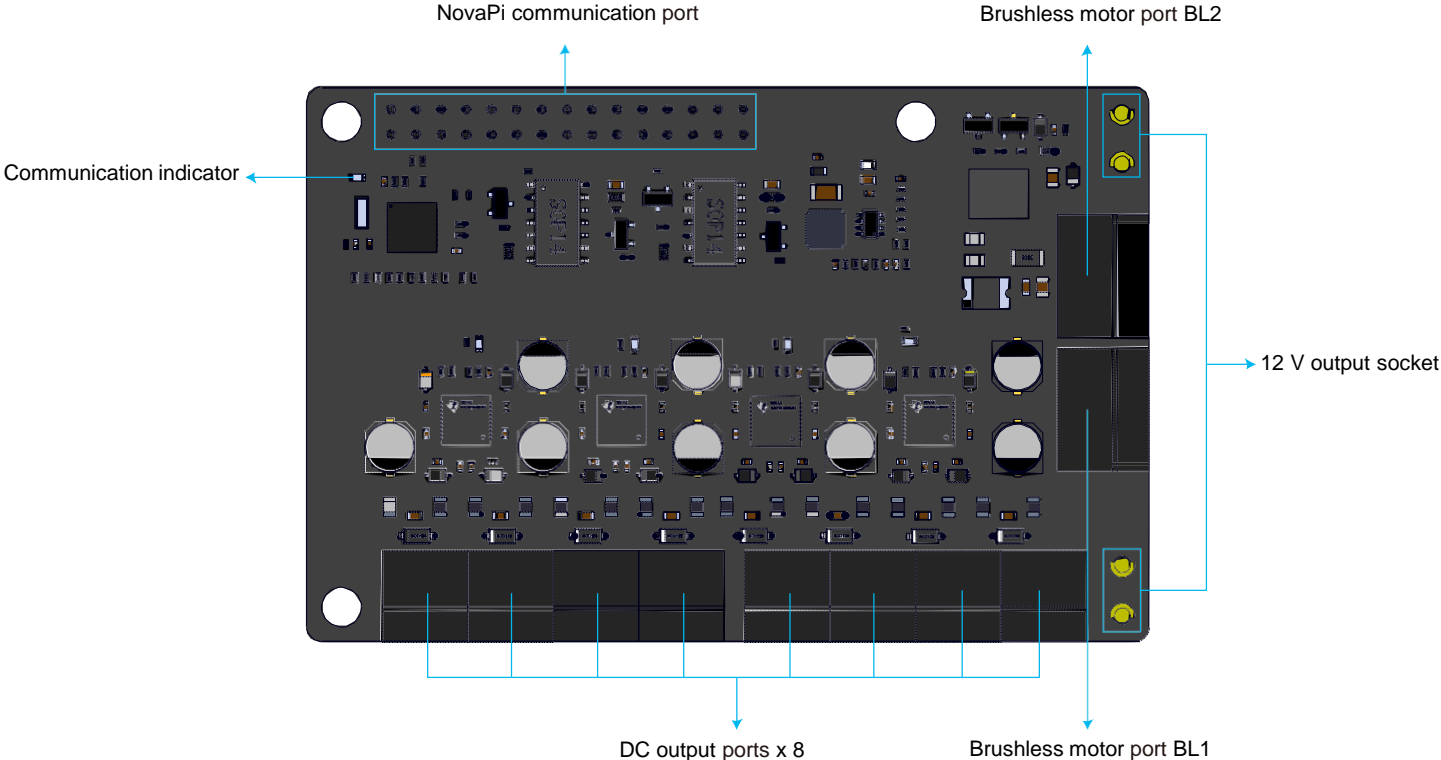
- Work with NovaPi.
- Can control Makeblock series powered devices such as 37 DC motors, electromagnetic valves, mechanical grabbers, and brushless motors
- Can control common powered devices including DC motors, electromagnets, and electromagnetic valves
- Eight DC output interfaces and two brushless motor interfaces
- Embedded overload protection circuits to prevent exceptional conditions from damaging the shield
- Require no extra external power supply

3. Technical Specifications

- Module dimensions: 85 mm x 56 mm x 19.5 mm
- Input voltage: 6 V - 13 V
- DC port voltage: 12 V
- Maximum DC port current: 3 A
- Brushless motor port voltage: 12 V
- Maximum brushless motor port current: 5 A

Power shield

4. Device Appearance

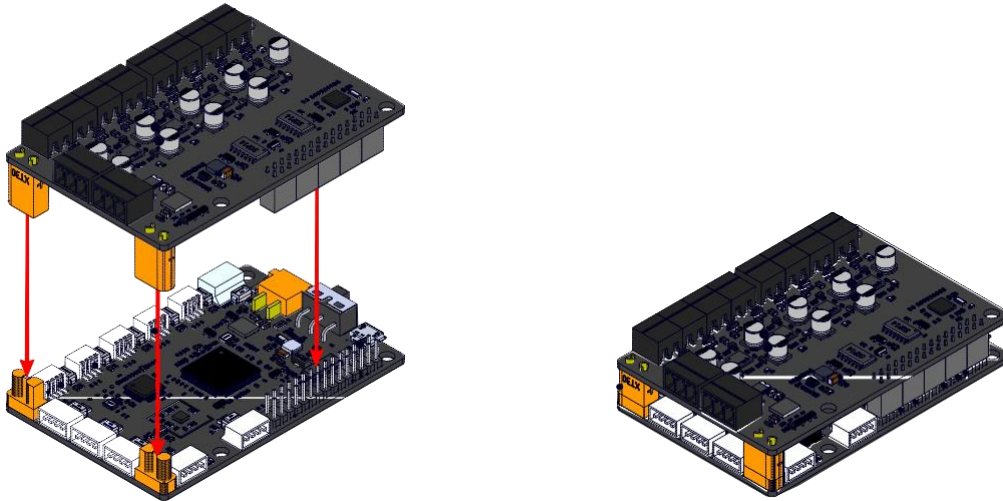


Power shield

5. Cautions

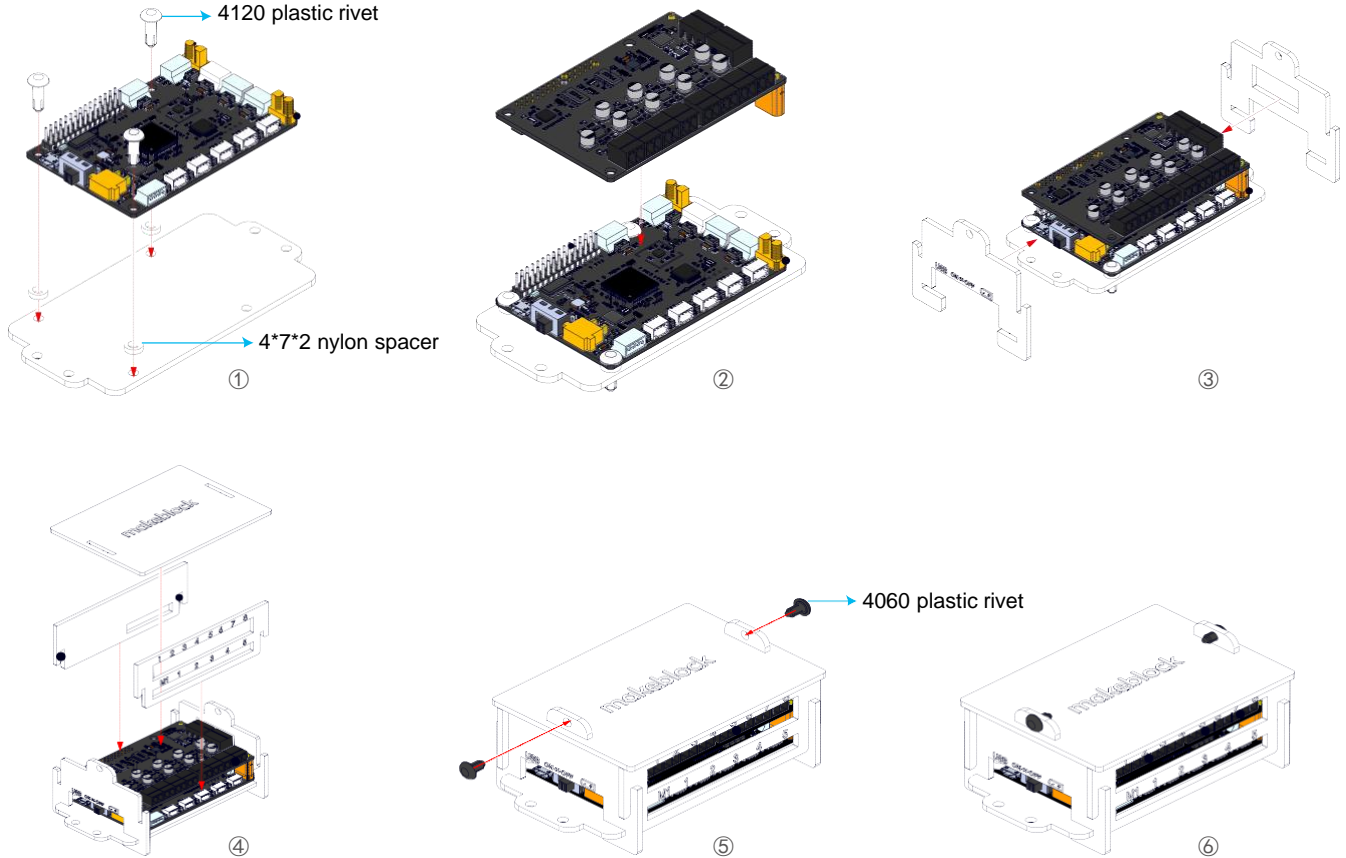
- The shield must be used with NovaPi and a dedicated support. (See "Mainboard and Shield Housing Installation Methods".)
- When mounting the shield, align the pins and press it to reach the bottom, so as to prevent loose contact.
- When unmounting the shield, keep it level to avoid bending and damaging the pins.
- Do not mount or unmount the shield when the power is on. Check all connections before powering on.
- Prevent conductive objects such as copper wires and tin dross from contacting the shield.

6. Installation Methods

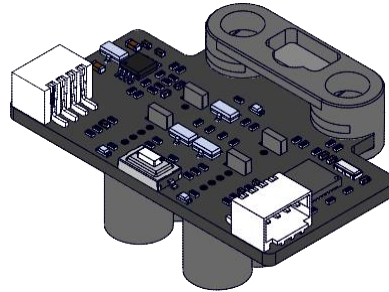


Power shield

7. Mainboard and Shield Housing Installation Methods



Two-way RGB Color Sensor



1. Overview

The RGB color sensor can identify colors and follow lines. It contains two RGB lights and two photosensitive receiving tubes to measure the reflected light of the RGB lights from object surface and determine the object surface color based on the light intensity percentage. In addition, it compares the return values of the two probes to help users perform line following. This sensor can be used to follow lines in light-color lanes with a dark background, as long as the color difference between the gray levels of the background and lane is greater than the threshold. (The line following performance improves as the color difference increases.) This sensor features quick detection, arena learning through buttons, and excellent adaptability.

2. Features

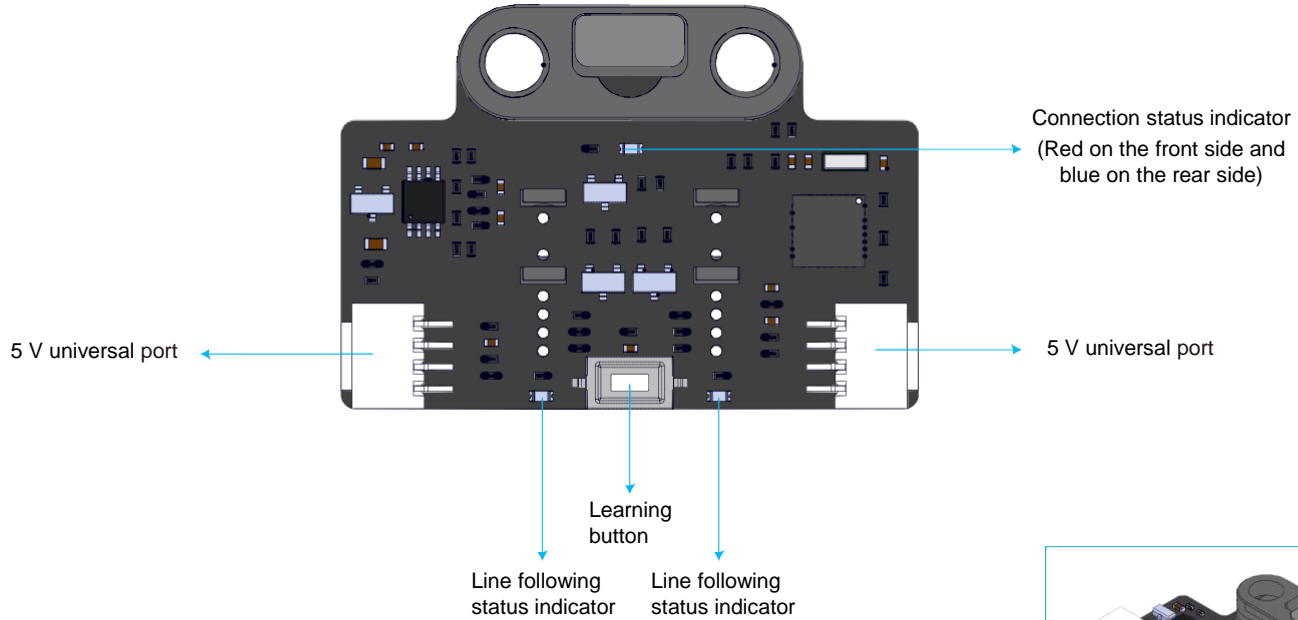
- Support Makeblock metal parts and Lego pins
- Combine RGB color identification and line following
- Automatically identify background and lane colors and compatible with various mats
- Integrate the line following algorithm for quick line following
- Small size suitable for various projects

3. Technical Specifications

- Module dimensions: 40 mm x 27.2 mm x 1.6 mm
- Operating voltage: 5.0 V
- Operating current: 84.0 mA
- Measurement range: It is recommended that the probes be kept 5 mm to 15 mm away from a lane based on the mat material and the on-site illumination.

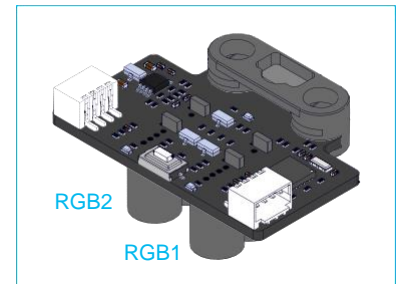
Two-way RGB Color Sensor

4. Device Appearance



Button function description

- Double press the button: Trigger learning of line following. Place the two sensor probes on the background of the mat and double press the button. When the two line following status LED indicators flash quickly, sway horizontally above the background and lines (for about 2.5 seconds) until the LED indicators stop flashing. The learning parameters are automatically saved. If learning fails, the two line following status indicators slowly flash and learning must be performed again.
- Long press the button: Change the color of the line following lights. Long press the button for two to three seconds. The light color changes circularly in the order of red, green, and blue. (Normally, the color does not need to be switched as it is set automatically after learning success.)



Two-way RGB Color Sensor

5. Cautions

- Three module extension sensitive areas can be used to handle various types of intersection.
- Avoid serial connection of too many identical modules, which could result in signal response delay.

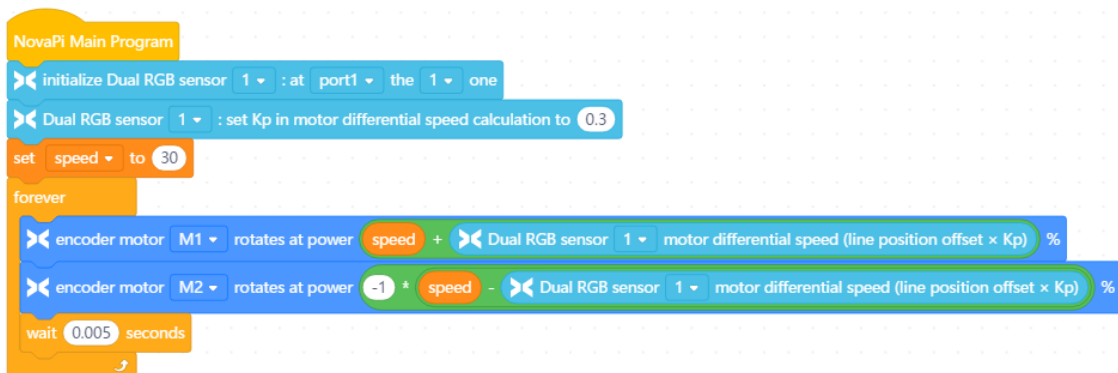
6. Programming Example

Statement block description:

Statement Block	Description	Remarks
	It defines an ID and an interface of the sensor. You can use a maximum of six identical modules. Each interface can be connected in a serial manner to a maximum of three modules.	It is generally written in the beginning of a main program for initialization. It needs to be run only once, and it is not recommended to write it in a loop statement.
	It sets the motor differential coefficient.	
	It sets the line following light color.	After learning success, a module automatically selects and saves the line following light color. Generally, the color does not need to be set manually.
	It checks the color identified by a probe.	00: Probes 1 and 2 are above a line. 01: Probe 2 is above a line and probe 1 is above the background. 10: Probe 2 is above the background and probe 1 is above a line. 11: Probes 1 and 2 are above the background.
	It checks the probe position status.	
	It checks whether a probe is above the background.	
	It obtains the module offset against a line.	<ol style="list-style-type: none">1. If the module is to the left of a line, the offset value is positive.2. If the 2 probes of the module are above a line, the offset value is 0.3. If a module is to the right of a line, the value is negative.
	It obtains the differential value returned for a motor from the module.	Range: 0-255
	It obtains the light intensity value collected by a module probe.	

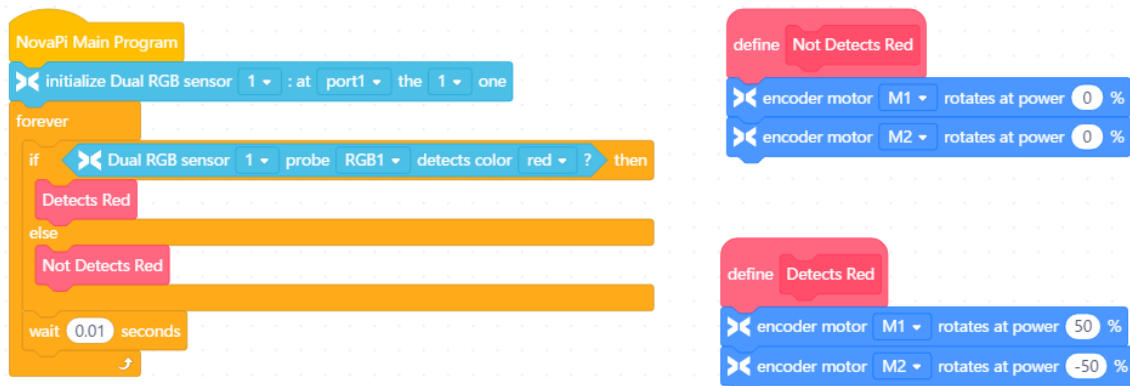
Two-way RGB Color Sensor

Line following example:



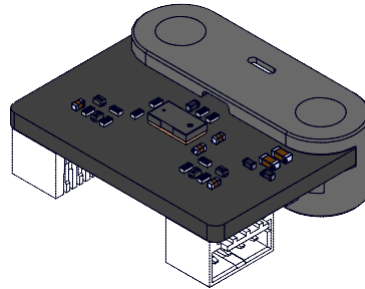
```
Scratch code for line following example:  
NovaPi Main Program  
- initialize Dual RGB sensor 1 : at port1 the 1 one  
- Dual RGB sensor 1 : set Kp in motor differential speed calculation to 0.3  
- set speed to 30  
- forever loop:  
  - encoder motor M1 rotates at power speed + Dual RGB sensor 1 motor differential speed (line position offset x Kp) %  
  - encoder motor M2 rotates at power -1 * speed - Dual RGB sensor 1 motor differential speed (line position offset x Kp) %  
  - wait 0.005 seconds
```

Color identification example:



```
Scratch code for color identification example:  
NovaPi Main Program  
- initialize Dual RGB sensor 1 : at port1 the 1 one  
- forever loop:  
  - if Dual RGB sensor 1 probe RGB1 detects color red ? then  
    - Detects Red  
  - else  
    - Not Detects Red  
  - wait 0.01 seconds  
  
Define Not Detects Red:  
- encoder motor M1 rotates at power 0 %  
- encoder motor M2 rotates at power 0 %  
  
Define Detects Red:  
- encoder motor M1 rotates at power 50 %  
- encoder motor M2 rotates at power -50 %
```

Distance Measurement Sensor



1. Overview

The distance measurement sensor uses the invisible light in the infrared band to measure the distance to the surface based on the TOF principle. This features high directivity and measurement accuracy.

2. Features

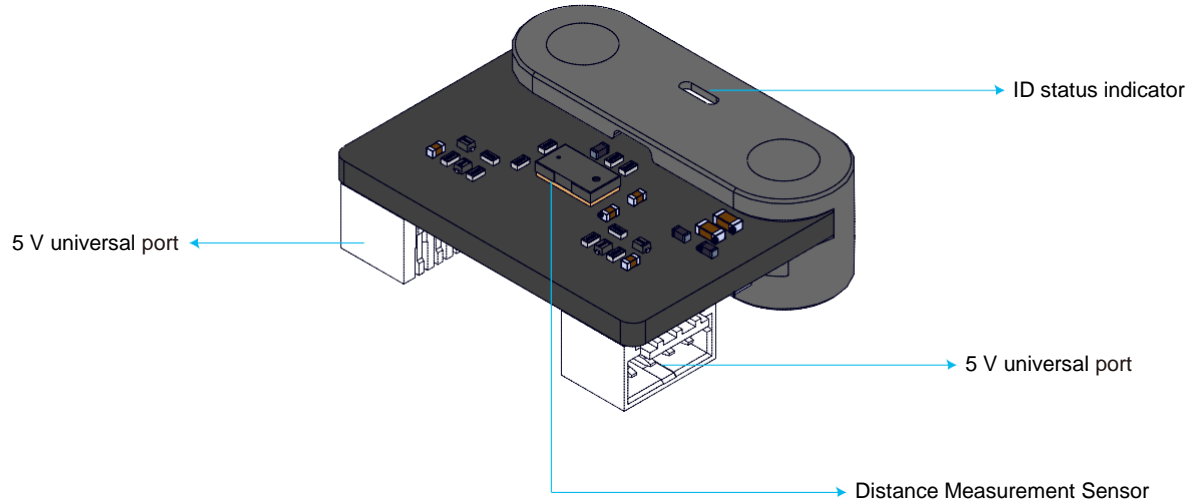
- Support Makeblock metal parts and Lego pins
- High directivity and measurement accuracy
- Small size suitable for various projects

3. Technical Specifications

- Module dimensions: 24 mm x 20 mm x 8 mm
- Operating voltage: 5.0 V
- Operating current: 35.0 mA
- Measurement range: 2 cm - 200 cm
- FOV: 25°
- Measurement accuracy: 3%
- Wavelength: 940 nm

Distance Measurement Sensor

4. Device Appearance





5. Cautions

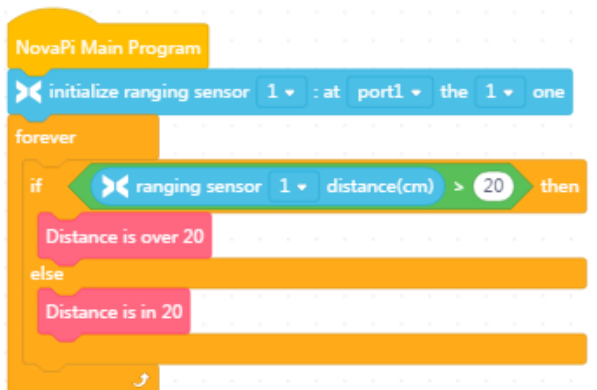
- To avoid module interference, it is recommended that the number of modules in one orientation should not exceed one.
- Avoid serial connection of too many identical modules, which could result in signal response delay.

Distance Measurement Sensor

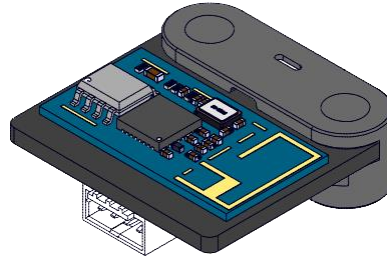
6. Programming Example

Statement block description:

Statement Block	Description	Remarks
 初始化测距传感器 1 : 位于 接口1 第 1 个	<p>It defines an ID and an interface of the sensor. You can use a maximum of 12 identical modules. Each interface can be connected in a serial manner to a maximum of six modules.</p> <p>SN: 1 - 12 index: 1 - 6 Port: Interface 1 - interface 5</p>	<p>It is generally written in the beginning of a main program for initialization. It needs to be run only once, and it is not recommended to write it in a loop statement.</p>
 测距传感器 1 障碍物距离 (CM)	<p>It obtains the effective range of the distance measurement sensor.</p> <p>Unit: cm Return value type: float Return value range: 3 cm - 200 cm</p>	<p>If the distance is greater than 200 cm or less than 3 cm, the value 200 is returned.</p>



Bluetooth Module



1. Overview

The Bluetooth module implements system connection via Bluetooth to Bluetooth joysticks and Bluetooth adapters.

2. Features

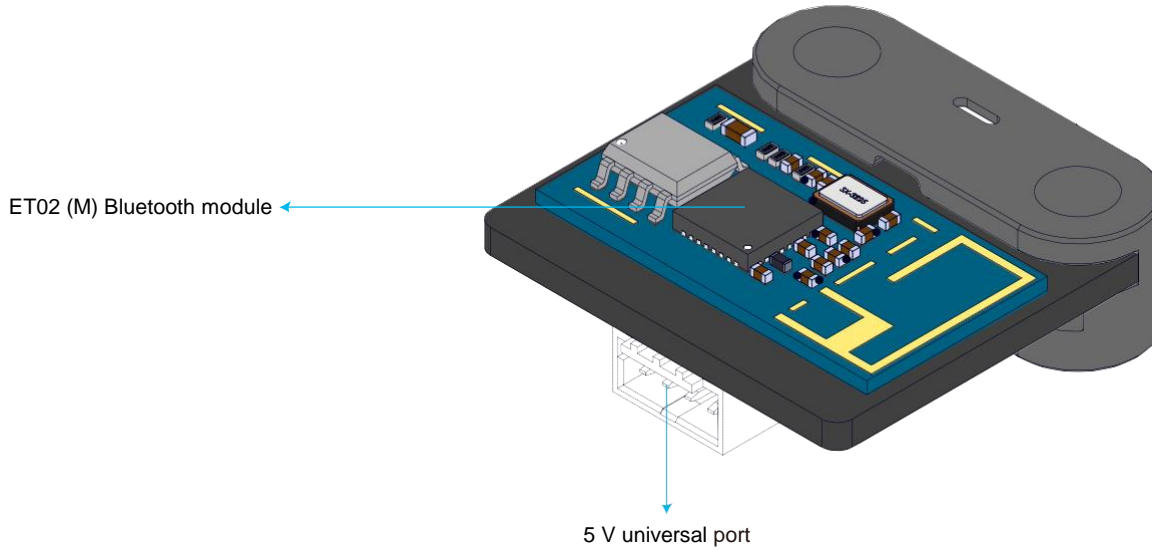
- Support Makeblock metal parts and Lego pins
- Support Bluetooth devices such as joysticks and dongles
- Small size suitable for various projects

3. Technical Specifications

- Module dimensions: 24 mm x 23 mm x 6 mm
- Operating voltage: 2.5 V - 5.5 V
- Operating current: 20 mA
- Communication port and protocol: serial port communication

Bluetooth Module

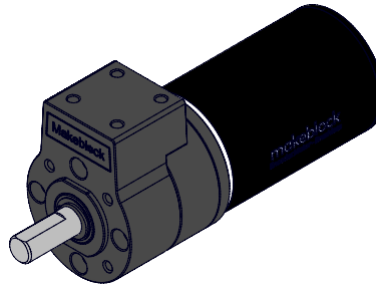
4. Device Appearance



5. Cautions

- To ensure proper communication, the Bluetooth module should be directly connected to NovaPi and cannot be connected in a serial manner to other modules.

36 Stacked Brushless Motor



1. Overview

The 36 stacked brushless motor uses a reducer gearbox with adjustable reduction-gear ratio. It can realize three reduction-gear ratios by adding or reducing gear modules. Its embedded encoder can accurately control the rotational speed and its embedded brake program can precisely control the time of start and stop. It uses a sheer metal gear set, and has built-in motor fixture to simplify installation.

2. Features

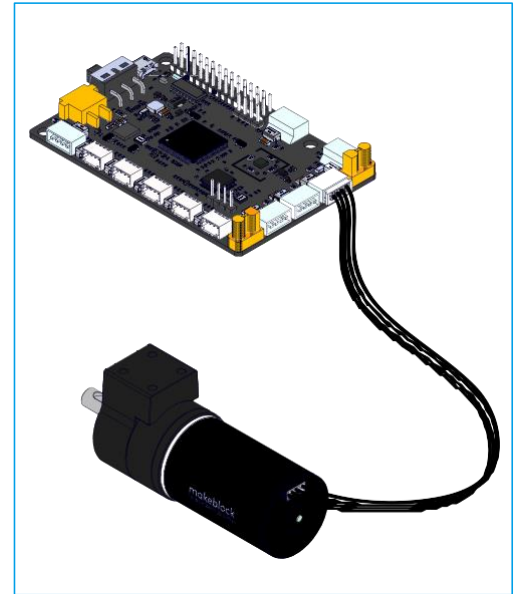
- Sheer metal gear set for excellent durability
- Embedded encoder for precise control of robotic motions
- Mounting holes for bracket-free motor mounting
- High torque and power
- Smart motor ports

3. Technical Specifications

- Module dimensions: 115.3 mm x \varnothing 36 mm
- Operating voltage: 10 V - 15 V
- No-load current: 750 mA
- Rated load torque: 5 kg.cm
- No-load rotational speed: $300 \pm 10\%$ rpm
- Communication port and protocol: serial port communication

36 Stacked Brushless Motor

4. Device Appearance









5. Cautions

- Select the screws with suitable lengths for installation, so as to avoid damaging the reducer gearbox.

36 Stacked Brushless Motor

6. Programming Example

Statement block description:

Statement Block	Description	Remarks
	<p>It sets the power output of the encoder motor.</p>	<p>Power: -100% - 100% A positive value indicates forward rotation, while a negative value indicates reverse rotation. If the set value exceeds the upper or lower limit, the motor will rotate at the top or bottom speed. After the input exceeds a limit, the limit value is populated.</p>
	<p>It makes a motor rotate at a certain speed relative to the current position.</p>	<p>The preset positive or negative rotary angle determines the direction of the final position to the current position. The speed ranges from 0 to 300. If the value exceeds the upper limit, the motor will rotate at the top speed.</p>
	<p>It makes a motor rotate at a certain speed relative to the details zero position.</p>	<p>The preset positive or negative rotary angle determines the direction of the final position to the current zero position. The speed ranges from 0 to 300. If the value exceeds the upper limit, the motor will rotate at the top speed.</p>
	<p>It makes a motor rotate at a fixed speed.</p>	<p>A positive value indicates forward rotation, while a negative value indicates reverse rotation. The speed ranges from -300 to 300. If the value exceeds the upper limit, the motor will rotate at the top speed.</p>
	<p>It detects the current rotational speed of the motor.</p>	<p>\</p>
	<p>It detects the current angular position of the motor relative to the zero position.</p>	<p>\</p>

36 Stacked Brushless Motor

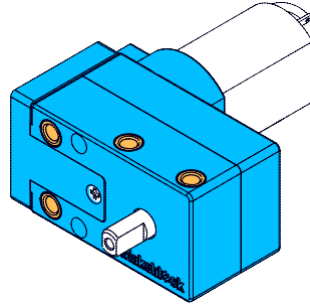
Programming example:

The image shows a Scratch-style code editor with a 'NovaPi Main Program' block. A 'forever' loop contains the following sequence of blocks:

- Encoder motor M1 rotates at speed of 50 r/min
- Encoder motor M1 rotates at speed of -50 r/min
- wait 3 seconds
- Encoder motor M1 rotates at speed of 0 r/min
- Encoder motor M1 rotates at speed of 0 r/min
- wait 3 seconds
- Encoder motor M1 rotates at speed of 150 r/min
- Encoder motor M1 rotates at speed of -150 r/min
- wait 3 seconds
- Encoder motor M1 rotates at speed of 50 r/min
- Encoder motor M1 rotates at speed of -50 r/min
- wait 3 seconds
- Encoder motor M1 rotates by 720 degree at speed of 120 r/min
- Encoder motor M1 rotates by -720 degree at speed of 120 r/min
- wait 3 seconds

The code ends with a small arrow icon at the bottom of the 'forever' loop block.

180 Smart Encoder Motor



1. Overview

The 180 smart encoder motor is an entry-level encoder motor. It works with NovaPi to serve as the chassis motor for MakeX Challenge.

2. Features

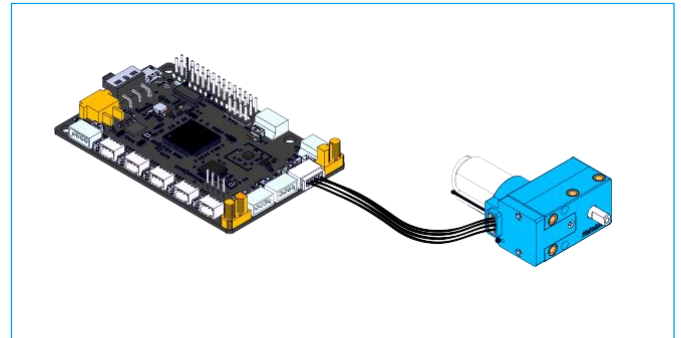
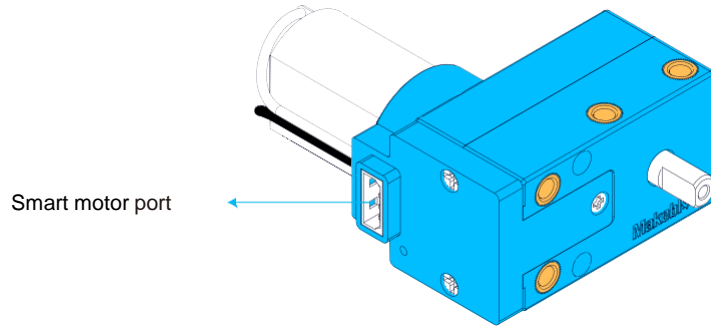
- Sheer metal gear set for excellent durability
- Embedded encoder for precise control of robotic motions
- Mounting holes for bracket-free motor mounting
- Various types of installation holes to facilitate installation
- High torque and power
- Smart motor port

3. Technical Specifications

- Reduction-gear ratio: 39.43
- Rated voltage: 12 V
- No-load current: 350 mA
- Communication port and protocol: serial port communication

180 Smart Encoder Motor




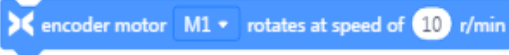


4. Device Appearance



180 Smart Encoder Motor

5. Programming Example

Statement block description:

Statement Block	Description	Remarks
	It sets the power output of the encoder motor.	Power: -100% - 100%. A positive value indicates forward rotation, while a negative value indicates reverse rotation. When the preset value exceeds the upper or lower limit, the motor will rotate at the top or bottom speed. After the input exceeds a limit, the limit value is populated.
	It makes a motor rotate at a certain speed relative to the current position.	The preset positive or negative rotary angle determines the direction of the final position to the current position. The speed ranges from 0 to 250. If the value exceeds the upper limit, the motor will rotate at the top speed.
	It makes a motor rotate at a certain speed relative to the details zero position.	The preset positive or negative rotary angle determines the direction of the final position to the current zero position. The speed ranges from 0 to 250. If the value exceeds the upper limit, the motor will rotate at the top speed.
	It makes a motor rotate at a fixed speed.	A positive value indicates forward rotation, while a negative value indicates reverse rotation. The speed ranges from -250 to 250. If the value exceeds the upper limit, the motor will rotate at the top speed.
	It detects the current rotational speed of the motor.	\
	It detects the current angular position of the motor relative to the zero position.	\

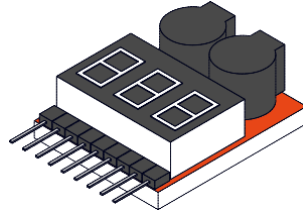
180 Smart Encoder Motor

Programming Example

The image shows a Scratch-style code editor with a background of a light blue grid. The code is written in orange and blue blocks. It starts with a yellow 'NovaPi Main Program' block. Below it is an orange 'forever' loop block. Inside the loop, there are several blue blocks: 'encoder motor M1 rotates at speed of 50 r/min', 'encoder motor M1 rotates at speed of -50 r/min', 'wait 3 seconds', 'encoder motor M1 rotates at speed of 0 r/min', 'encoder motor M1 rotates at speed of 0 r/min', 'wait 3 seconds', 'encoder motor M1 rotates at speed of 150 r/min', 'encoder motor M1 rotates at speed of -150 r/min', 'wait 3 seconds', 'encoder motor M1 rotates at speed of 50 r/min', 'encoder motor M1 rotates at speed of -50 r/min', 'wait 3 seconds', 'encoder motor M1 rotates by 720 degree at speed of 120 r/min', 'encoder motor M1 rotates by -720 degree at speed of 120 r/min', and 'wait 3 seconds'. The code ends with a small orange arrow block.

```
NovaPi Main Program
forever
  encoder motor M1 rotates at speed of 50 r/min
  encoder motor M1 rotates at speed of -50 r/min
  wait 3 seconds
  encoder motor M1 rotates at speed of 0 r/min
  encoder motor M1 rotates at speed of 0 r/min
  wait 3 seconds
  encoder motor M1 rotates at speed of 150 r/min
  encoder motor M1 rotates at speed of -150 r/min
  wait 3 seconds
  encoder motor M1 rotates at speed of 50 r/min
  encoder motor M1 rotates at speed of -50 r/min
  wait 3 seconds
  encoder motor M1 rotates by 720 degree at speed of 120 r/min
  encoder motor M1 rotates by -720 degree at speed of 120 r/min
  wait 3 seconds
```


Low-voltage Alarm



1. Overview

The voltage display is used for 1S - 8S lithium battery check. The cell voltage and total battery voltage are detected automatically and reverse connection protection is implemented to help you understand the battery status anytime and avoid battery over-discharge or over-charge. If the voltage is lower than the preset value, the beeper will beep and the red LED will flash. The default value is 2.7 V and the recommended value is 3.6 V. You can press the button and change the value. Your setting is automatically saved.

2. Features

- Used for 1S-8S lithium battery check
- Voltage detection accuracy: ± 0.01 V
- Group voltage display range: 0.5 V - 4.5 V
- Total voltage display range: 0.5 V - 36 V
- 1S test mode voltage range: 3.7 V - 30 V
- Low-voltage beeper alarm mode: 2S - 8S
- Alarm voltage setting range: OFF~2.7~3.8 V
- Dimensions: 40 mm x 25 mm x 11 mm (L x W x H)

Cautions:

- Make the metal surface of the battery balance head directly face the low-voltage alarm and connect the alarm to the left end of the balance head to view the voltage of each cell and the total voltage.
- The default threshold of the alarm is 2.7 V. You are recommended to change it to 3.7 V (by pressing the black button on the alarm).



1. Overview

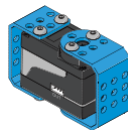
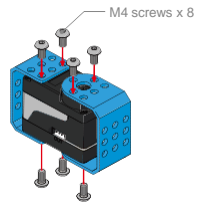
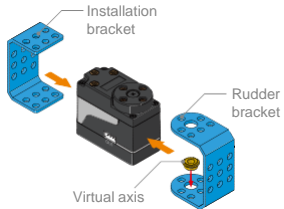
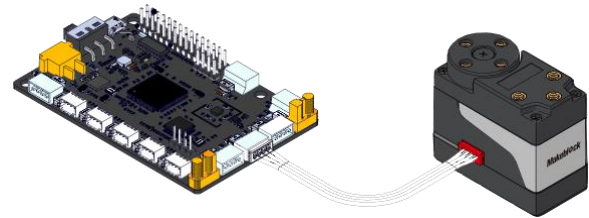
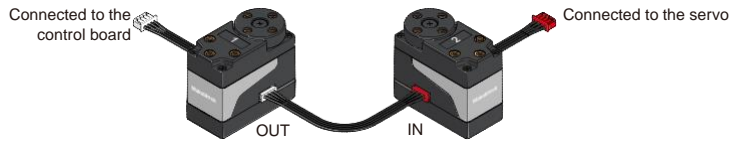
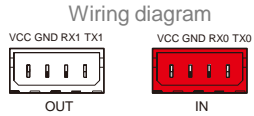
The Smart Servo MS -12A is a next-generation smart servo that Makeblock has independently developed. It focuses on resolving traditional servos' problems, such as complex control, small angular range, inability to perform continuous rotation, and single accessories.

2. Features

- Gear: Sheer metal gear (reduction-gear ratio 1:305)
- Velocity: 0.18s/60° , 7.4
- Operating voltage: 6 V - 12.6 V
- Angular resolution: 4096
- Rated torque: 12 kgf.cm
- Locked-rotor current: 2 A

Smart Servo MS-12A

3. Wiring and Installation Diagram



1. Mount the virtual axis from the inside of the rudder bracket onto the bottom of the rudder bracket.

2. Mount the bracket to the servo and align it to the installation holes.

3. Apply and fasten screws as shown in the figure.

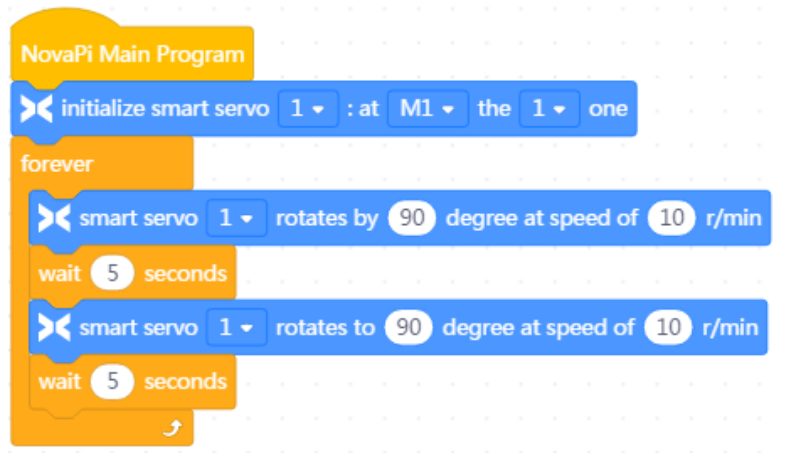
4. Complete

Smart Servo MS-12A

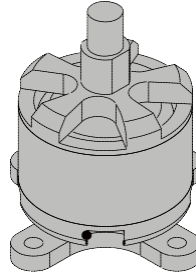
4. Cautions

- The servo has immense torque, which makes commissioning dangerous. Therefore, do not perform commissioning or demonstration when holding the servo in your hand.
- Children under four years old must use the servo under professional instructions.
- Water contacting the servo and NovaPi may result in a short circuit.
- If the powered servo is blocked from rotating, the gear set or motor may be damaged.
- The servo does not contain repairable components and you are not recommended to disassemble or assemble it by yourself.

5. Programming Example



Brushless DC Motor



1. Overview

The brushless DC motor is provided by Makeblock exclusively for the launching mechanism. It features a much higher rotational speed than other DC motors to launch “bullets” to accomplish various missions.

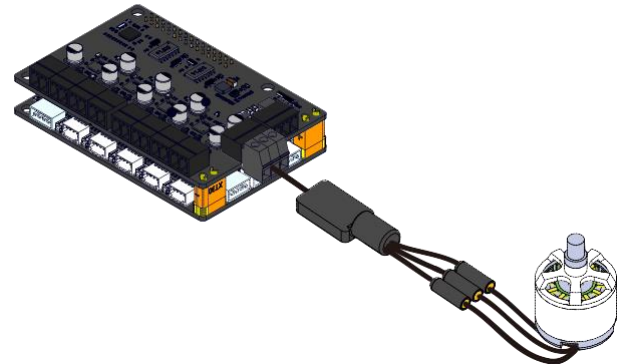
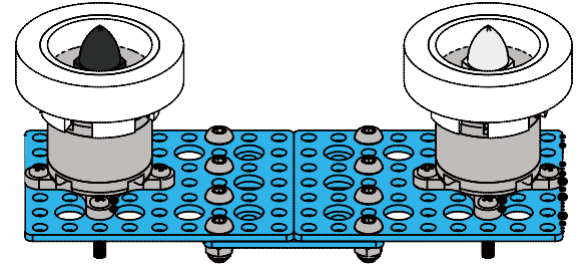
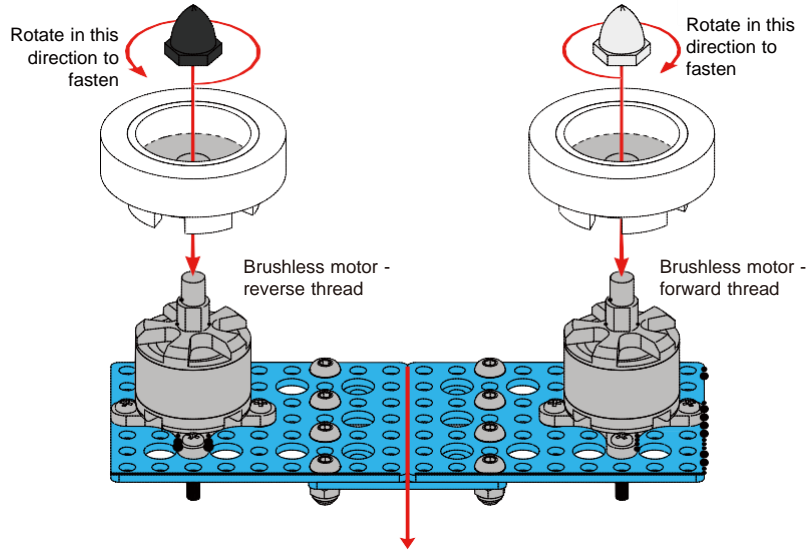
2. Specifications

Rated voltage: 11.1 V

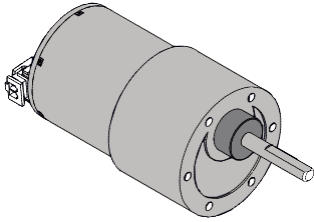
Rated rotational speed: 7,300 rpm

Rated current: 10,000 mA MAX

Brushless DC Motor Usage



37 DC motor



1. Overview

A DC motor is driven by direct current and its rotational speed can be easily controlled by tuning the voltage.

2. Features

Its rotational speed can be changed, but its position and rotational speed cannot be accurately controlled. It can generate strong torque and bear a certain level of overload.

37 DC motor: 50 rpm

Technical specifications:

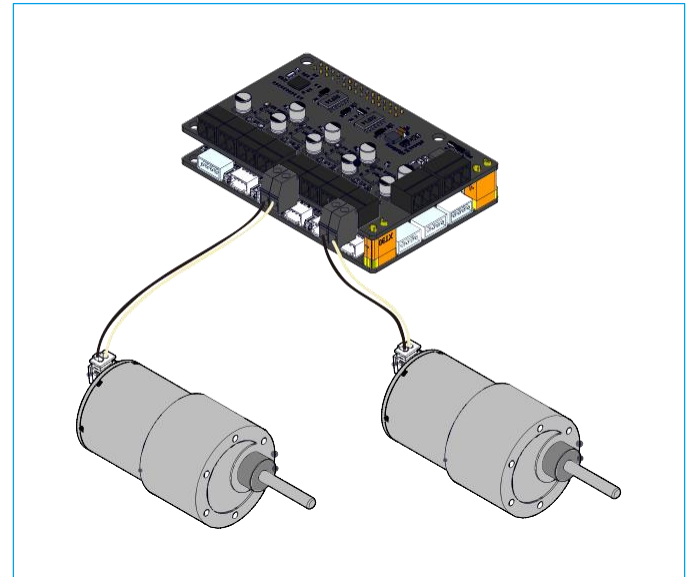
1. Rated voltage: 12.0 V (DC)
2. Temperature range: $+25 \pm 3^\circ\text{C}$
3. Humidity range: $60\% \pm 5\%$
4. Reduction-gear ratio: 1:90
5. No-load current: $\leq 80 \text{ mA}$
6. No-load rotational speed: $50 \pm 12\% \text{ rpm}$
7. Rated torque: 2.4 kg.cm
8. Rated current: $\leq 300 \text{ mA}$
9. Rated rotational speed: $41 \pm 12\% \text{ rpm}$
10. Locked-rotor torque: 9 kg.cm
11. Locked-rotor current: $\leq 1.8 \text{ A}$

37 DC motor: 200 rpm

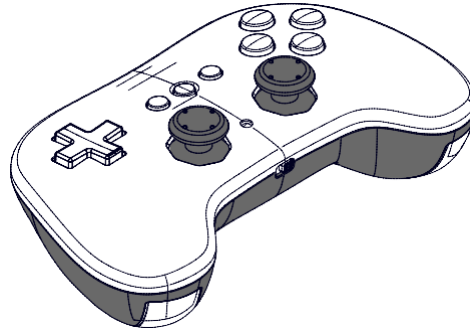
Technical specifications:

1. Rated voltage: 12.0 V (DC)
2. Temperature range: $+25 \pm 3^\circ\text{C}$
3. Humidity range: $60\% \pm 5\%$
4. Reduction-gear ratio: 1:30
5. No-load current: $\leq 120 \text{ mA}$
6. No-load rotational speed: $200 \pm 13\% \text{ rpm}$
7. Rated torque: 2.0 kg.cm
8. Rated current: $\leq 450 \text{ mA}$
9. Rated rotational speed: $160 \pm 13\% \text{ rpm}$
10. Locked-rotor torque: 7.5 kg.cm
11. Locked-rotor current: $\leq 1.8 \text{ A}$

3. Connection mode



Bluetooth Controller



1. Overview

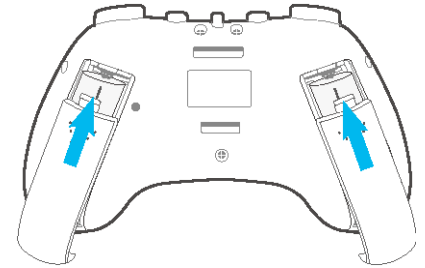
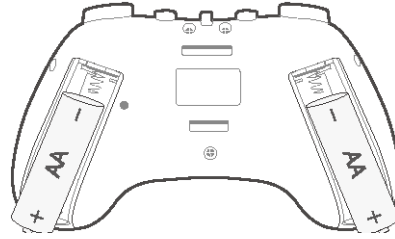
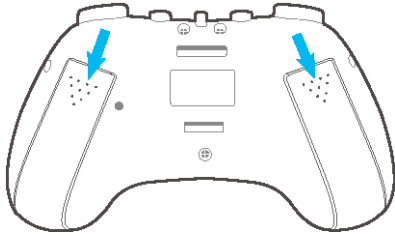
The Bluetooth controller has 15 buttons and two joysticks. The functions of the buttons can be customized and can be used for multiple programs to facilitate operations as soon as the programs are uploaded.

2. Technical Specifications

- Material: ABS
- Bluetooth version: 4.0+
- Transmission distance: 20 m
- Operating current: ≤ 25 mA
- Transmit power: 4 dBm
- Frequency range: 2,402 MHz - 2,480 MHz
- RF transmit range: 4 dBm
- Maximum transmission distance: 20 m
- Bluetooth version: 4.0
- Data transmission: Data packets can be obtained by Bluetooth devices within 100 ms (low delay).
- Battery: two AA dry cell batteries
- Supported OS: MacOS / Windows
- External package dimensions: 170 mm x 110.5 mm x 54 mm (L x W x H)
- Product dimensions: 149 mm x 88 mm x 46 mm (L x W X H)

Bluetooth Controller

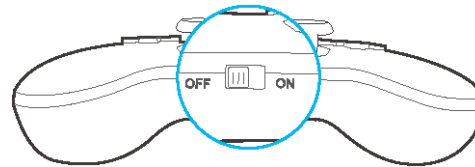
4. Installation of AA batteries (not included)



- When the indicator becomes steady red, which means low battery, you need to replace the batteries in a timely manner.

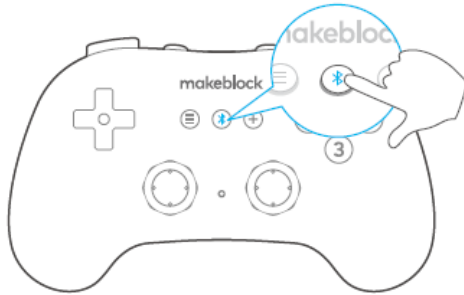
5. Bluetooth pairing

- 1 Power on the Bluetooth controller. The indicator flashes blue slowly.



Bluetooth Controller

- 2 Place the controller close to the robot and long press the button  until the indicator flashes quickly. Release the button to enable automatic Bluetooth pairing.



Long press the button until the indicator flashes quickly.

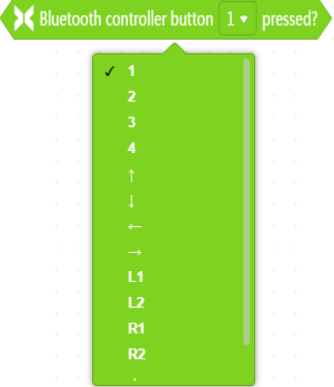
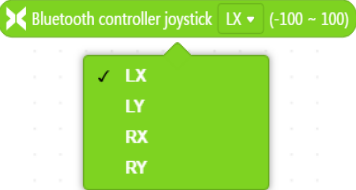


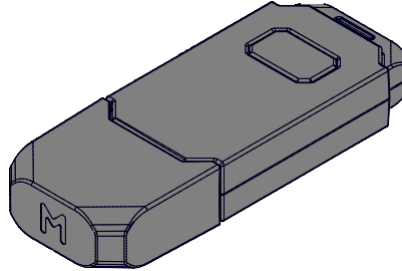
Pairing succeeds when the indicator is steady blue.

- ▶ If there is no operation within 50 seconds when the controller is unpaired or within five minutes after it is paired, it enters the sleep state. You can press any of the buttons to wake it up.
- ▶ After being powered on, the controller will search for the robot with which it was last paired to perform automatic pairing.

Bluetooth Controller

6. Statement block description:

Statement Block	Description	Remarks
 <p>Bluetooth controller button 1 ▾ pressed?</p> <ul style="list-style-type: none">✓ 1234↑↓←→L1L2R1R2.	<p>It judges whether a controller button is pressed.</p>	<p>Return value type: bool Range: False - not pressed; True - pressed</p>
 <p>Bluetooth controller joystick LX ▾ (-100 ~ 100)</p> <ul style="list-style-type: none">✓ LXLYRXRY	<p>It reads the controller joystick value.</p>	<p>Return value type: int Range: 100 to -100. When the joystick is tilted left or up, a position value is generated; when the joystick is tilted right or down, a negative value is generated.</p>



1. Overview

The Makeblock Bluetooth adapter supports version 4.0 (BLE) and serves as a smart short-distance wireless data transmission interface adapter for Bluetooth devices. It can be paired with all Makeblock devices with built-in Bluetooth modules, enabling an easier wireless connection.

2. Features

- Support Windows, MacOS, ChromeOS, and Linux

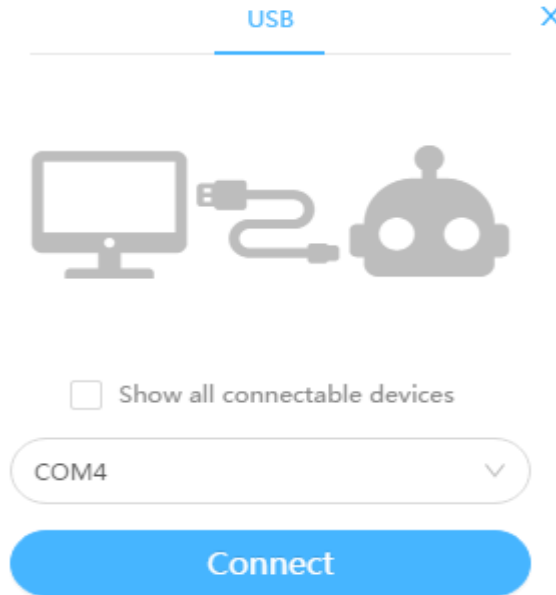
3. Technical Specifications

- Transmission distance: 15 m (standard Bluetooth device transmission distance)
- Bluetooth version: 4.0
- Receiving sensitivity: -90 dBm
- Power supply: 5 V
- Transmit power: Max. 4 dBm
- Computer interface: USB 2.0
- Operating frequency band: 2.4 GHz - 2.48 GHz unlicensed ISM band

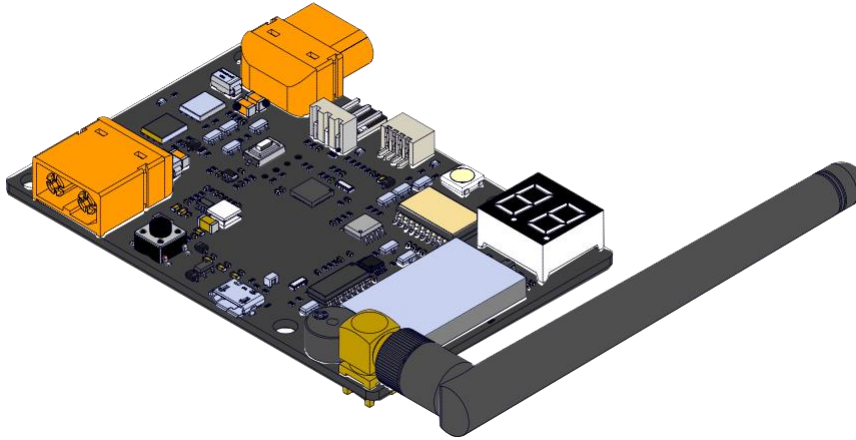
Bluetooth Adapter

4. Procedure

1. Connect the Bluetooth adapter to a USB port of a computer. The adapter indicator flashes slowly.
2. Turn on the switch on the robot mainboard, and press the button of the Bluetooth adapter. The adapter enters the pairing state and its indicator flashes quickly.
3. Move the robot close to the Bluetooth adapter for automatic pairing. The adapter indicator turns steady, indicating pairing success.
4. Select the serial port currently used by the Bluetooth adapter to start device connection.



Power Management Module



1. Overview

The power management module is an important competition-oriented device. It is designed mainly for wireless connection to the MakeX competition system to monitor the power status of participating teams' robots and send competition instructions (such as switching to manual/automatic control).

2. Features

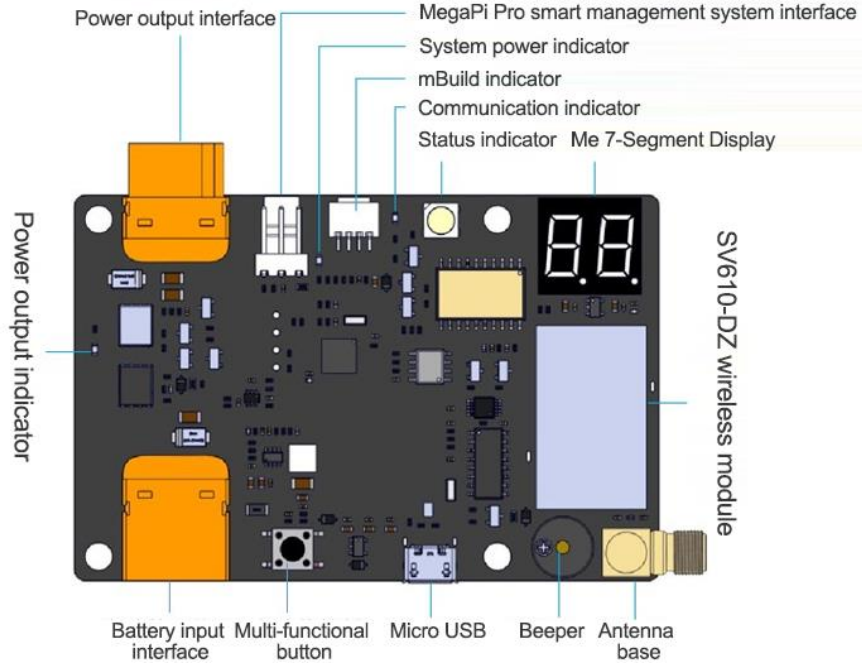
- Work with NovaPi.
- Use RGB LED to indicate competition status and facilitate observation from a distance.
- During training, you can use buttons to simulate competition stages.
- Equipped with an external antenna for more stable signal.

3. Technical Specifications

- Module dimensions: 85 mm x 56 mm x 11.5 mm
- Operating voltage: 6 V - 13 V
- Operating current: 100 mA
- Communication port and protocol: wireless transparent transmission module/serial port/dedicated protocol

Power Management Module

4. Device Appearance



Power Management Module

5. Procedure

- 1) Power on the module to initiate self-check.
 - Each time the power management module is powered on, it will check whether the wireless module works properly.
 - Normal: The beeper emits one short beep.
 - Abnormal: The LED display shows “Er” and the beeper beeps three times.

- 2) Restore the default module parameter settings.
 - When power supply is cut unexpectedly after competition or another unexpected situation occurs, the power management module may not switch back to the default channel. In this case, restore the default parameter settings of the module.
 - When the module is faulty, you can try troubleshooting by restoring its default parameter settings.
 - In power-off state, press the FUN button and connect the battery to power on the system. The beeper emits a long beep (2s), the LED display shows “20”, and the system works properly with the default parameter settings.

- 3) Switch the power output status.
 - During daily training, you can use the button to switch the power output status of the power system to simulate the competition conditions and commission the software and hardware of robots.
 - The button can be long pressed to switch the power output status only when the wireless module works in the default channel 20 (shown on the LED display).
 - Long pressed the FUN button for 2s to 3s to switch to 12 V power output. When the 12 V power output indicator turns steady red, the output is on. When the indicator turns off, the output is off.

- 4) Switch between manual/automatic competition modes.
 - During daily training, you can use the button to switch between the manual/automatic competition modes to simulate the competition conditions and commission the software and hardware of robots.
 - The button can be long pressed to switch the power output status only when the wireless module works in the default channel 20 (shown on the LED display).
 - Double press the FUN button to switch between the automatic/manual competition modes. (In automatic competition mode, the status indicator WORK turns steady blue. In manual competition mode, the indicator turns steady green.)
 - After you double press the button, the status indicator WORK starts flashing, and the status will be switched 3s later. When the indicator starts flashing, stay away from the vehicle to avoid being injured by the moving vehicle.

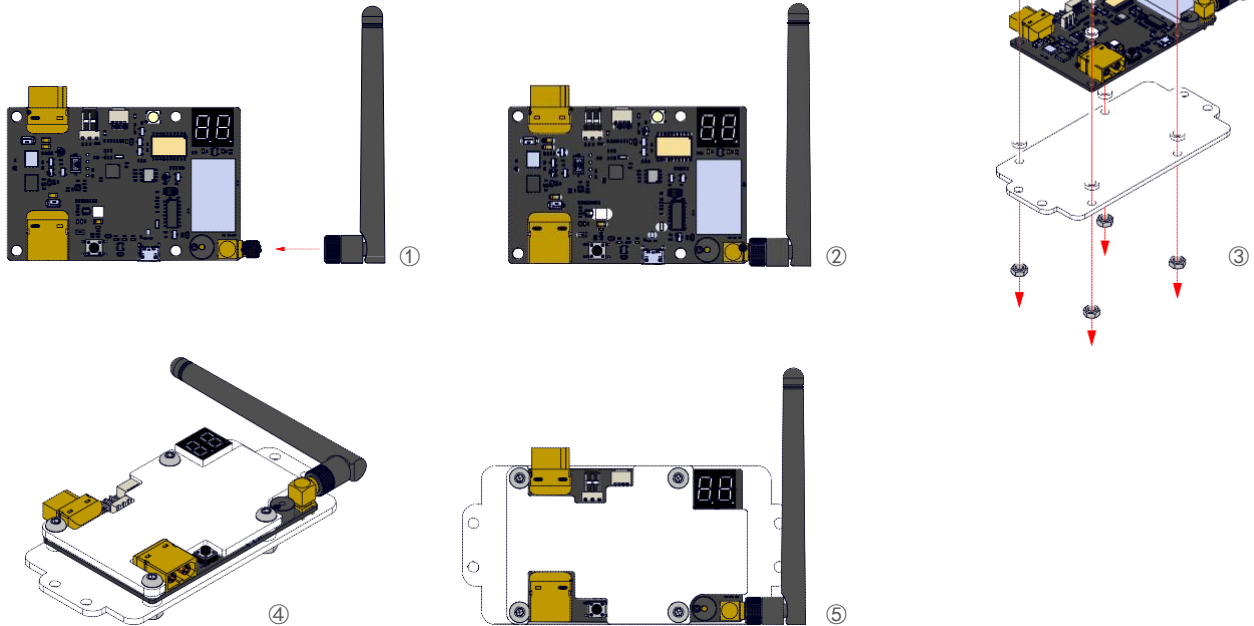
- 5) Report UID information.
 - During inspection, the competition system uses UID information to bind your power management module hardware in the system.
 - Each time the FUN button is pressed, the wireless module reports UID information once and the WORK indicator flashes red once.

Power Management Module

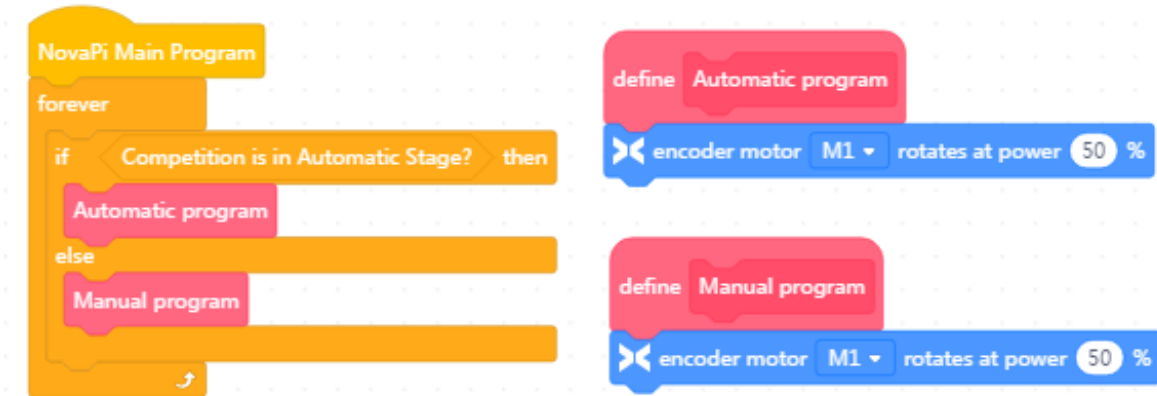
6. Cautions


- Make sure to use the power management module bracket for installation.
- Ensure a firm wire connection and a proper wiring.
- Adjust the antenna position, and keep the antenna away from metal objects and other motional devices.

7. Installation Methods



8. Programming Example



Statement Block	Description	Remarks
	Function: Check whether the automatic competition mode is enabled.	Unit: none Return value type: bool Range: True - automatic competition; False - manual competition