# ① Product overview

Welcome to Bell Mabot!

Mabot is a modular robot which fully displays the fun of intelligent robots. Various interesting shapes and playing ways can be created by splicing different modules.

If you have never spliced Mabot before, we recommend you to select one of the recommended configurations from the package. These robots are created by the designers of Mabot. You can control them freely through mobile phone or tablet computer. Mabot can be connected for game playing by turning on Bluetooth Low Energy (BLE) of mobile device. With the graphical programming software, it can also complete more complicated tasks, and it is an ideal choice for cultivating AI aborigines.

If you want to learn more about Mabot programming and programming software, please visit http://www.bellrobot.com.

# ② Description of Mabot parts

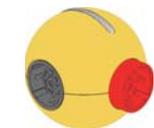## The package contains the following items:

Control Ball x 1

Battery Ball x 2

Drive Ball x 4

Sensor Ball - Color x 2

Sensor Ball - Touch x 2

Sensor Ball - Infrared x 2

Connection Ball - Horizontal Joint x 4

Connection Ball - Swinging Joint x 4

Connection Ball - 6 Port x 15

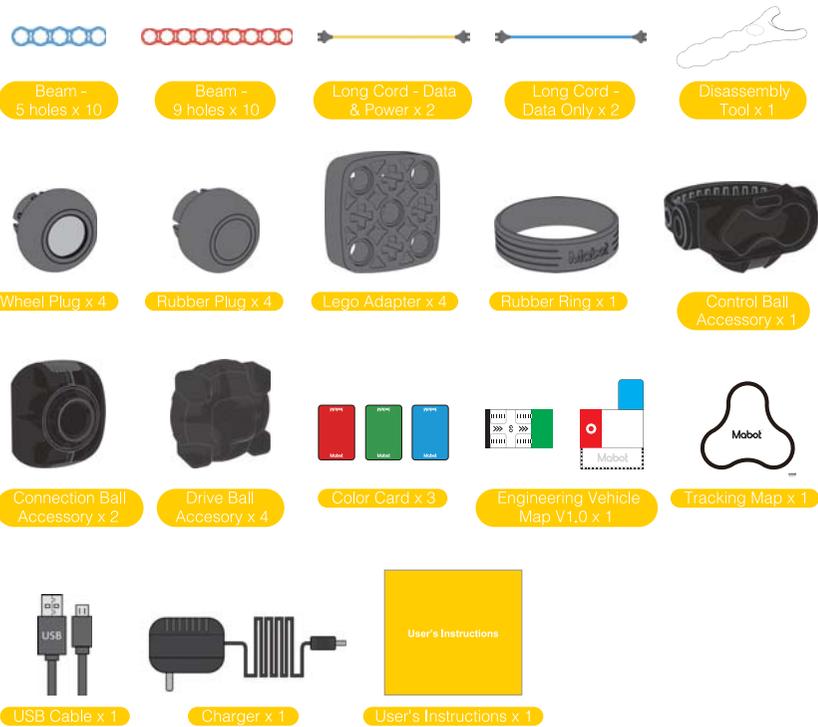Connection Ball - 3 Port x 6

M Rod x 4

L Rod x 4

S Rod x 20

S Shaped Connecting Link x 40

Clipper x 1

Beam -
5 holes x 10

Beam -
9 holes x 10

Long Cord - Data
& Power x 2

Long Cord -
Data Only x 2

Disassembly
Tool x 1

Wheel Plug x 4

Rubber Plug x 4

Lego Adapter x 4

Rubber Ring x 1

Control Ball
Accessory x 1

Connection Ball
Accessory x 2

Drive Ball
Accesory x 4

Color Card x 3

Engineering Vehicle
Map V1.0 x 1

Tracking Map x 1

USB Cable x 1

Charger x 1

User's Instructions

User's Instructions x 1

## Description of the main parts

## Control Ball

Overview

Control center of the robot

Technical specifications

+ Buzzer

After the system started, the buzzer will give out a "beep" sound.

After the program is downloaded, the buzzer will give out a "beep" sound.

+ Bluetooth communication module with a stable connection distance of 10m, longest

15m on the open ground.

+ Included gyroscope module.

+ Status light of the Control Ball

The white shell of the Control Ball is a status light.

The status light can display 8 colors:

Red   Orange   Yellow   Green   Cyan   Blue   Purple   White

The status light of the Control Ball indicates:

+ The initial default light is white.

+ Download the official model through APP. In case of download success, the green light will flash three times. In case of download failure, the red light will flash for three times.

+ Keys

Key 1 has the same functions as Key 2. By pressing any key, APP can be started or stopped.

Key 1 →   ← Key 2

Note: Some configurations are directional (refer to configuration description).
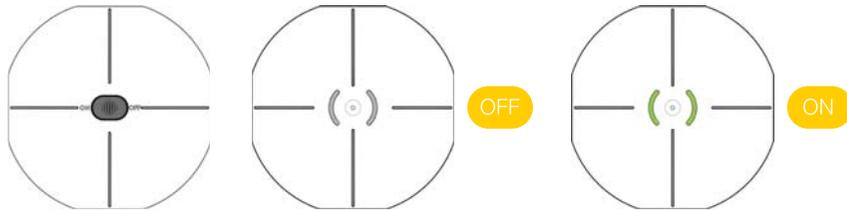
## Battery Ball

It will take two hours to fully charge a Battery Ball. During charging, the red light is on. After full charging, the green light will on.

The balls in the package consume power differently due to their different functions. Driving wheel, Connection Ball - Horizontal Jointand Connection Ball - Swinging Joint consume large power. The more this module is used in a configuration, the shorter the battery service life is. In case of low power, some modules of the device might be insensitive. Please charge the device on time.

Press 2 seconds to turn on the power with the display light on in the closed position.

Press 3 seconds to turn off the power with the display light off in the open position.

OFF

ON

Some important information on Battery Ball:

+The battery capacity of the Battery Ball is 760mAh, and the output current is 2A.

+The quantity of high power consumption module that one Battery Ball configuration can load with is no more than 6.

+The Battery Ball cannot be charged when it is turned on.If so, the Battery Ball will automatically shut down and enter the normal state of charge.If you want to use it at this time, you must unplug the charger and then open it properly. Do not charge while using.

+ If the Battery Ball is not working, close it and ensure that the switch is OFF.

+ Don't use the damaged Battery Ball.

+ Children under 9 years old should use a special charger to charge the Battery Ball under the adult's supervision.

+ When the status light of Battery Ball status light turns red flashing, please charge it on time.

+ The standard charging time for the Battery Ball is two hours. After charging, remove the charger on time.

+ Don't insert a sharp metal object into the connector. Otherwise, it might cause short circuit or permanent damage.

Note: In case of high power quantity, the status light will turn green. In case of medium power quantity, the status light will turn red. In case of low power quantity, the status light will flash in red.

## Drive Ball

The electric machinery can control the motion of the Drive Ball through APP or program.

+ The status light can display 8 colors:

Red  Orange  Yellow  Green  Cyan  Blue
Purple  White

Note: The default light color is consistent with the defined color of the Control Ball, but it can display the color that you define for the Drive Ball in APP.

## Color Ball

The Color Ball can detect the color or light intensity by the small window once entering into the sensor surface. The sensor can be used in three modes: color mode, reflected light intensity mode and ambient light intensity mode.

In color mode, the Color Ball can identify 8 colors:

Red  Orange  Yellow  Green  Blue  Purple  White  Black

In the reflected light intensity mode, the measurement range of the sensor is between 0 (extremely dark) and 100 (extremely bright). In the ambient light intensity mode, the Color Ball measures the light intensity from ambient environment to the window. The measurement range is between 0 (extremely dark) and 100 (extremely bright). When it is under "color mode" or "reflected light intensity mode", the Color Ball must be at a correct angle, close to but not in contact with the surface of the object under detection (for example, the "inspection robot" in the package) in order to be the most accurate.

Note: Don't smear or paste any foreign matter on the light, or it will affect the judgment of the sensor; the mirror surface and the brunette object will also affect the normal operation of the sensor. Please don't look directly at this light.

## Sensor Ball - Touch

A Sensor Ball - Touch can detect whether the touch button of the sensor is under pressure.



Normal state

Under pressure
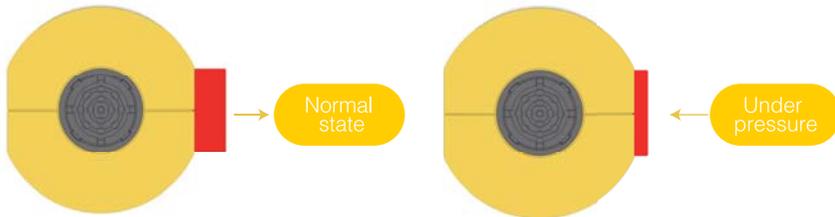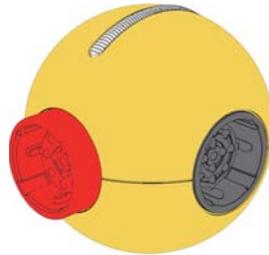
Note: Don't destroy the touch button artificially, pull it out or squeeze it.

## Sensor Ball - Infrared

A Sensor Ball - Infrared can detect the infrared light reflected from solid objects. The Sensor Ball - Infrared in this series measures the distance through the reflected intensity of infrared ray. The measurable range is between 5~15cm. (This parameter is subject to the test result on the white A4 paper.)

Note: Don't smear or paste any foreign matter on the black shell, or it will affect the judgment of the sensor; the mirror surface and the brunette object will also affect the normal operation of the sensor.

5-15cm
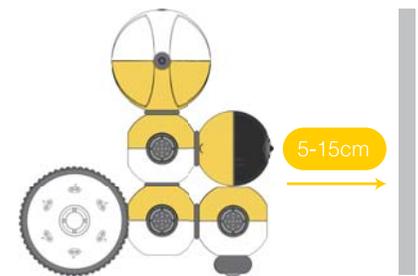
## Connection Ball - Horizontal Joint

It can rotate the object horizontally at ±75°.

Note: Don't break off the module with hands when it is energized, or it will damage the module. The loaded object is restricted by weight. If the loaded object cannot rotate normally, the object should be taken down immediately, or it might be damaged. No foreign matter obstructs the rotation between the two hemispheres.
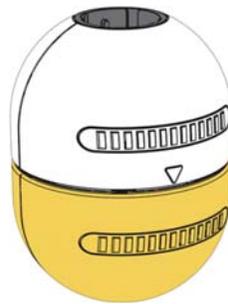
## Connection Ball - 3 Port

Each Connection Ball - 3 Port has three connectors, and the included angle between the two connectors is 120°. It is used to bear the load of every functional ball and connect structures and electrical appliances.

## Connection Ball - Swinging Joint

It can swing the object horizontally at ±75°.

Note: Don't break off the module with hands when it is energized, or it will damage the module. The loaded object is restricted by weight. If the loaded object cannot rotate normally, the object should be taken down immediately, or it might be damaged. No foreign matter obstructs the rotation between the two hemispheres.

## Connection Ball - 6 Port

Each Connection Ball - 6 Port has six connectors, and the included angle between the two connectors is 90°. It is used to bear the load of every functional ball and connect structures and electrical appliances.

## S Rod

It is used to connect structures and electrical appliances.

## S Shaped Connecting Link

It is used to connect structures.

## M Rod

A connecting rod with a unit length of a Battery Ball, used to connect structures and electrical appliances.

## L Rod

A connecting rod with three units length of a Connection Ball - 6 Port, used to connect structures and electrical appliances.

## Beam - 5 holes

It is used to connect structures.

## Beam - 9 holes

It is used to connect structures.

## Long Cord - Data Only

It is used to communicate between electric appliances.

The Long Cord - Data Only is only used for the control signal transmission between modules, and has no current transmission function. When a large number of high power consumption modules are presented in Mabot, the output current of a single battery module can not meet the demand of power supply.You need to divide the high power consumption module into different groups to supply power, then you can use this Long Cord - Data Only to control the communication signal between the battery groups.

## Long Cord - Data & Power

The Long Cord - Data & Power can be used for current and signal transmission between modules.



## Wheel Plug

It is used to support configuration,or reduce drag.



## Rubber plug

It is used to support configuration,or increase drag.



## Lego Adapter

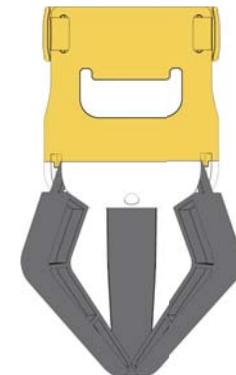It is used as a Lego conversion interface.



## Rubber Ring

It is used to aid countering for the Connection Ball-Horizontal Joint.



## Clipper

It can achieve the grasping function by matching with the Connection Ball-Horizontal Joint.

## Decorative pieces

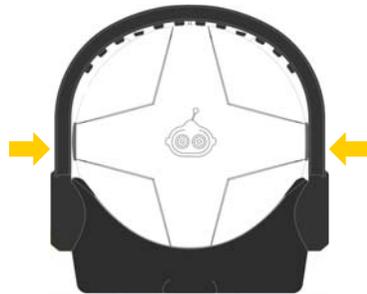It contains three different decorative pieces.

**Control Ball Accessory**        **Connection Ball Accessory**        **Drive Ball Accesory**

Please confirm when installing that you can press the button when the Control Ball Accessory combines the Control Ball with both sides.
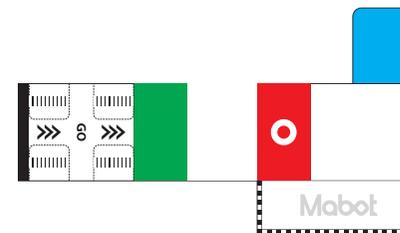
Decorative pieces can make Mabot even cooler.

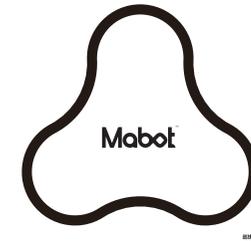## Color Card

It has three colors: red  green  blue

## Engineering  Vehicle Map V1.0

Accessories for the playing of the M Grabber.

## Tracking Map

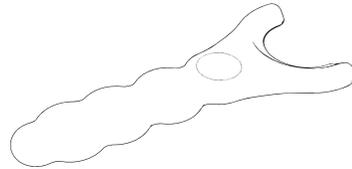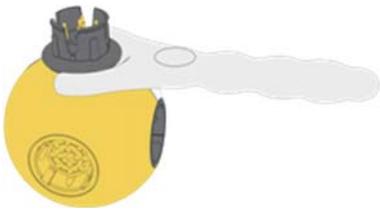Accessories for the playing of the Tracker Boy.

## Disassembly Tool

Instructions for Disassembly Tool

Instruction ①

01 Insert the Disassembly Tool between the connecting rod and the Connection Ball .

02 Apply direction to the arrow, and then you can take out the connecting rod.
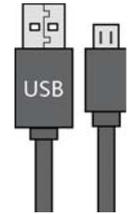
Instruction ②

01 Press the handle of the Disassembly Tool in the raised position of S Shaped Connecting Link on the beam.

02 Press the handle downwards and push out the connecting rod.

## USB Cable

Use the USB Cable to insert the micro-USB end into the port of the Control Ball. It is used for upgrading wired firmware and downloading user-defined programs on PC.

## Charger

1. When the Battery Ball is fully charged (when the indicator light turns green), stop charging and remove it in time.

2. Operating temperature is between 10℃~40℃ (indoor).

3. Keep it waterproof.

4. The charger will generate heat during charging. This is a normal phenomenon. Don't cover it with an article in order to prevent the impact on heat radiation and danger.
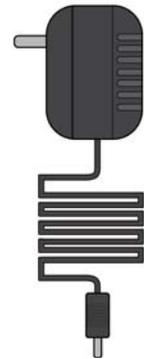
# ③ Precautions for use

## Pay attention to the following during Mabot operation:

- Use the device within a temperature range of 10℃-40℃ , when the ambient temperature is too high or too low , malfunctions may occur to the device.

- Do not place the device close to any heat source or exposed ignition source , such as electric radiators , microwave ovens , toasters,stoves,candles or other places where the temperature may be high . Do not dry the device using external heating devices such as microwave ovens or electric driers .

- Don't soak any part of Mabot into water or other liquid.

- Keep the surface of Mabot clean , keep the device and its accessories away form strong impact or vibration to avoid damage to the device and its accessories , thus causing failure .

- Don't throw, cast or kick Mabot, or its mechanical functions might be damaged.

- The device is equipped with a non-removable battery . Do not replace the battery by yourself in order not to damage the battery or the device .

- Do not discard the battery at will . Dispose it properly according to the local regulations .

- Don't use any sharp metal object (such as tweezers and needles) to prick the holes of the connector.

- Don't damage the metal needle of the connecting rod.

- This product contains small articles. Don't swallow it in order to avoid danger. It is not advisably used by children under 3 years old.

- Do not disassemble or modify the device and its accessories . Otherwise it will no longer be within the company`s warranty . In case of device failure , contact us in a timely fashion .

- Transformers and power supplies shall be used under the full supervision of the parents .

## ④ Firmware upgrade

Please review the version update at the official website, and download the latest firmware version for upgrading.

Official website: www.bellrobot.com

+ Master control firmware upgrade

Lighting: Normally, the red light flashes after the green light flashes. After upgrading, the light turns the default color. (It is download abnormality in other states.)

+ Firmware version upgrade of function ball

Lighting: Normally, the green light flashes after the red light flashes. After upgrading, the light turns the default color. (It is download abnormality in other states.)

## ⑤ App download and installation

Introduction to App functions: Adopting Bluetooth Low Energy (BLE) connection technology, it can be installed and used in IOS8, Android 4.4 or above.

You can use your mobile phone to explore more behavior modes and playing ways for Mabot.

Scan this QR code and download

Mabot GO or Mabot IDE immediately.

## 6 FAQ

**1.** Q: My Mabot often loses connection and is much slower than usual.

A: This may be caused by interference. Please ensure that no other Bluetooth devices (especially audio device) are connected. These devices can cause interference easily and result the above problems. If the problem is serious, try to closes the wireless connection to reduce interference.

**2.** Q: My Mabot Solo Wheel fails to keep balance and falls down easily.

A: It is very likely that the Battery Ball is too low or has no power. Please charge the battery in time.

**3.** Q: Why is my robot unable to work?

A: Perhaps the battery is low. Please charge the Battery Ball in time to ensure that the power of the Battery Ball is high.

**4.** Q: The humanoid robot cannot work.

A: Please check the assembly manual, and ensure that the direction of every function ball is correct.

**5.** Q: The Sensor Ball - Infrared cannot avoid/follow the obstacle.

A: The normal obstacle avoiding range of Sensor Ball - Infrared is 5~15cm. Check whether it is beyond the effective range. Don't smear or paste any foreign matter on the black shell, or it will affect the judgment of the sensor; the mirror surface and the brunette object will also affect the normal operation of the sensor.

**6.** Q: Color Ball cannot judge the color.

A: The Color Ball must be at a correct angle, close to but not in contact with the surface of the object under detection. Don't smear or paste any foreign matter on the light, or it will affect the judgment of the sensor; the mirror surface and the brunette object will also affect the normal operation of the sensor.

**7.** Q: Some modules have no response when I complete the assembly and turn on the power.

A:This is because you did not plug the connecting rod or the module tightly. You can try to plug the corresponding connecting rod or module again.

## CE Statement

This device was tested for typical body-worn operations. To comply with RF exposure requirements, a minimum separation distance of 0mm must be maintained between the user's body and the handset, including the antenna. Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic components. Body-worn accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied or an approved antenna.

This device in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. All essential radio test suites have been carried out.

1. Caution: Risk of explosion if battery is replaced by an incorrect type.Dispose of used batteries according to the instructions.

2. The product shall only be connected to a USB interface of version USB 2.0

3. Adapter shall be installed near the equipment and shall be easily accessible.

4. The plug considered as disconnect device of adapter .

5. The device complies with RF specifications when the device used at 0mm form your body.

## FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception,

which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different.

from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

FCC ID: 2ANCM-MC001

# User's Instructions

**Mabot**

**Model : MA1004**