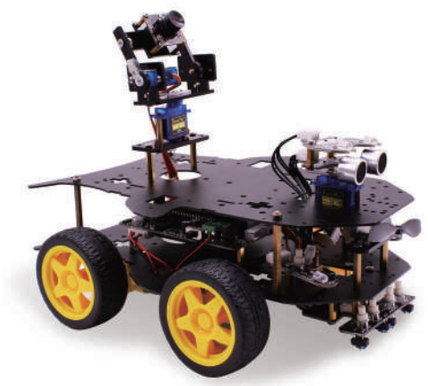
1

YAHBOOM

Raspberry Pi-4WD smart robot

Manual



① Please read this manual carefully before use

② The company reserves the right of interpretation for this manual

③ Product appearance, please prevail in kind

④ Please keep the manual properly after reading

Introduction

The 4WD Smart Car is an open source hardware platform education robot baced on Raspberry Pi 3B/3B+ controllers. It has powerful function and easy assembly,suitable for creating customers to expand design and development. In addition, the 4WD smart car supports a number of customized sophisticated sensors, which can perform functions such as tracking, obstacle avoidance, following, light-seeking, and grayscale recognition; supports multiple remote control methods, Bluetooth 4.0 remote control, infrared remote control, computer control etc; supports a variety of assembly method, single and double platform structure, and selection of multiple mounting holes on the platform.

About us

Shenzhen Yahboom Technology Co., Ltd. is a professional company specialized in open source hardware and maker education. We have two Enterprise Concept: turn ideas into reality and Let more children become maker. Company's products now have covered early childhood education, intelligent robot education, university automation technology education, and so on. In addition, the company provides long-term help and products for colleges and training institutions to develop a training program.

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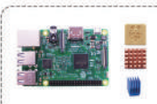
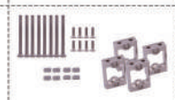
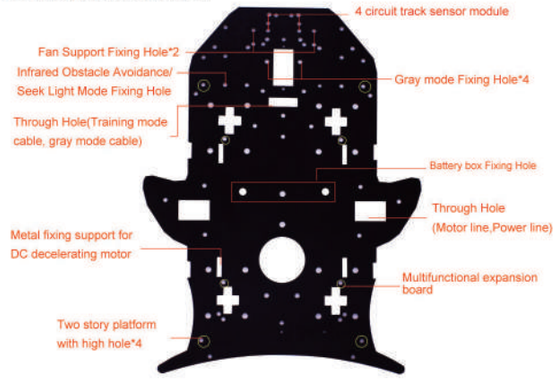
Package list

	Raspberry Pi 3 model B+ (with 8G SD card and heatsink) [Option]		4WD breakoubx1 M3*11mm copper pillar x4 M3*8mm screw x10 M2.5*20mm copper pillar x4 M2.5*8mm screw x8
	Infrared obstacle avoidance & light seeking module x2 M3*8mm screw x2 M3*5mm screw x2 M3*12mm copper pillar x2 4pin cablex2		Tracking module x1 M3*8mm screw x4 M3*23mm copper pillar x2 6pin cablex1
	RGBx1 M3*8mm screw x2 M3*5mm screw x2 M3*12mm copper pillar x2 4pin cable x1		Ultrasonic modulex1 M3*8mm screw x2 M3*5mm screwx2 M3*12mm copper pillar x2 4pin cable x1
	18650 battery box x1		Bluetooth4.0 module x1
	Motorx4		18650 Lipo battery x3
	Acrylic expansion board x1		Alu chassis x1 M3*8mm screw x10 M3*55mm copper pillar x4 M3 nut x2
	Fan package x1 M3*8mm screwx4 M3*19mm copper pillar x2 M2*6mm screw x4 M2 nut x4		Tyre x4
	Wire jumper x5		Motor mounting bracket x4 M3*30mm screwx8 M3*8mm screw x8 M3 nut x8
	Screwdriver x1		Servox1 M2*8mm copper pillar x2 M2*6mm screw x4 M2*5mm screw x1
	40pin cable x1		12.6V battery charger x1
 【Camera version】	Camera servo package x2	 【amera version】	HD camerax1 USB cable x1
 【Camera version】	M3*28mm copper pillarx2 M3*8 screw x8 M3 nut x4 M2*6 screw x12 M2 nubx2 M2*10 copper pillar x4 M2*8 copper pillar x2 M5*10 rivetx1 M2*10 screw x3	 【amera version】	Camera platform acrylic mounting frame

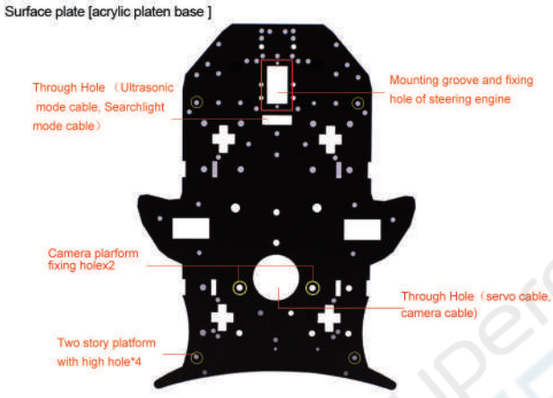
3

Introduction of base plate mounting holes

Base plate[Aluminum platen base]

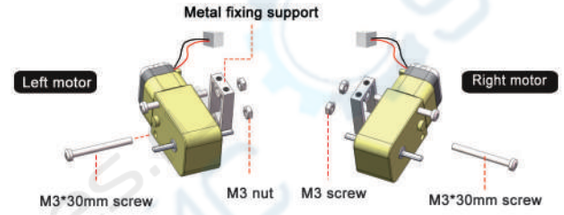


Surface plate [acrylic platen base]



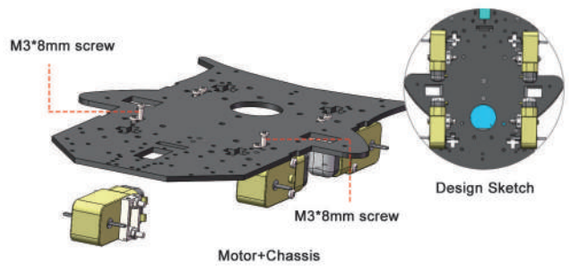
Assemble steps（Standard)

01 Assemble motor

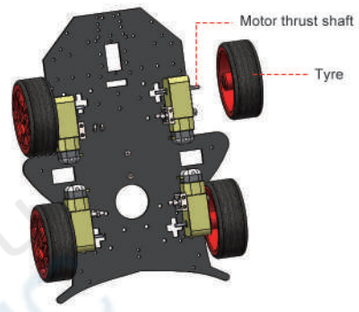


Screw+fixing support+motor
（Two motors on the each side, the fixing bracket is mounted on the side of the motor wiring, the screw holes is facing upwards.）

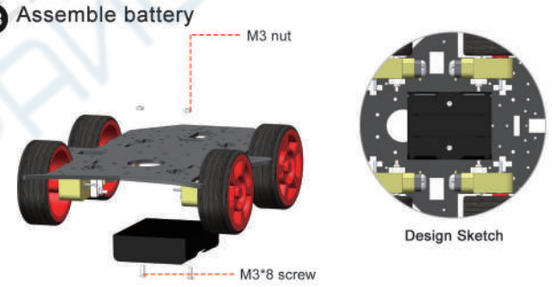
4



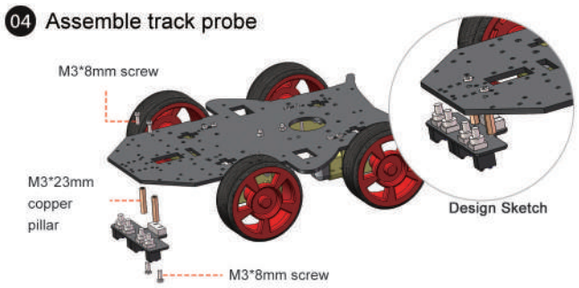
02 Assemble tyre



03 Assemble battery

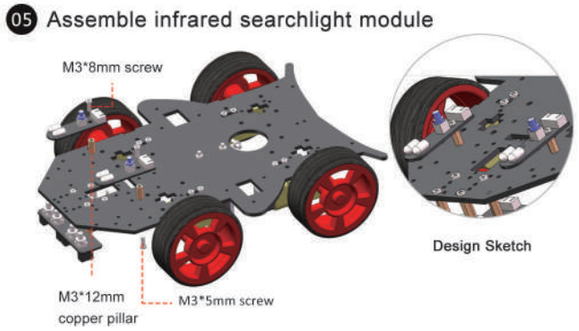


04 Assemble track probe

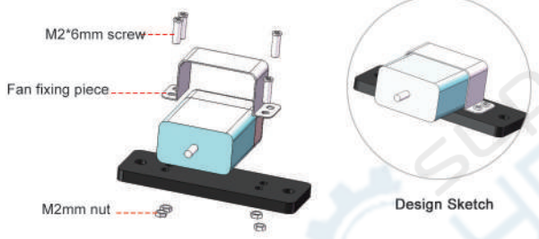


5

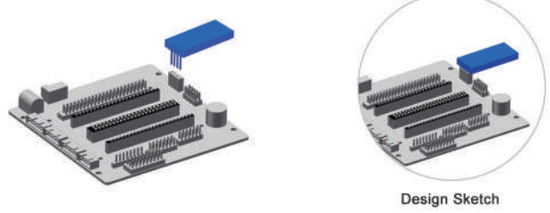
05 Assemble infrared searchlight module



06 Assemble fan



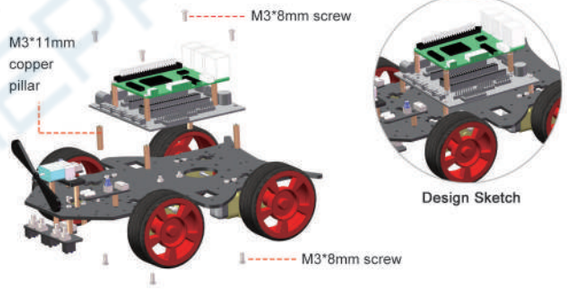
07 Assemble bluetooth



6

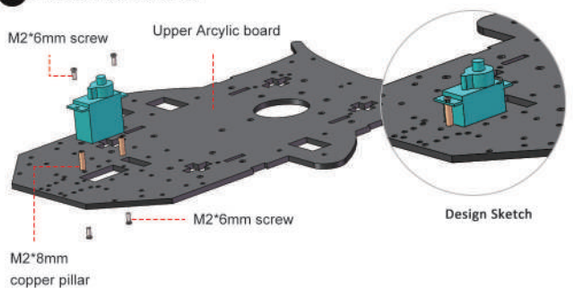
08 Assemble Raspberry Pi board and expansion board

09 Assemble Expansion board



The Single-layer structure is assembled, and the structure can realize the function: Remote control mode，Obstacle avoidance mode，Colorful searchlight，Follow mode.

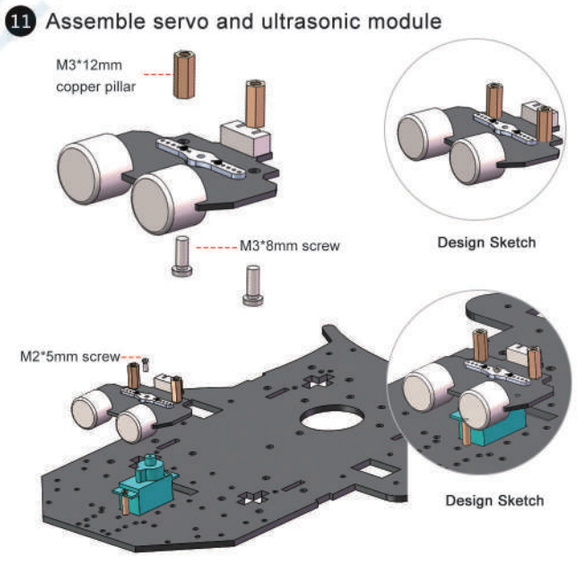
10 Assemble servo



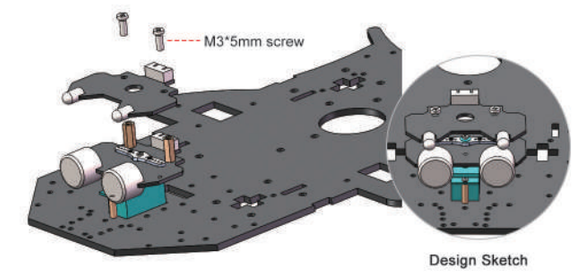
（Note: the servo turns inward）

7

11 Assemble servo and ultrasonic module



12 Assemble ultrasonic and searchlight module



13 Assemble double platform (Camera version is not available)

The double-layer structure is assembled, and the structure can realize the function: Remote control mode; Tracking mode; Obstacle avoidance mode; Colorful searchlight; Follow mode.

8

Assemble steps (Camera version)

Arcylic plate introduction

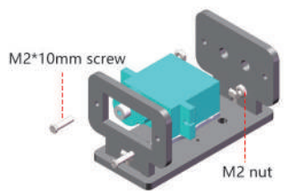
01 Assemble first degree of freedom serve

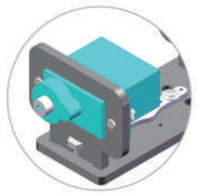
02 Assemble first degree of freedom servo wheel

03 Assemble second degree of freedom support

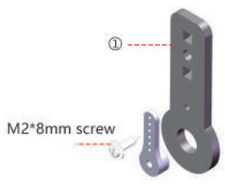
9

04 Assemble second degree of freedom servo



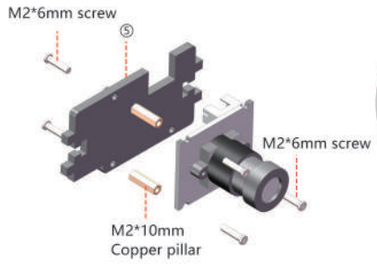

Design Sketch

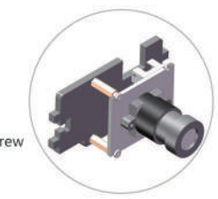
05 Assemble rotating arm



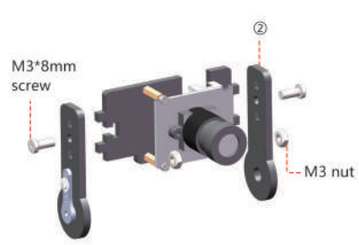

Design Sketch

06 Assemble camera and fixing board




Design Sketch

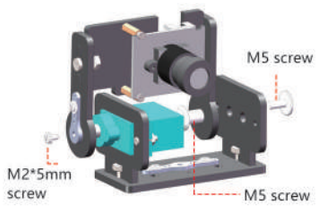
07 Assemble rotating arm and fixing board

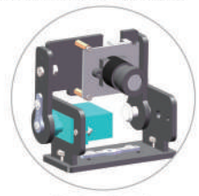



Design Sketch

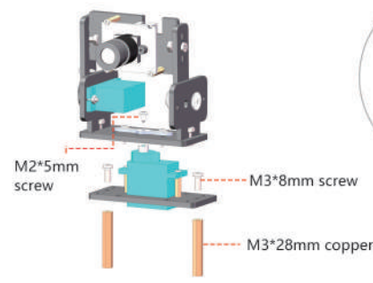
10

08 Assemble second degree of freedom servo and camera



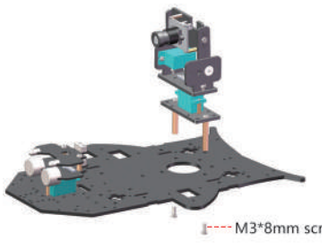

Design Sketch

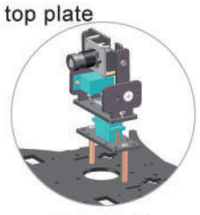
09 Assemble copper pillar



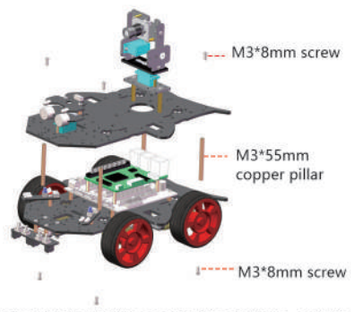

Design Sketch

10 Assemble camera platform and top plate




Design Sketch

11 Assemble double plates

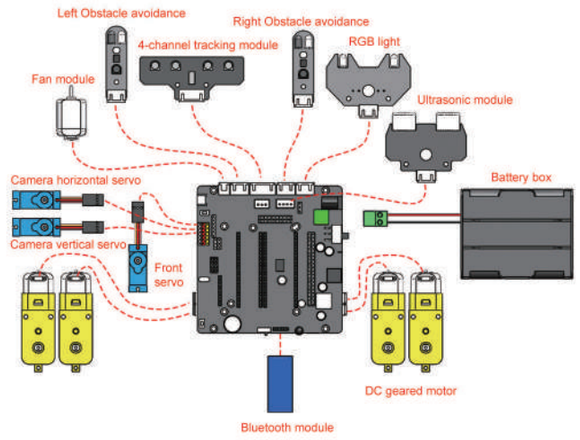


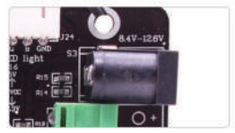

Design Sketch

The two-layer structure assembly is completed, and this structure can realize functions: remote control mode, track mode, obstacle avoidance mode, seven-color inspection, Follow mode.

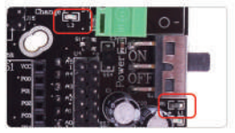
11

Introductions for expansion board connection



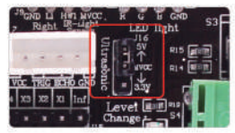


[8.4V-12.6V]: DC charging stand: 18650 lithium battery is used for charging. Note that this DC port is on the expansion board.



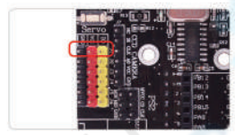
[L3]: The power supply indicator light is always on after the power switch is turned on. If it is not lit, please check the power supply wiring (the power line red corresponds to [+] and the black corresponds to [-]).

[L1]: Low voltage indicator. When the voltage is low, the light is off and the power supply indicator [L3] is still lit.



Jumper cap shorted [MVCC->5V] (factory default plug in Here.)

Put the switch to [OFF].



The front servo interface is [J1], in which brown is connected to GND, red is connected to VCC, and orange is connected to IO port.
The horizontal servo interface of camera is [J2], in which brown is connected to GND, red is connected to VCC, and orange is connected to IO port.
The vertical servo interface of the camera is [J3], in which brown is connected to GND, red is connected to VCC, and orange is connected to IO port.

Arduino function jumper area: Raspberry Pi version does not use this function.

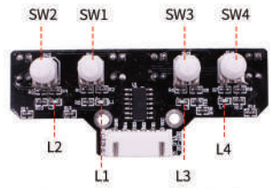
L2	HW2	L1	HW1
X4	X3	X2	X1
INF			

There is no need to insert a jumper cap in this area.

Function debugging

1.Tracking mode :

Environmental requirements: indoors, where infrared light is not strong. The black line track width on the white bottom surface needs to be greater than 16mm.



4-channel track module (front)

4-channel track module (back)

Debugging:

① Adjust the potentiometer [SW1] so that when the photoelectric sensor [P1] is facing the white bottom surface, the LED light [L1] is off, and when facing the bottom of the black line, the LED light [L1] is on.

② Adjust the potentiometer [SW2] so that when the photoelectric sensor [P2] is facing the white bottom surface, the LED light [L2] is off, and when facing the bottom of the black line, the LED light [L2] is on.

③ Adjust the potentiometer [SW3] so that when the photoelectric sensor [P3] is facing the white bottom surface, the LED light [L3] is off, and when facing the bottom of the black line, the LED light [L3] is on.

④ Adjust the potentiometer [SW4] so that when the photoelectric sensor [P4] is facing the white bottom surface, the LED light [L4] is off, and when facing the bottom of the black line, the LED light [L4] is on.

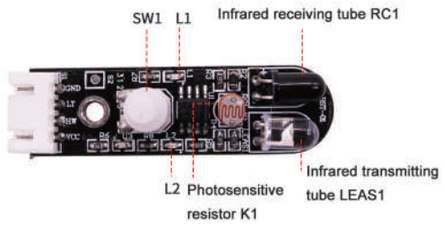
Note: When adjusting the potentiometer, the rotation amplitude should not be too large, and the rotation amplitude is less than 30 degrees.

2.Obstacle avoidance /follow mode

Environmental requirements:indoors, where the infrared light is not strong. The width of the object to be followed is slightly greater than 11cm and the height is greater than 6cm.

Debugging:

Adjust potentiometer[SW1],making the infrared emission tube and the infrared receiver from the obstacle less than 10cm, LED[L] turn on; otherwise, LED[L 1] turn off.



Infrared obstacle avoidance & light seeking module

3.Seek light mode :

Environmental requirements:indoors, where the light is not strong.The light of flashlight is more obvious than the light inside.

Debugging:

Adjust the potentiometer[SW1] of IR obstacle avoidance &seek light module, making LED[L2] turn on under the normal indoor light, when flashlight lights on the photosensitive resistor[K1], LED[L2] turn off.

Note: When using the homing mode, the 4WD smart car is mounted in a single-layer platform structure so that the sensor receives optical signals.

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Bluetooth remote control

APK Download link:
https://drive.google.com/open?id=1oPzd6XhfCQSvbbZ3negwfHXu0UBOnnjL

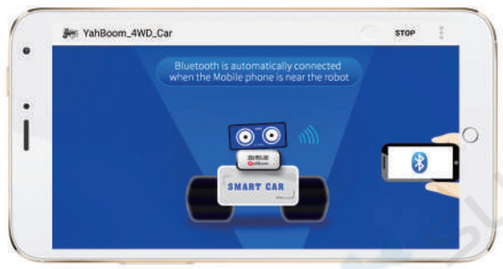
Please download bluetooth APK with Ardroid phone:

Turn on the Bluetooth on your mobile phone and open the application [Yabo 4WD].

The Bluetooth module near the tail of the 4WD smart car can be connected automatically.

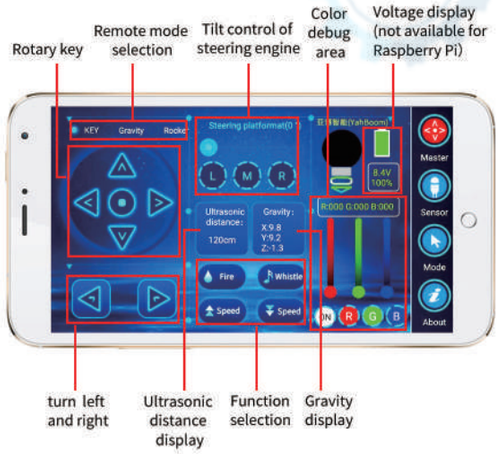
If you find that the search Bluetooth signal changes in the upper left corner, you can directly click CONNECT to connect.

Note: [51/ARDUINO Burning Switch] on the expansion board toggles the switch to [OFF].



After the connection is successful, enter the main control interface.

Master interface



Note：4WD smart car to be completed the assemble of double deck structure, can be used.

About servo : if used, it is found than the servo is not facing forward . You can click the 【Middle】 of the 【servo pan/tilt control】to make servo to the midpoint. Then according to【Servo and ultrasonic module combination】,place ultrasonic sensor facing forward ,reassemble it.

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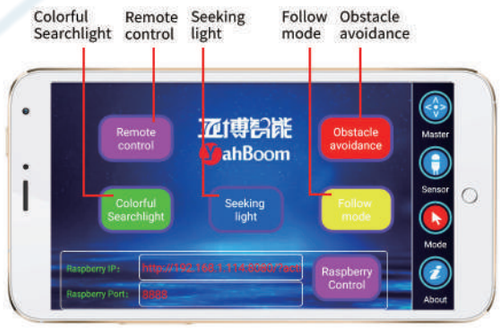
Sensor display

Mode Choice



Mode description:

1：Remote control mode: the default is remote control mode, after clicking 【OK】, can remote control by 【master interface】.

2：Obstacle avoidance mode: before operation, place click the 【Middle】 of the 【servo pan/tilt control】in the【master interface】 to reset servo, making ultrasonic sensor facing forward. Then, debug the smart car according to the "Obstacle avoidance mode" in the "Function debugging", click 【OK】 of the【Obstacle avoidance mode】after debugging, the smart car will automatically drive and avoid the obstacle.

3：Tracking mode： Please debug the smart car according to the "Tracking mode" in "Function Debugging". Place it on the black line after debugging (the two sensor probes in the middle of the four-way patrol module must be on the black line, otherwise the line cannot be patrolled) Click on the "Start" smart car in the "Tracking Mode" to track along the black line track.

4：Colorful searchlight: click 【OK】of the 【Colorful searchlight】, the smart car rotating the pan/tilt, searchlight random change color.

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5：Seek light mode: 4WD smart car needs to adopt the single platform structure, or assemble the IR obstacle avoidance &seek light module on the upper layer of the double deck structure. please debug the smart car according to the "Seek light mode" in the "Function debugging", and place it in the darker environment after debugging, click 【OK】 of the [Seek light mode mode], lights on the seek light sensor, the smart car will travel in the direction of light.

6：Follow mode: please debug the smart car according to the "Follow mode" in the "Function debugging", click [OK] of the [Follow mode] after debugging, the smart car will follow the obstacle.

7.Raspberry Pi video (camera version)

The Raspberry Pi main control board of the Raspberry Pi wifi smart car has been configured into router mode before the factory, boot from the start mjpeg Video server and bluetooth_control Bluetooth control process. The default router IP address is 192.168.0.1

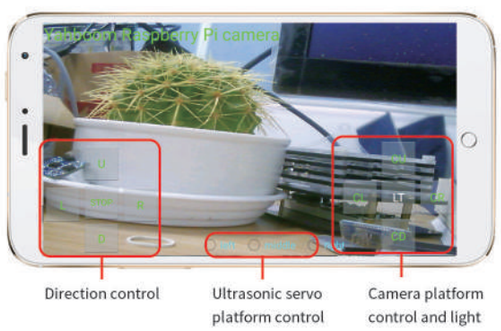
Operation step:

1. Connect to the Raspberry Pi wifi hotspot with your mobile phone: YahBoom_Car
The initial password is: 12345678

2.Enter the Raspberry Pi ip address: http://192.168.0.1:8080/?action=snapshot.

Raspberry Pi port number: 8888,Click 【Raspberry Pi video】 (camera version)

The following Raspberry Pi video control interface appears.



Note: The Raspberry Pi video display interface controls the car, using the Bluetooth transmission control command, and the video stream uses TCP communication. After the configuration, the Raspberry Pi SSH login user name is pi, the login password is yahboom., the SSH port number is 22, and the root user login password is yahboom.

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Source code

Raspberry Pi source code link:
https://drive.google.com/open?id=1fD0ZmCctBPBLMEQ0IECGQ3rABJgq4p0A

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