UNOBOT 3.0
SMART ROBOT CAR

ZHIYI智譯

Lesson 5 Bluetooth Car

Points of This Section

It is very important and so cool to control your car wirelessly in a certain space when we learn the Arduino. So in this lesson, we will teach you how to control a car by Bluetooth.

Learning Objectives:

Learn how to use the Bluetooth module and the Bluetooth APP Learn how to control the light by using Bluetooth

Learn how to control the vehicle via Bluetooth

Preparations:

A vehicle (equipped with battery) A USB cable

A Bluetooth module A Phone or tablet

Ⅰ. Bluetooth module (HC-06)

The Bluetooth is a wireless technology standard for exchanging data between fixed and mobile devices over short distances using short-wave UHF radio waves in the industrial, scientific, and medical radio bands (2.400 to 2.485 GHz), and building personal area networks (PANs). There are also RF protocols such as ZigBee and Wi-Fi.

Bluetooth

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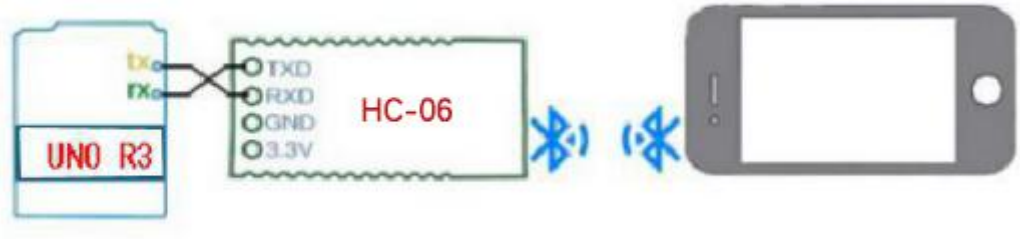
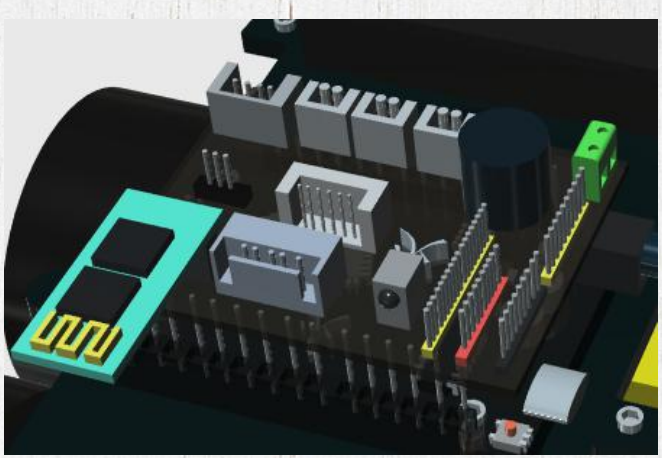
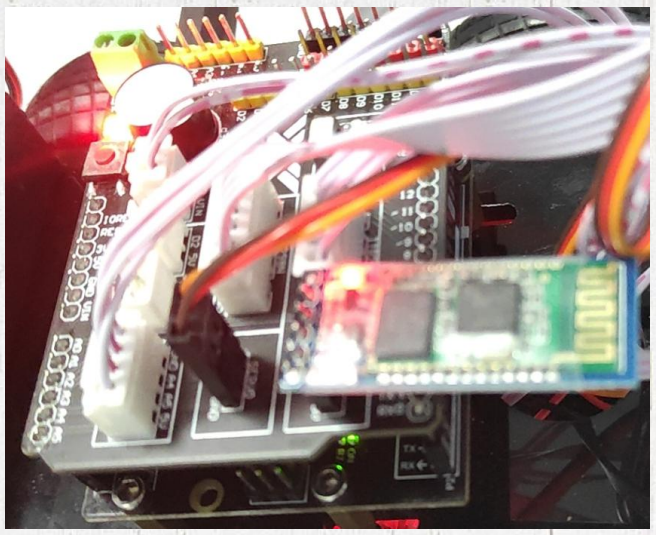
In UNObot 3.0 Car Kit, we use the Bluetooth module model "HC-06", it can send serial data to other devices via Bluetooth.



HC-06 communicates with UNO through the RX/TX pin on the shield.





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Ⅱ. Getting Started with the ZHI YI BLE Tool APP

Before beginning, connect the HC-06 Bluetooth module to the expansion board and turn on the power.

STEP1: Install the application

Currently there are only Android apps:

1. For the Android system, copy the APK file to the Android product device and install it. The APK file is located in "UNOBot3.0_Car \APP\ZHI YI CAR.apk"

STEP2: Open the APP

As below, we use an Android for example to show you how to control the ZHI YI Smart Robot Car via this App:

First of all, turn on your cellphone’s Bluetooth function.

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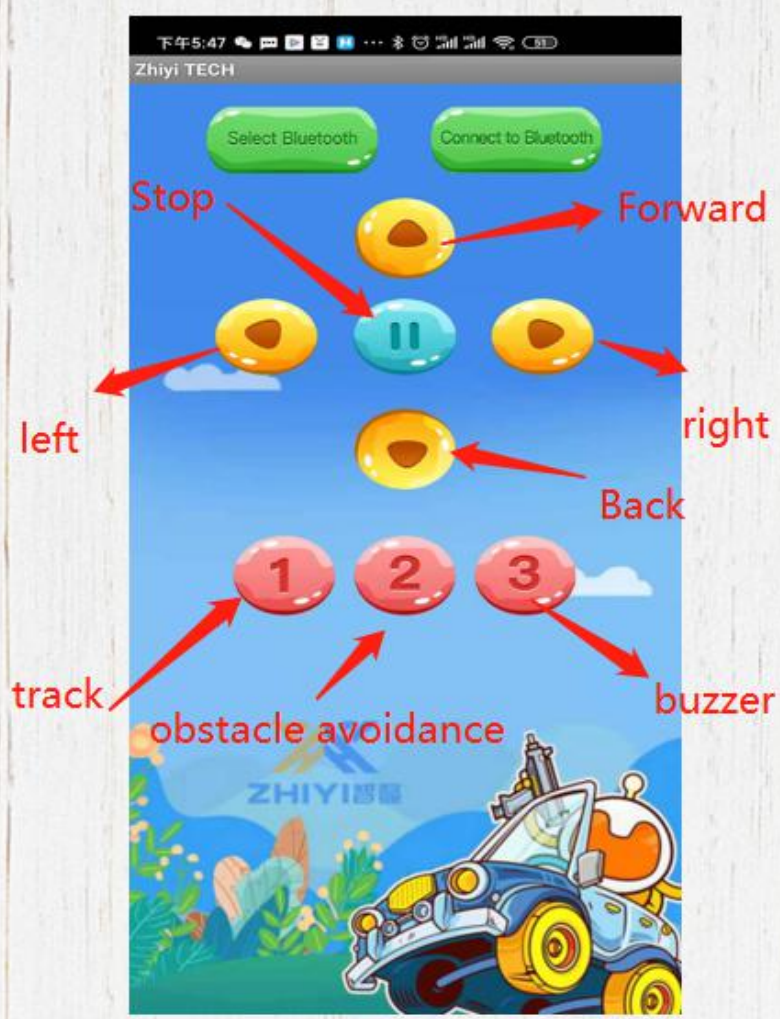
Open the "UNOBot 3.0 Car" application.



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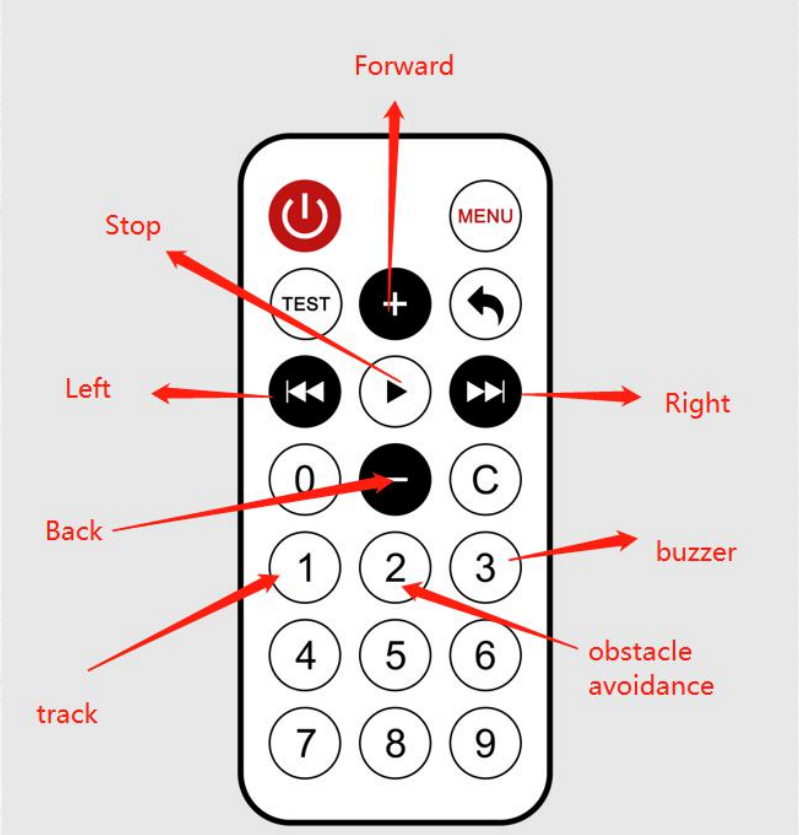
Note: The APP operation interface number 1 is the car tracking mode. The number 2 is the ultrasonic obstacle avoidance mode, the number 3 is the music mode, and the car can also be controlled by the infrared remote controller.



Ⅲ. Make a Bluetooth Car

When the car turns left or right, it’s not necessary to set the speed too fast. On the contrary, we need to control the speed of the car. But how to control?
The answer is PWM.

PWM is the abbreviation of “Pulse Width Modulation”, is called pulse modulation in short, is an effective technique to control analog circuit with digital output of microprocessor, car is used to change the speed of motor by altering duty cycle of a square wave. In other words, connect and break circuit between two sides of motor constantly is the switch of holding motor work, and motor will not be off when power is off because of the fast speed. So we can control the speed of car if we control specific value of power-on time and power-off time. The speed of car will be maximum when circuit is holding still. The speed of car will be minimum if circuit is holding off. The speed of car will be median in half time. PWM is a technology to get analog quantity through digital method. A square wave is formed by digital control, there are only two states: on and off. (That is high-low of digital pins). Simulate voltage changing from 0 to 5V by controlling specific value of duration on and off time. Occupied time of on (That is high level in academy) is called pulse width, so PWM is also called pulse width modulation. Let’s learn about PWM through five square waves below.

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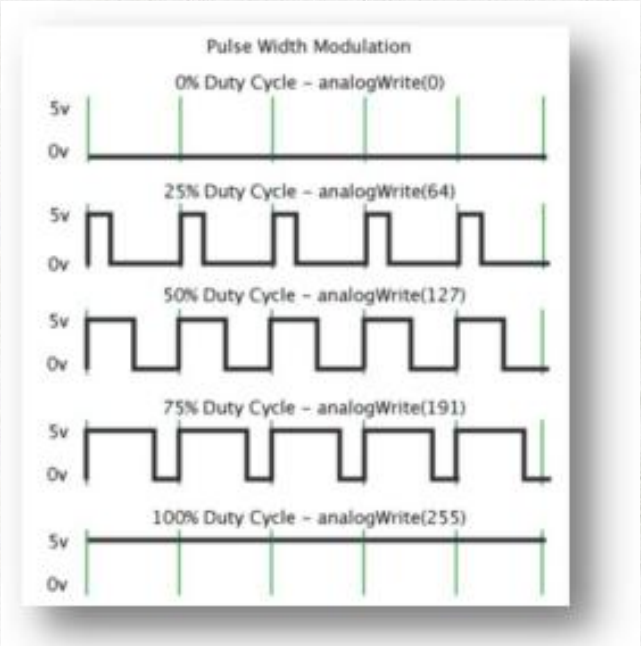

Green vertical line above represent a period of square wave. The value written into every analogWrite(pin,value) corresponds to the percentage, the percentage is also called Duty Cycle, refer to the percentage gotten from specific value between duration high level and low level time in a period. In the above figure, from top to bottom, the first square wave, duty cycle is 0%, corresponding value is 0. Output circuit current is minimum, motor hold still. The longer duration time is, the bigger circuit current motor gets, the faster the speed is. So, the final one's duty cycle is 100%, corresponding value is 255, motor rotates in full speed. 50% is medium hyponastic rotate speed, 25% is relatively slower, even can't start. (The circuit current is relatively big to start motor because of static friction) PWM is mostly used to adjust light of LED and rotate speed of motor, wheel speed controlled by motor is easily be controlled. The advantage of PWM can be more reflected when you play with some Arduino cars.

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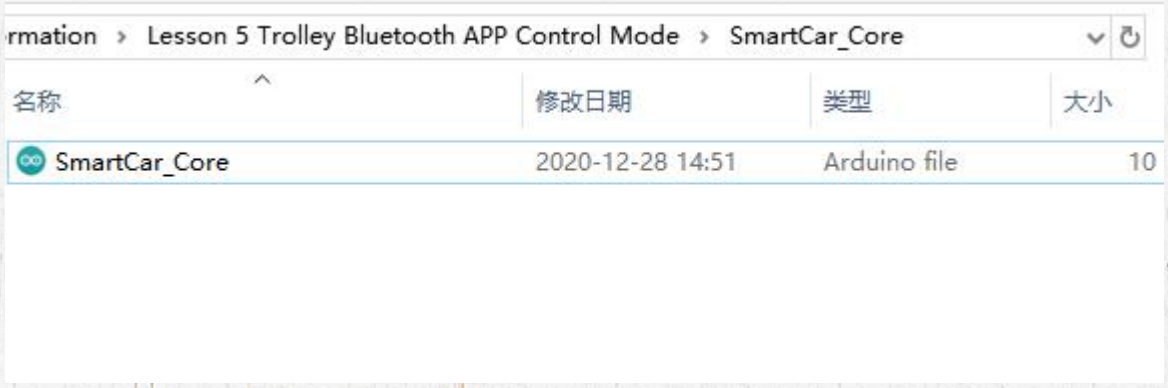
After learning the basic knowledge, we will upload the program as below to the car, open the code file in the path “\UNOBot 3.0 Car Kit Plus\bluetooth_car\ bluetooth_car.ino” and then upload the program to the UNO control board.

Now we can control the car by Bluetooth and play with it.

Reminder:

If you want to realize the Bluetooth and infrared remote control at the same time to control the car to switch between functional modes; you need to upload the following program to the car, and open the code file under the "UNOBot3.0 car Kit V Plus\SmartCar_Core" path. Then upload the program to the UNO control board.



Now we can control the car by Bluetooth and play with it.

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Thanks for watching!

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