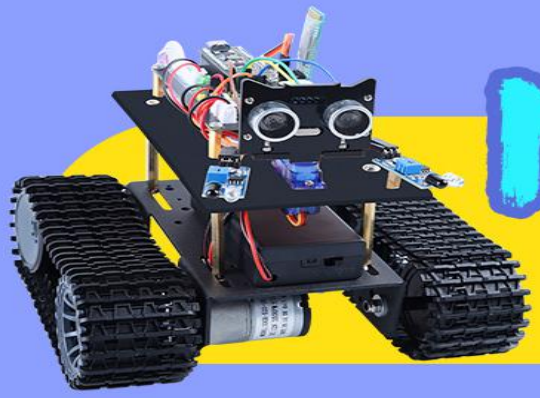
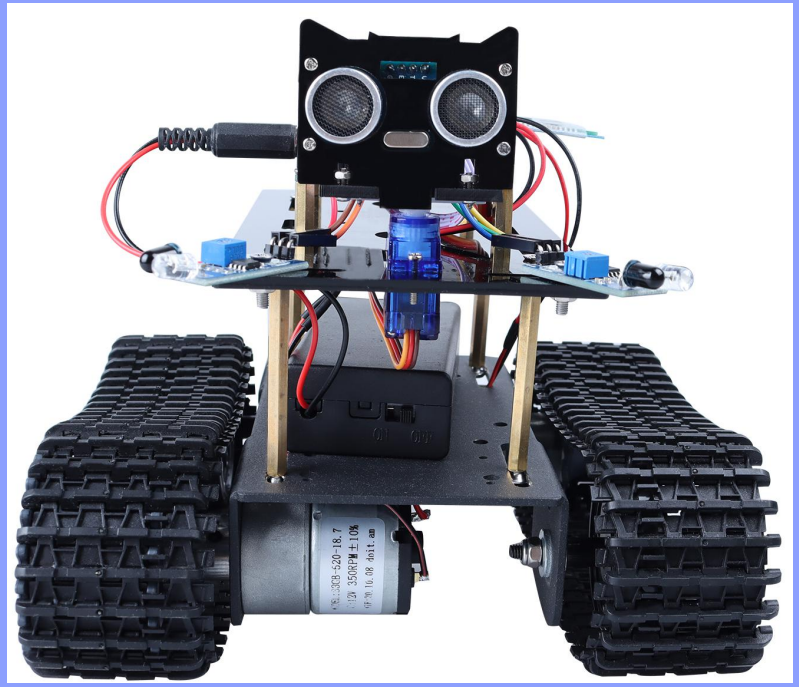


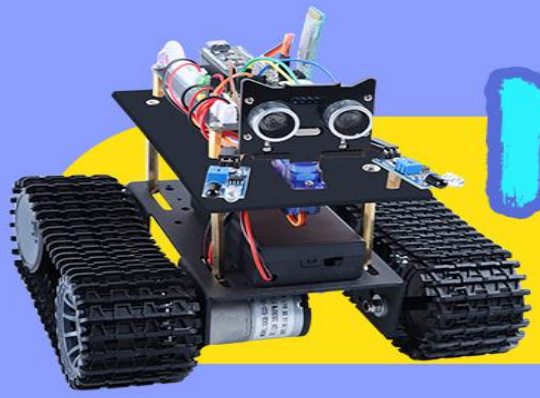
# NANOBOT ASSEMBLY TUTORIAL

## Lesson 6 Trac car

This lesson will learn the principles of using infrared obstacle avoidance sensors and ultrasonic ranging sensors.
Using the principle of these two sensors, a car can follow an object in front of it or drive backwards.

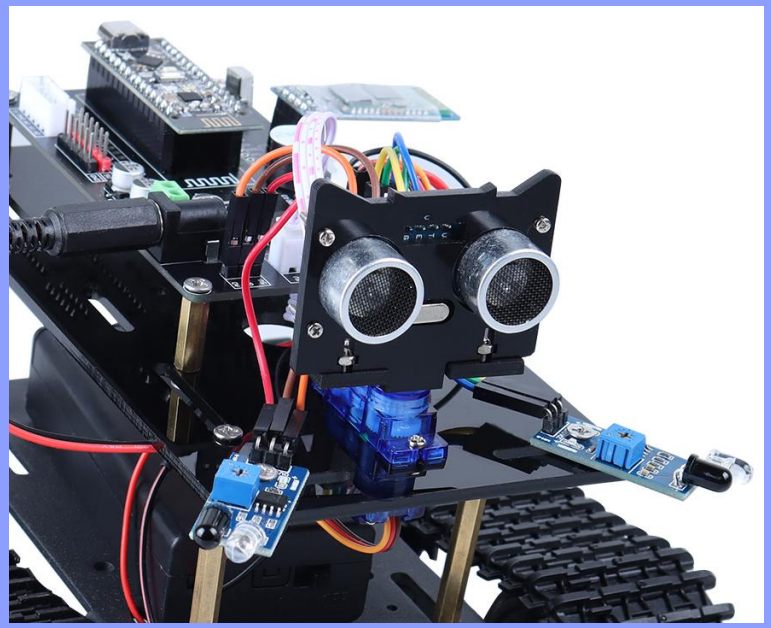


智懿 ZHIYI

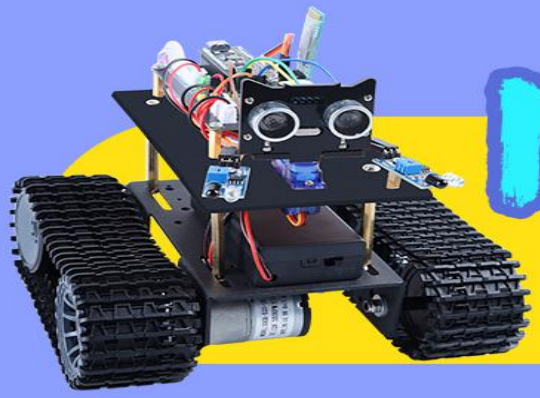


# NANOBOT ASSEMBLY TUTORIAL

Now, to see how it works,
Materials ready: Trolley *1(with battery)
Infrared obstacle avoidance sensor *2
Ultrasonic ranging sensor *1
Servo motor SG90 *1
USB data cable *1



智懿 ZHIYI



# NANOBOT
## ASSEMBLY TUTORIAL

**Introduction of ultrasonic ranging sensor**

1.IO trigger ranging, trigger signal input terminal (TRIG) input a high level signal above 10 microseconds, ultrasonic transmission port receives the signal automatically send 8 40Hz square waves, at the same time start the timer, when the sensor receives the echo, stop the timing and output the echo signal, echo signal pulse width is proportional to the measured distance.
According to the time interval, the distance can be calculated with the formula: distance =(high level signal time * sound velocity)/2, and the speed of sound propagation in the air is 340m/s.

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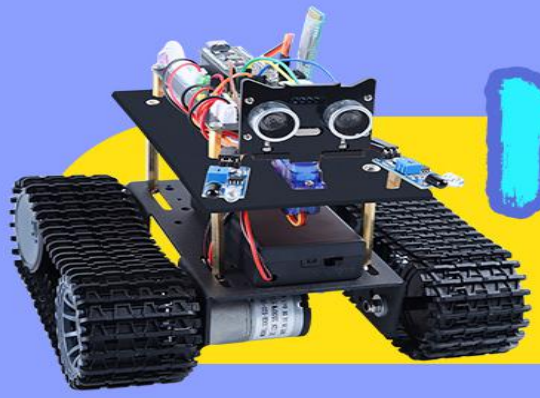

# NANOBOT
## ASSEMBLY TUTORIAL

### Infrared Obstacle-Avoidance Sensor Introduction

Infrared obstacle avoidance sensor has three pins, namely :VCC, grounded, exhaled, is the output signal, there are only two states,0 and 1, namely high and low level of two states (high level 5 V, low level 0 V; "1" for high level reading and "0" for low level reading). The sensor is powered on, and the default output is high level.

When a follower is detected, the OUT pin will output a low level, so there will be a change from high to low.

Then, the program of the following mode is executed and written, so as to realize the car driving around the following object.

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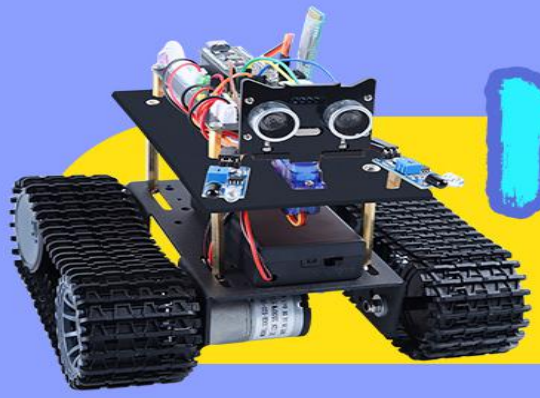

# NANOBOT
## ASSEMBLY TUTORIAL

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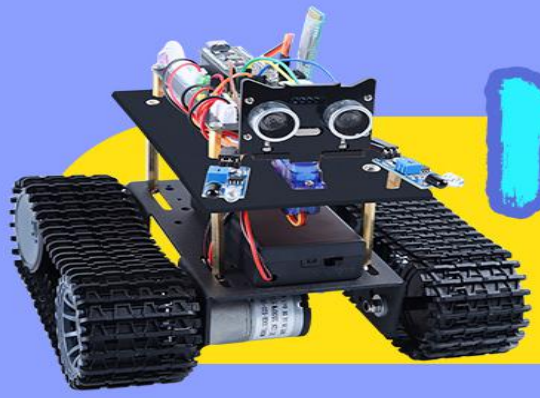
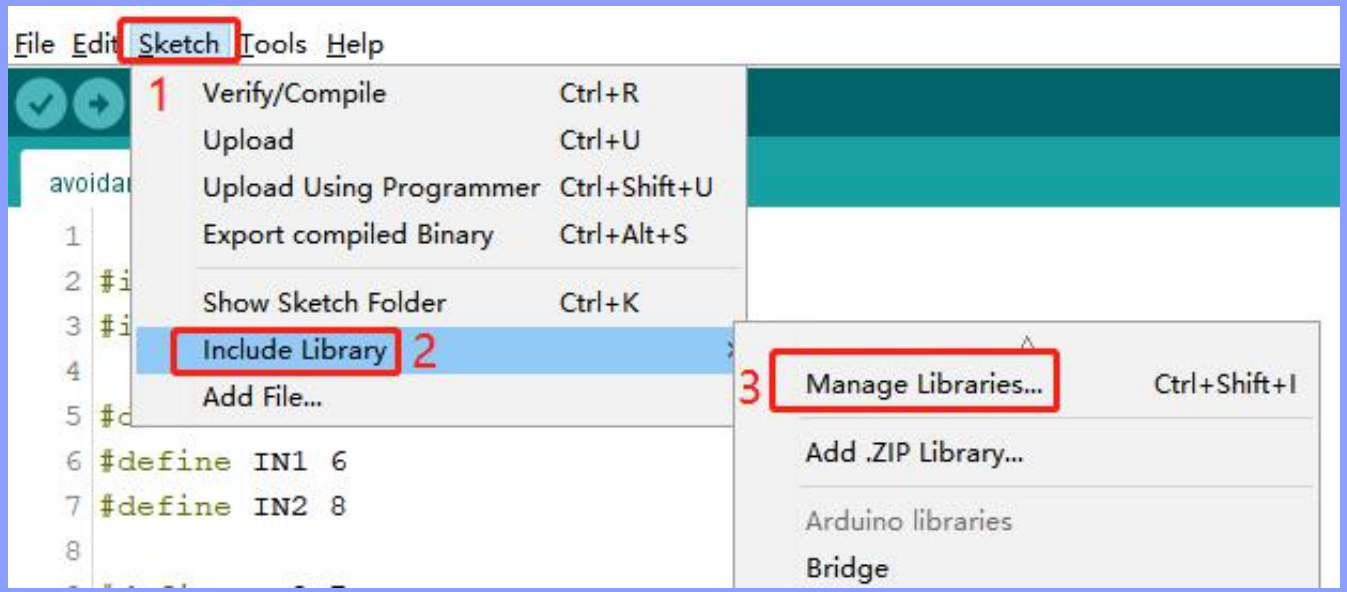
智熠 ZHIYI

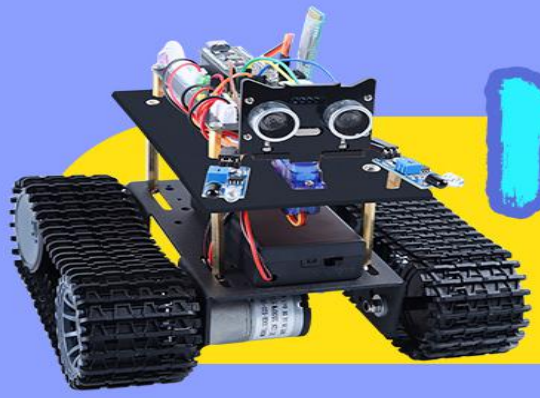


# NANOBOT
## ASSEMBLY TUTORIAL

Due to the use of servo motor program, need to install the servo library

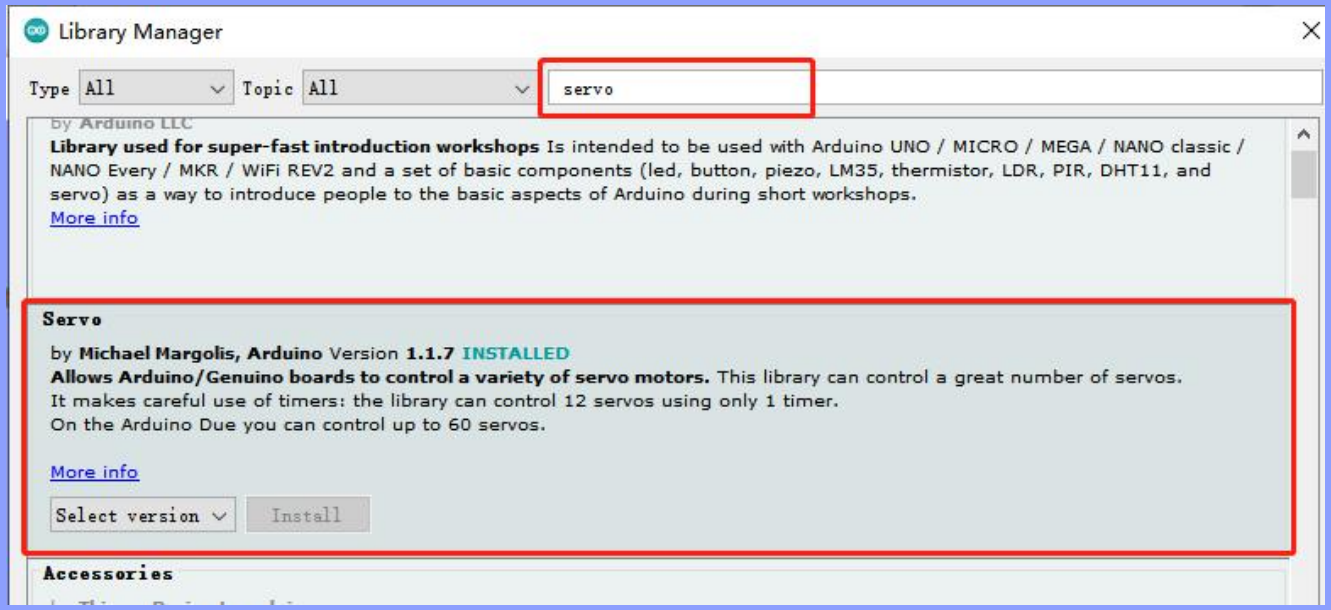
Select Sketch -> Include Library -> Manage Libraries

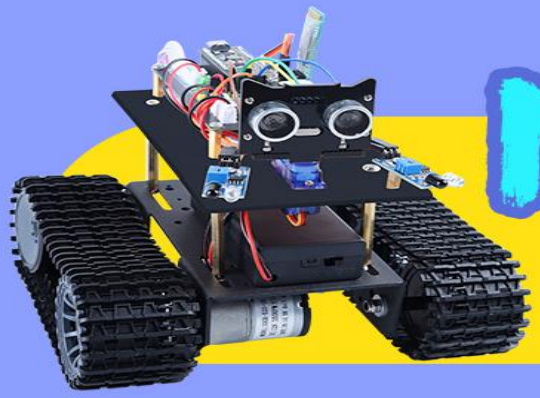




# NANOBOT ASSEMBLY TUTORIAL

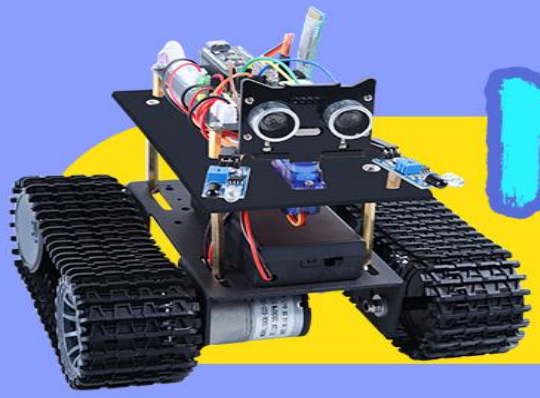
Search servo and then install the newest version. The following picture shows that the Servo library is already installed.





# NANOBOT ASSEMBLY TUTORIAL

Open Lesson 6 and upload the program to the NANO_NRF control board.



# NANOBOT
## ASSEMBLY TUTORIAL

After uploading the program to the Nano-NRF control board, disconnect the cable, place the vehicle on the ground, and switch on the power.
If there is no obstacle, you will see the car moving forward. If there is an obstacle in front, the servo motor will rotate with the ultrasonic sensor and record the distance from the car to the obstacle. The vehicle will change direction to bypass the obstacle.

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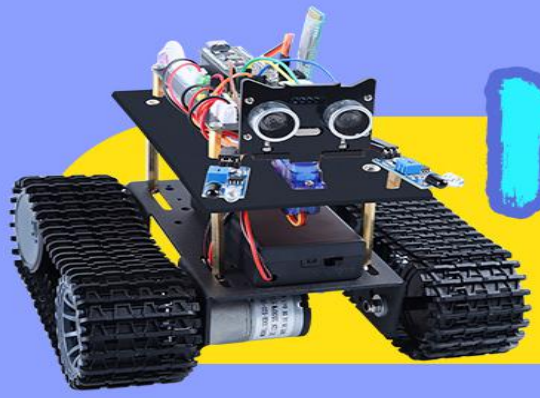
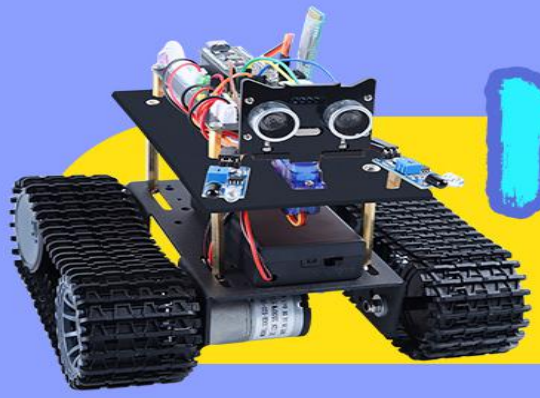


# NANOBOT
## ASSEMBLY TUTORIAL

The principle of the car to follow the items is very simple, through the ultrasonic ranging sensor, measuring the distance between the car and the following items, when in the set range, the car will drive to the front, less than the set range, the car will drive backwards.

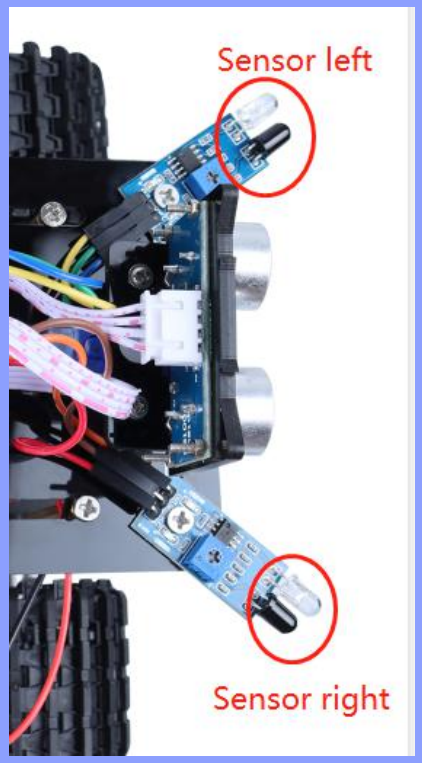
```
}
// The distance is between 20cm and 40cm
 else if(get_dis > 20 && get_dis < 40)
 {
     myservo.write(100);
     Motor(106,255,255);;
 }
 // Backup less than 15cm
 else  if(get_dis < 15 )
 {
     myservo.write(100);
     Motor(149,255,255);
 }
 else
 {
     myservo.write(100);
     Motor(0,0,0);
 }
```

智懿 ZHIYI

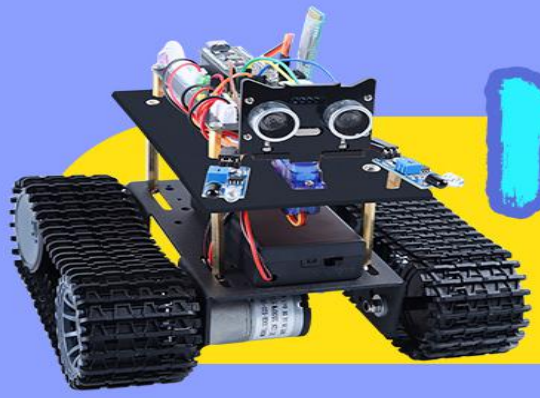


# NANOBOT
## ASSEMBLY TUTORIAL

When the right infrared obstacle avoidance sensor encounters a following object, it will drive to the right, and if the left infrared obstacle avoidance sensor encounters a following object, it will drive to the left.




智懿 ZHIYI

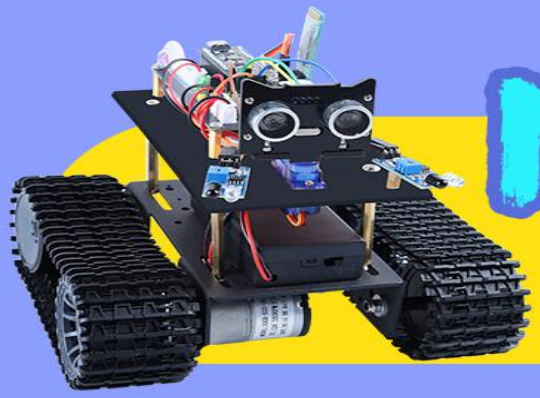


# NANOBOT
## ASSEMBLY TUTORIAL

Code preview:

```
//If the sensor on the right encounters a follower, turn right
if( digitalRead(IR_Senor_R) == 0)
{
    myservo.write(60);
     Motor(57,255,255);//turn right
    delay(300);
}
else if( digitalRead(IR_Senor_L) == 0)
{
    myservo.write(140);
    Motor(198,255,255);
    delay(300);
}
// The distance is between 20cm and 40cm
else if(get_dis > 20 && get_dis < 40)
{
    myservo.write(100);
     Motor(106,255,255);;
}
```

智熠 ZHIYI



# NANOBOT
## ASSEMBLY TUTORIAL

**Thanks for watching!**

智熠 ZHIYI