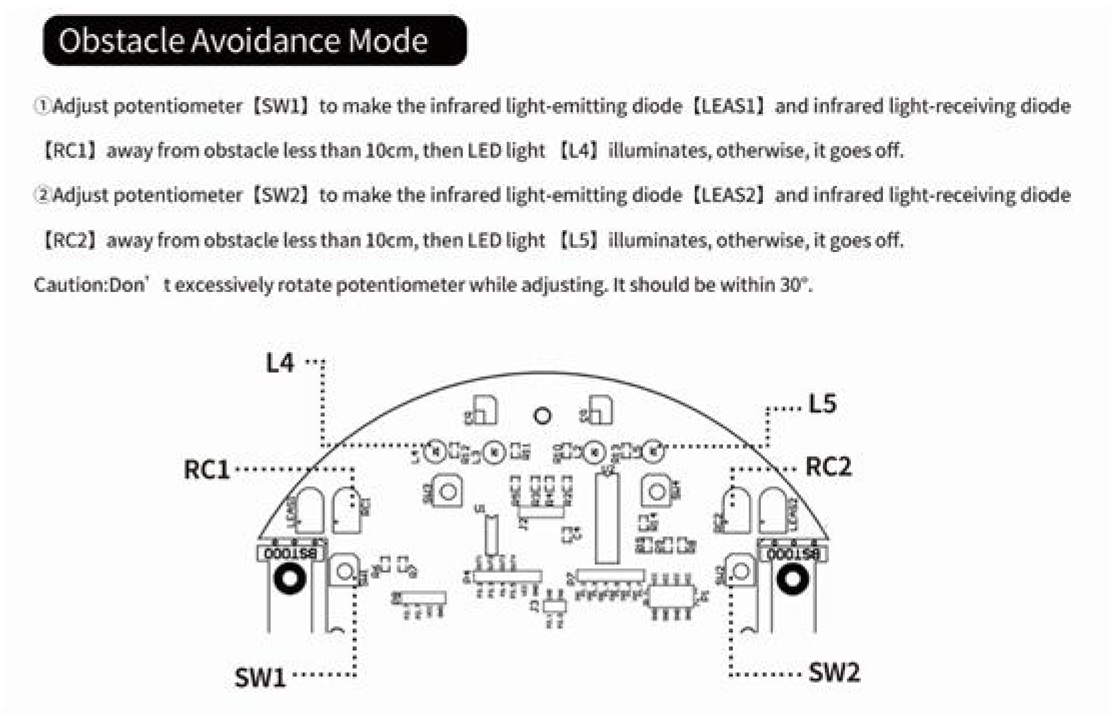
7 Infrared obstacle avoidance - follow

The purpose of the experiment:

Using the characteristics of the infrared obstacle avoidance sensor, the obsta cle is used to block the left and right infrared obstacle avoidance probes of the trolley, and when the trolley recognizes the obstacle ahead, the obstacle is fol lowed.

Precautions:

1. Before conducting the experiment, you need to debug the adjustable resistors SW1 and SW2 in front of the smart car, as shown below.



Obstacle Avoidance Mode

①Adjust potentiometer【SW1】to make the infrared light-emitting diode【LEAS1】and infrared light-receiving diode【RC1】away from obstacle less than 10cm, then LED light【L4】illuminates, otherwise, it goes off.

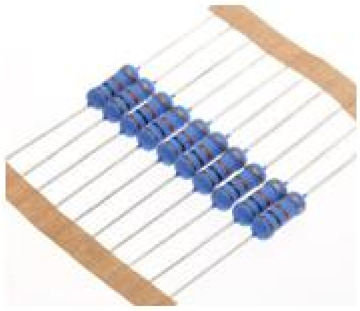
②Adjust potentiometer【SW2】to make the infrared light-emitting diode【LEAS2】and infrared light-receiving diode【RC2】away from obstacle less than 10cm, then LED light【L5】illuminates, otherwise, it goes off.

Caution:Don' t excessively rotate potentiometer while adjusting. It should be within 30°.

2. This experiment must be carried out in an environment without outdoor light, and it is also necessary to pull curtains to block outdoor light indoors.

List of components required for the experiment:

Arduino Smart Car* 1
USB cable* 1
Active buzzer* 1
DuPont Line* 13
Breadboard* 1
Button * 1
10K resistor * 1



Experimental code analysis:

```
//============================yahboom========================
====
//   Intelligent car infrared obstacle avoidance experiment2(follow avoidance)
//=============================================================
=====
int Left_motor_back=9;      //(IN1)
int Left_motor_go=5;        //(IN2)
int Right_motor_go=6;       //(IN3)
int Right_motor_back=10;    //(IN4)
int key=A0;//Define the key A0 interface
int beep=A1;//Define the buzzer A1 interface
const int SensorRight = A2;         //Right tracking infrared sensor(P3.2 OUT1)
const int SensorLeft = A3;          //Left tracking infrared sensor(P3.3 OUT2)
const int SensorLeft_2 = A4;      //Left infrared sensor(P3.4 OUT3)
const int SensorRight_2 = A5;     //Right infrared sensor(P3.5 OUT4)
int SL;       //Left tracking infrared sensor state
int SR;       //Right tracking infrared sensor state
int SL_2;     //Left infrared sensor state
int SR_2;     //Right infrared sensor state
void setup()
{
  //Initialize the motor drive IO for output mode
  pinMode(Left_motor_go,OUTPUT); // PIN 5 (PWM)
  pinMode(Left_motor_back,OUTPUT); // PIN 9 (PWM)
  pinMode(Right_motor_go,OUTPUT);// PIN 6 (PWM)
  pinMode(Right_motor_back,OUTPUT);// PIN 10 (PWM)
  pinMode(key,INPUT);//Define the key interface for the input interface
  pinMode(beep,OUTPUT);
  pinMode(SensorRight, INPUT);    //Define Right tracking infrared sensor for
the input interface
  pinMode(SensorLeft, INPUT);     //Define left tracking infrared sensor for the
input interface
  pinMode(SensorRight_2, INPUT); //Define right infrared sensor for the input
interface
  pinMode(SensorLeft_2, INPUT);   //Define left infrared sensor for the input
interface
}
//======================The basic action of
car=========================
//void run(int time)
void run()
{
  digitalWrite(Right_motor_go,HIGH);   //right motor go
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,100);//PWM ratio 0~255 speed control,
                              //the difference of left and right wheel slightly increase or
decrease
  analogWrite(Right_motor_back,0);
  digitalWrite(Left_motor_go,HIGH);   // left motor go
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,100);//PWM ratio 0~255 speed control,
                              //the difference of left and right wheel slightly increase or
decrease
  analogWrite(Left_motor_back,0);
  //delay(time * 100);    //execution time, can be adjusted
}
//void brake(int time)
void brake()
{
  digitalWrite(Right_motor_go,LOW);
  digitalWrite(Right_motor_back,LOW);
  digitalWrite(Left_motor_go,LOW);
  digitalWrite(Left_motor_back,LOW);
  //delay(time * 100);//execution time, can be adjusted
}
//void left(int time)
void left()         //turn left(left wheel stop,right wheel go)
{
  digitalWrite(Right_motor_go,HIGH);    //right motor go
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,100);
  analogWrite(Right_motor_back,0);      //PWM ratio 0~255 speed control
  digitalWrite(Left_motor_go,LOW);
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,0);
  analogWrite(Left_motor_back,0);      //PWM ratio 0~255 speed control
  //delay(time * 100);       //execution time, can be adjusted
}
```

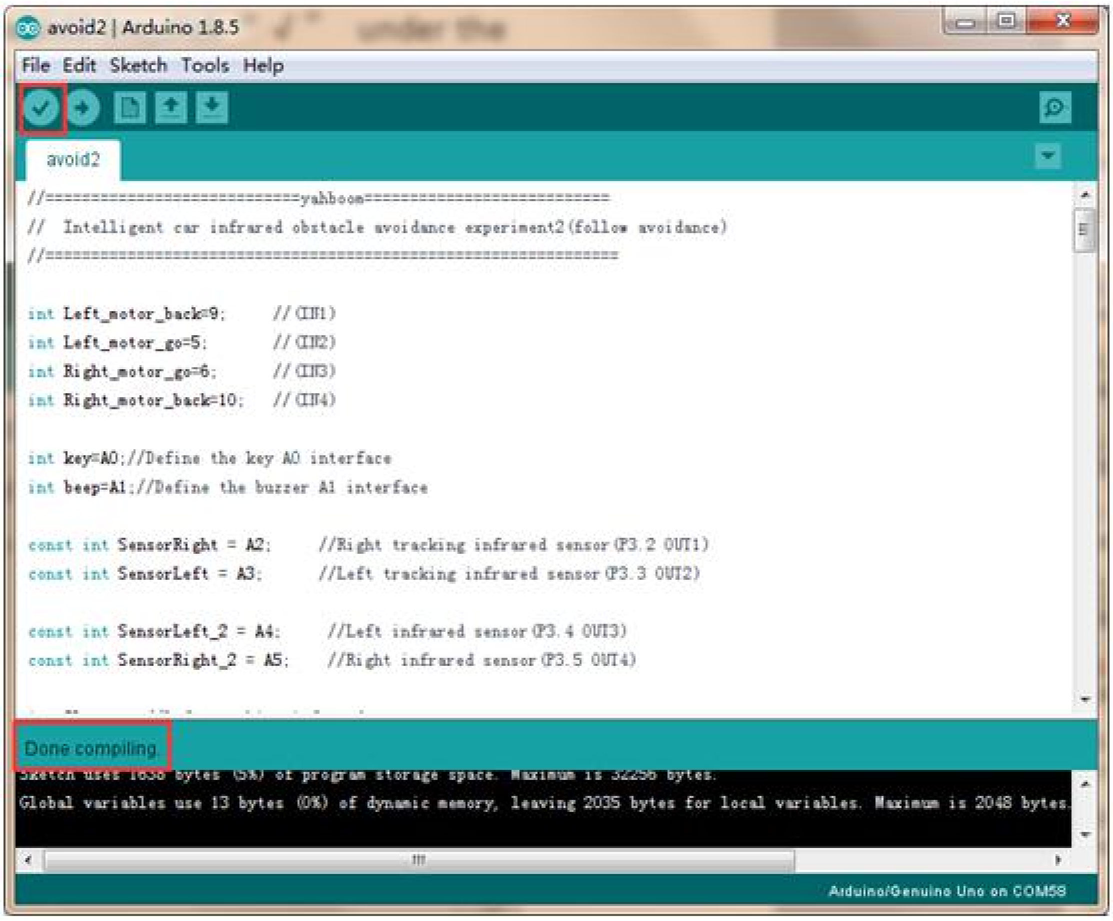
```
void spin_left(int time)         //left rotation(left wheel back，right wheel go)
{
  digitalWrite(Right_motor_go,HIGH);    //right motor go
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,100);
  analogWrite(Right_motor_back,0);      //PWM ratio 0~255 speed control
  digitalWrite(Left_motor_go,LOW);
  digitalWrite(Left_motor_back,HIGH);   //left motor back
  analogWrite(Left_motor_go,0);
  analogWrite(Left_motor_back,100);     //PWM ratio 0~255 speed control
  delay(time * 100);    //execution time, can be adjusted
}
//void right(int time)
void right()        //turn right (right wheel stop,left wheel go)
{
  digitalWrite(Right_motor_go,LOW);
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,0);
  analogWrite(Right_motor_back,0);     //PWM ratio 0~255 speed control
  digitalWrite(Left_motor_go,HIGH);    //left motor go
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,100);
  analogWrite(Left_motor_back,0);      //PWM ratio 0~255 speed control
  //delay(time * 100);       //execution time, can be adjusted
}
void spin_right(int time)        //right rotation(right wheel back,left wheel go)
{
  digitalWrite(Right_motor_go,LOW);
  digitalWrite(Right_motor_back,HIGH);//right motor back
  analogWrite(Right_motor_go,0);
  analogWrite(Right_motor_back,100);   //PWM ratio 0~255 speed control
  digitalWrite(Left_motor_go,HIGH);    //left motor go
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,100);
  analogWrite(Left_motor_back,0);      //PWM ratio 0~255 speed control
  delay(time * 100);    //execution time, can be adjusted
```

```
}
void back(int time)
{
  digitalWrite(Right_motor_go,LOW);    //right motor back
  digitalWrite(Right_motor_back,HIGH);
  analogWrite(Right_motor_go,0);
  analogWrite(Right_motor_back,100);   //PWM ratio 0~255 speed control
  digitalWrite(Left_motor_go,LOW);     //left motor back
  digitalWrite(Left_motor_back,HIGH);
  analogWrite(Left_motor_go,0);
  analogWrite(Left_motor_back,150);//PWM ratio 0~255 speed control
  delay(time * 100);      //execution time, can be adjusted
}
//==========================================================
void keysacn()
{
  int val;
  val=digitalRead(key);//Read the value of the   port 7 level to the val
  while(!digitalRead(key))//When the key is not pressed, circulate all the time
  {
    val=digitalRead(key);//This sentence can be omitted and the circulate can
run away
  }
  while(digitalRead(key))//When the key is pressed
  {
    delay(10);
    val=digitalRead(key);//Read the value of the port 7 level to the val
    if(val==HIGH)   //Judge whether the key is pressed again
    {
      digitalWrite(beep,HIGH);         //buzzer sound
      while(!digitalRead(key))             //Judge whether the key isreleased
        digitalWrite(beep,LOW);             //buzzer no sound
    }
    else
      digitalWrite(beep,LOW);           //buzzer no sound
  }
```

```
}
void loop()
{
  keysacn();
  while(1)
  {
    //There is a signal is LOW , no signal is HIGH
    SR_2 = digitalRead(SensorRight_2);
    SL_2 = digitalRead(SensorLeft_2);
    if (SL_2 == LOW&&SR_2==LOW)
      run();    //Call run function
    else if (SL_2 == HIGH & SR_2 == LOW)
    //There is an obstacle on the right,return signal,turn right.

      right();
    else if (SR_2 == HIGH & SL_2 == LOW)
     //There is an obstacle on the left,return signal,turn left.
      left();
    else //There are no obstacles on both sides,brake
    brake();
  }
}
```

Experimental steps:

1. We need to open the code of this experiment: **avoid2.ino,**click"√" under the menu bar to compile the code, and wait for the word "**Done compiling** " in the lower right corner,as shown in the figure below.



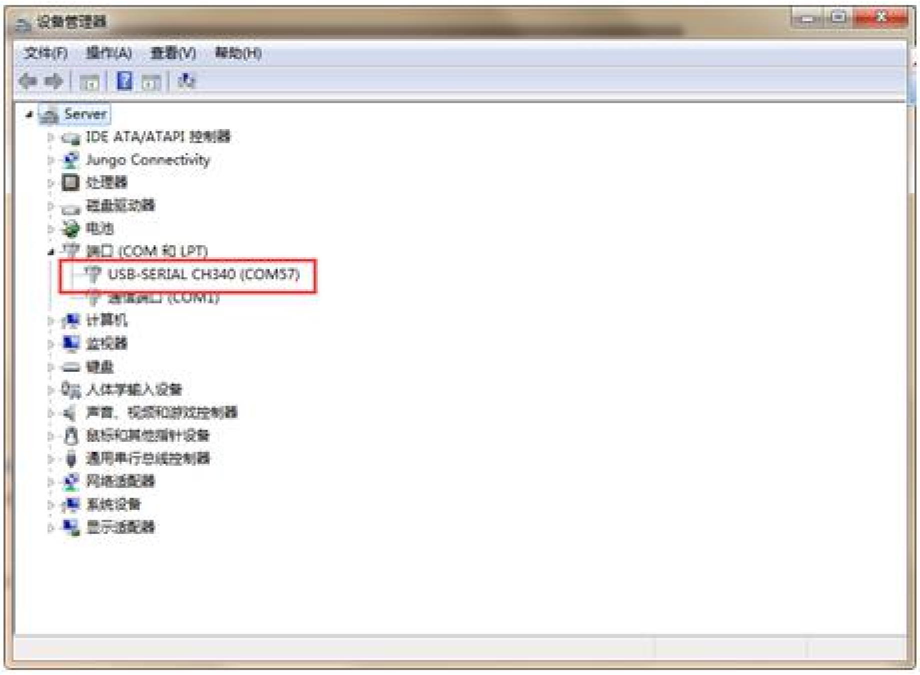
```
//==========================yahboom==========================
//  Intelligent car infrared obstacle avoidance experiment2(follow avoidance)
//===========================================================

int Left_motor_back=9;     //(IN1)
int Left_motor_go=5;       //(IN2)
int Right_motor_go=6;      //(IN3)
int Right_motor_back=10;   //(IN4)

int key=A0;//Define the key A0 interface
int beep=A1;//Define the buzzer A1 interface

const int SensorRight = A2;     //Right tracking infrared sensor(P3.2 OUT1)
const int SensorLeft = A3;      //Left tracking infrared sensor(P3.3 OUT2)

const int SensorLeft_2 = A4;     //Left infrared sensor(P3.4 OUT3)
const int SensorRight_2 = A5;    //Right infrared sensor(P3.5 OUT4)
```

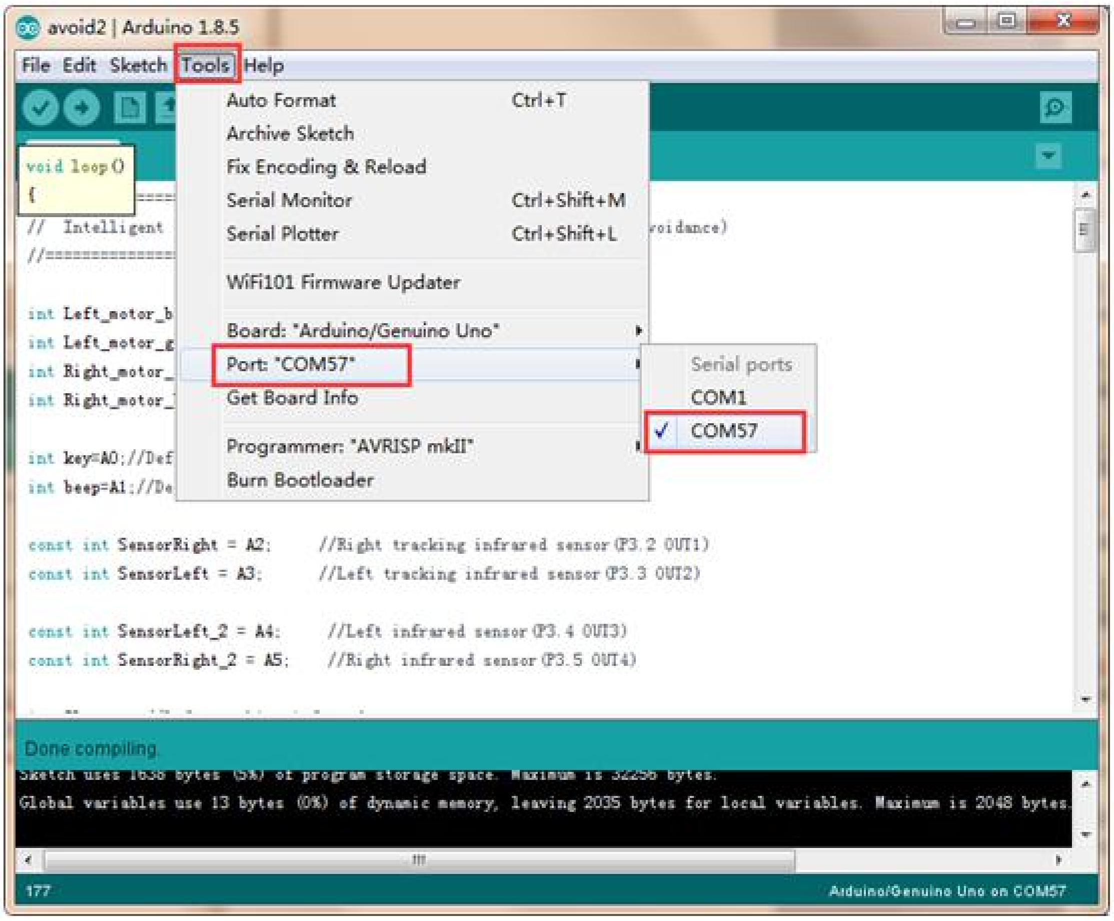
Done compiling.

```
Sketch uses 1638 bytes (5%) of program storage space. Maximum is 32256 bytes.
Global variables use 13 bytes (0%) of dynamic memory, leaving 2035 bytes for local variables. Maximum is 2048 bytes.
```

Arduino/Genuino Uno on COM58

2. In the menu bar of Arduino IDE, we need to select 【Tools】---【Port】--- selecting the port that the serial number displayed by the device manager just now, as shown in the figure below.



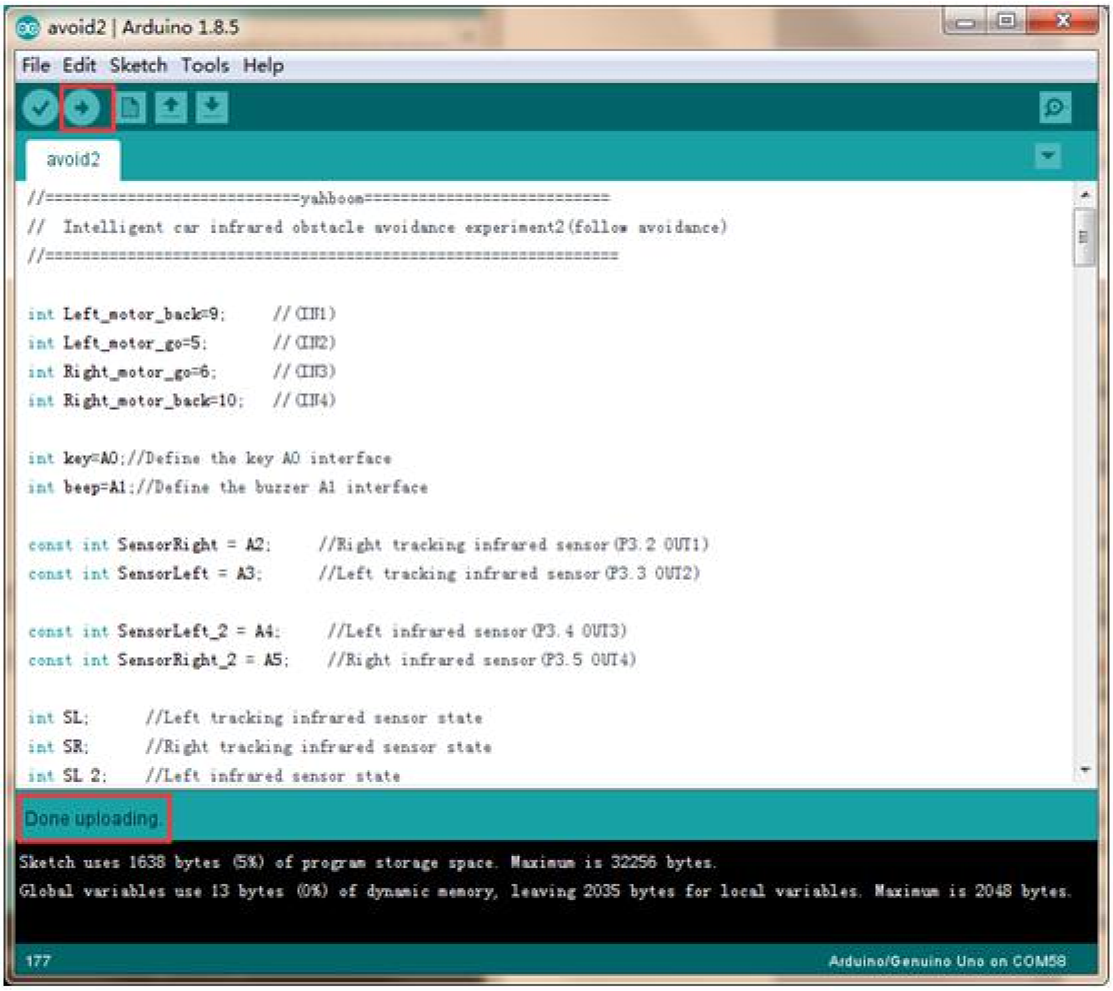


```
void loop()
{
//  Intelligent                                  voidance)
//===============

int Left_motor_b
int Left_motor_g
int Right_motor_
int Right_motor_

int key=A0;//Def
int beep=A1;//De

const int SensorRight = A2;     //Right tracking infrared sensor(P3.2 OUT1)
const int SensorLeft = A3;      //Left tracking infrared sensor(P3.3 OUT2)

const int SensorLeft_2 = A4;     //Left infrared sensor(P3.4 OUT3)
const int SensorRight_2 = A5;    //Right infrared sensor(P3.5 OUT4)
```

```
Done compiling.
Sketch uses 1638 bytes (5%) of program storage space. Maximum is 32256 bytes.
Global variables use 13 bytes (0%) of dynamic memory, leaving 2035 bytes for local variables. Maximum is 2048 bytes.
```

```
177                                                   Arduino/Genuino Uno on COM57
```

3. After the selection is completed, you need to click "→"under the menu bar to upload the code to the Arduino UNO board. When the word "**Done uploading**" appears in the lower left corner, the code has been successfully uploaded to the Arduino UNO board, as shown in the figure below.

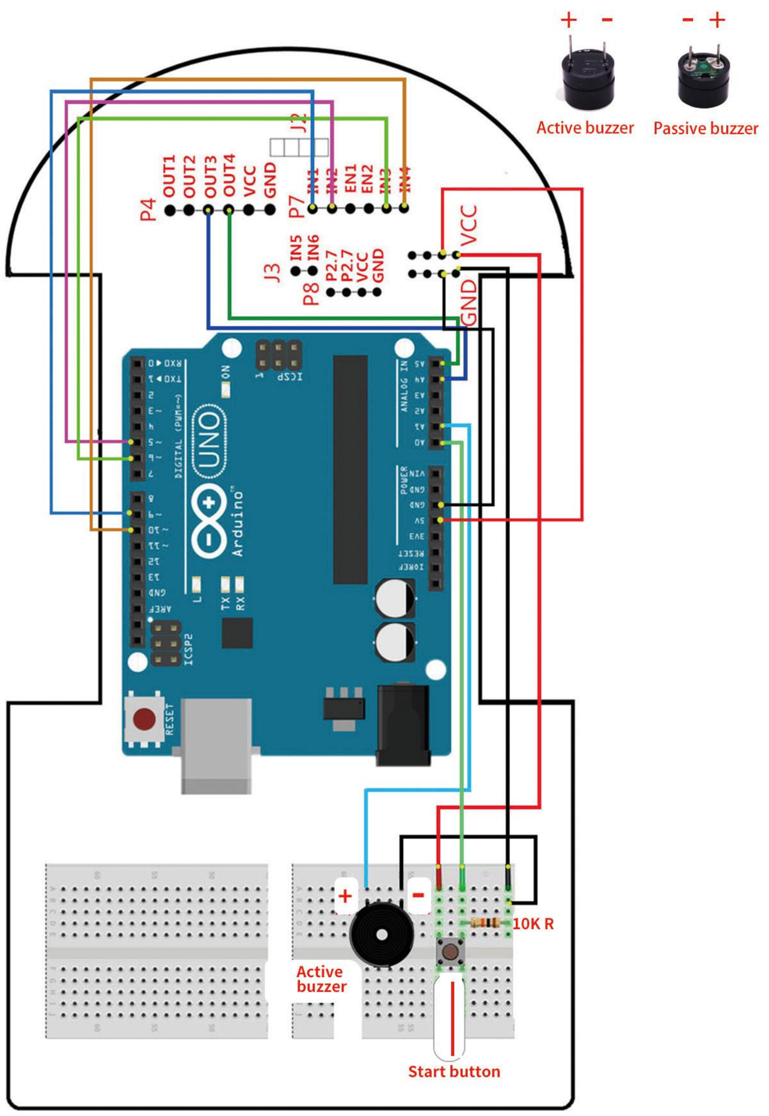


```
//===========================yahboom==========================
//  Intelligent car infrared obstacle avoidance experiment2(follow avoidance)
//==============================================================

int Left_motor_back=9;     //(IN1)
int Left_motor_go=5;       //(IN2)
int Right_motor_go=6;      //(IN3)
int Right_motor_back=10;   //(IN4)

int key=A0;//Define the key A0 interface
int beep=A1;//Define the burzer A1 interface

const int SensorRight = A2;     //Right tracking infrared sensor(P3.2 OUT1)
const int SensorLeft = A3;      //Left tracking infrared sensor(P3.3 OUT2)

const int SensorLeft_2 = A4;     //Left infrared sensor(P3.4 OUT3)
const int SensorRight_2 = A5;    //Right infrared sensor(P3.5 OUT4)

int SL;      //Left tracking infrared sensor state
int SR;      //Right tracking infrared sensor state
int SL_2;    //Left infrared sensor state
```

```
Done uploading.
Sketch uses 1638 bytes (5%) of program storage space. Maximum is 32256 bytes.
Global variables use 13 bytes (0%) of dynamic memory, leaving 2035 bytes for local variables. Maximum is 2048 bytes.
177                                                          Arduino/Genuino Uno on COM58
```

4.Please wire the Smart Car as shown below.

4.3 Infrared obstacle avoidance wiring diagram



According to the wiring diagram, the smart car can realize infrared obstacle avoidance and infrared follow-up functions after uploading the corresponding program. Before the experiment, please refer to (III. Fuctions of Usage Intstructions).

5. Put the debugged smart car in a wide area, turn on the power switch, press the start button, place the obstacle in front of the left and right infrared obstacle avoidance probe of the smart car, move the obstacle, and the smart car will follow the obstacle.