Tracking

The purpose of the experiment:

After the program is uploaded, debug BatCar's potentiometers SW1 and SW2 according to the debugging method at the end of the article, open the BatCar's power switch, press the start button K1, and after hearing the short whistle, BatCar starts to follow the previous object.

List of components required for the experiment:

BatCar*1

USB data cable*1

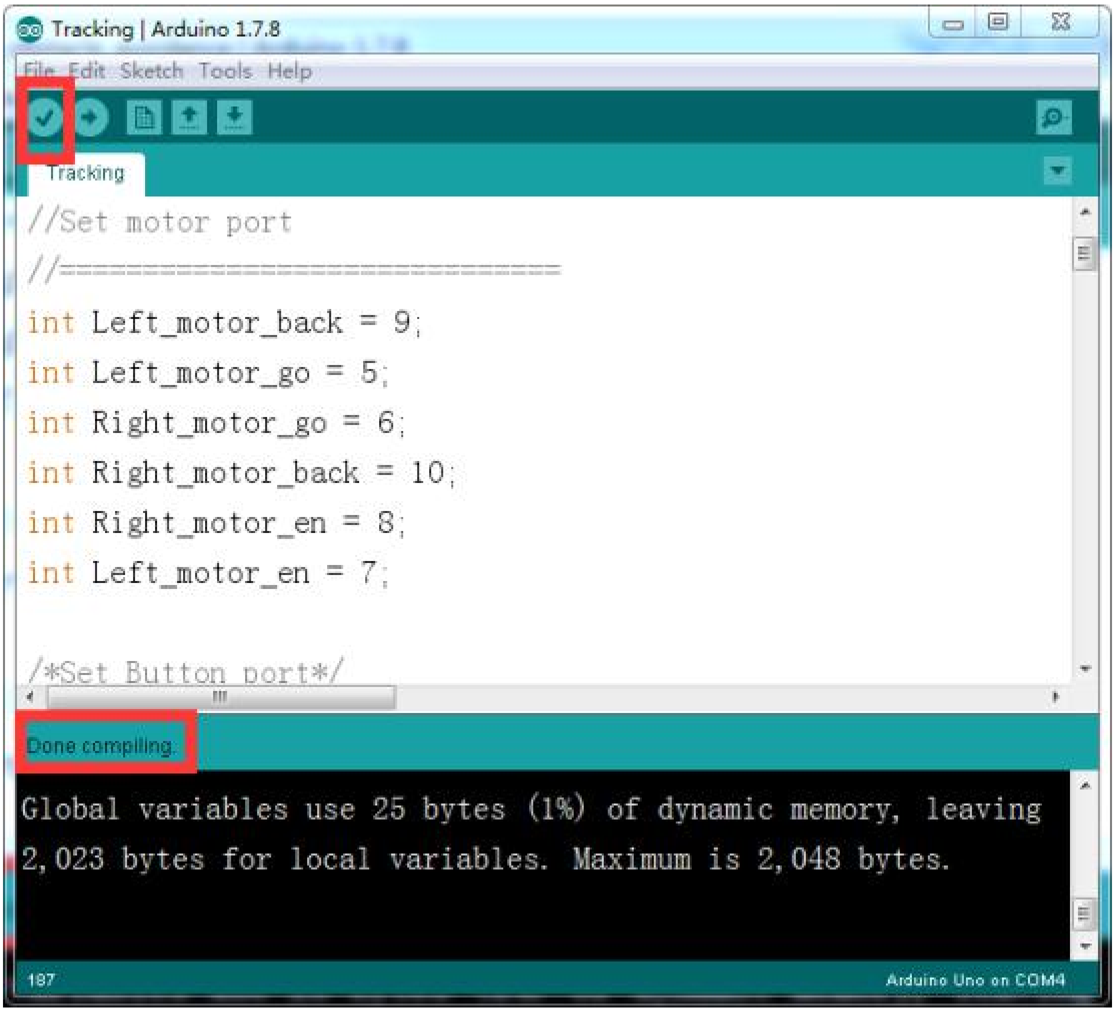
Experimental code analysis:

```
int Left_motor_back = 9;
int Left_motor_go = 5;
int Right_motor_go = 6;
int Right_motor_back = 10;
int Right_motor_en = 8;
int Left_motor_en = 7;
/*Set Button port*/
int key=4;
/*Set BUZZER port*/
int beep=3;
/*Line Walking*/
const int SensorRight = A3;     // Set Right Line Walking Infrared sensor port
const int SensorLeft = A2;      // Set Left Line Walking Infrared sensor port
int SL;     // State of Left Line Walking Infrared sensor
int SR;     // State of Right Line Walking Infrared sensor
/*Infrared obstacle avoidance*/
const int SensorRight_2 = A4;      // Right   Infrared sensor
const int SensorLeft_2 = A5;      // Left   Infrared sensor
int SL_2;     // State of Left   Infrared sensor
int SR_2;     // State of Right   Infrared sensor
void setup()
{
  //Initialize motor drive for output mode
  pinMode(Left_motor_go,OUTPUT);
  pinMode(Left_motor_back,OUTPUT);
  pinMode(Right_motor_go,OUTPUT);
  pinMode(Right_motor_back,OUTPUT);
  pinMode(key,INPUT);// Set button as input
  pinMode(beep,OUTPUT);// Set buzzer as output
  pinMode(SensorRight, INPUT); // Set Right Line Walking Infrared sensor as input
  pinMode(SensorLeft, INPUT); // Set left Line Walking Infrared sensor as input
  pinMode(SensorRight_2, INPUT); //Set Right   Infrared sensor as input
  pinMode(SensorLeft_2, INPUT); //Set left Infrared sensor as input
  digitalWrite(key,HIGH);//Initialize button
  digitalWrite(beep,HIGH);// set buzzer mute
}
//======================Motor=======================
void run()
{
  digitalWrite(Right_motor_go,HIGH);// right motor go ahead
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,100);//PWM--Pulse Width Modulation(0~255). It can be adjusted to control speed.
  analogWrite(Right_motor_back,0);
  digitalWrite(Left_motor_go,HIGH);// set left motor go ahead
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,100);//PWM--Pulse Width Modulation(0~255). It can be adjusted to control speed.
  analogWrite(Left_motor_back,0);
}
void brake() //stop
{
  digitalWrite(Right_motor_go,LOW);
  digitalWrite(Right_motor_back,LOW);
  digitalWrite(Left_motor_go,LOW);
  digitalWrite(Left_motor_back,LOW);
}
void left()//turn left
{
 digitalWrite(Right_motor_go,HIGH);  // right motor go ahead
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,100);
  analogWrite(Right_motor_back,0);// PWM--Pulse Width Modulation(0~255) control speed
  digitalWrite(Left_motor_go,LOW);     // left motor stop
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,0);
  analogWrite(Left_motor_back,0);// PWM--Pulse Width Modulation(0~255) control speed
}
void spin_left(int time)         //Left rotation
{
   digitalWrite(Right_motor_go,HIGH); // right motor go ahead
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,100); // PWM--Pulse Width Modulation(0~255) control speed
  analogWrite(Right_motor_back,0);
  digitalWrite(Left_motor_go,LOW);     // left motor back off
  digitalWrite(Left_motor_back,HIGH);
  analogWrite(Left_motor_go,0);
  analogWrite(Left_motor_back,100); // PWM--Pulse Width Modulation(0~255) control speed
  delay(time * 100);
}
void right() //turn right
{
  digitalWrite(Right_motor_go,LOW);     // right motor stop
  digitalWrite(Right_motor_back,LOW);
  analogWrite(Right_motor_go,0);
  analogWrite(Right_motor_back,0);
  digitalWrite(Left_motor_go,HIGH);// left motor go ahead
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,100);
  analogWrite(Left_motor_back,0);// PWM--Pulse Width Modulation(0~255) control speed
}
void spin_right(int time)         //Right rotation
{
  digitalWrite(Right_motor_go,LOW);    // right motor back off
  digitalWrite(Right_motor_back,HIGH);
  analogWrite(Right_motor_go,0);
  analogWrite(Right_motor_back,200);// PWM--Pulse Width Modulation(0~255) control speed
  digitalWrite(Left_motor_go,HIGH);// left motor go ahead
  digitalWrite(Left_motor_back,LOW);
  analogWrite(Left_motor_go,200);
  analogWrite(Left_motor_back,0);// PWM--Pulse Width Modulation(0~255) control speed
  delay(time * 100);
}
void back(int time)   //back off
{
  digitalWrite(Right_motor_go,LOW);   //right motor back off
  digitalWrite(Right_motor_back,HIGH);
  analogWrite(Right_motor_go,0);
  analogWrite(Right_motor_back,150);// PWM--Pulse Width Modulation(0~255) control speed
  digitalWrite(Left_motor_go,LOW);   //left motor back off
  digitalWrite(Left_motor_back,HIGH);
  analogWrite(Left_motor_go,0);
  analogWrite(Left_motor_back,150);// PWM--Pulse Width Modulation(0~255) control speed
  delay(time * 100);
}
//==========================================================

void keysacn()
{
  int val;
  val=digitalRead(key);// Reads the button ,the level value assigns to val
  while(digitalRead(key))// When the button is not pressed
  {
    val=digitalRead(key);
  }
  while(!digitalRead(key))// When the button is pressed
  {
   delay(10); //delay 10ms
    val=digitalRead(key);// Reads the button ,the level value assigns to val
    if(val==LOW)   //Double check the button is pressed
    {
      digitalWrite(beep,LOW);//The buzzer sounds
      delay(50);//delay 50ms
    while(!digitalRead(key))  //Determine if the button is released or not
        digitalWrite(beep,HIGH);//mute
    }
    else
      digitalWrite(beep,HIGH);//mute
  }
}
/*main loop*/
void loop()
{
  keysacn();    //Press the button to start
  while(1)
  {
  /*********************************************************************************************
  Infrared signal back means there is something obstacled ,returns low level
and led lights up.
  Infrared signal gone means there is nothing obstacled ,returns high level and
led lights off.
  *********************************************************************************************/

    SR_2 = digitalRead(SensorRight_2);//Right infrared sensor detects the
obstacle,then LED[L5] light illuminates and otherwise it goes off.
```

```
    SL_2 = digitalRead(SensorLeft_2);//Left infrared sensor detects the obstacle,then LED[L4] light illuminates and otherwise it goes off.
    if (SL_2 == LOW&&SR_2==LOW)// Black lines were not detected at the same time
      run();    // go ahead
    else if (SL_2 == HIGH & SR_2 == LOW)// Left sensor against white undersurface and right against black undersurface , the car left off track and need to adjust to the right.
      right();
    else if (SR_2 == HIGH & SL_2 == LOW) // Rihgt sensor against white undersurface and left against black undersurface , the car right off track and need to adjust to the left.
      left();
    else   // Black lines were detected at the same time , the car stop.
    brake();
  }
}
```

Experimental steps:

1. We need to open the code of this experiment: **Tracking.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.

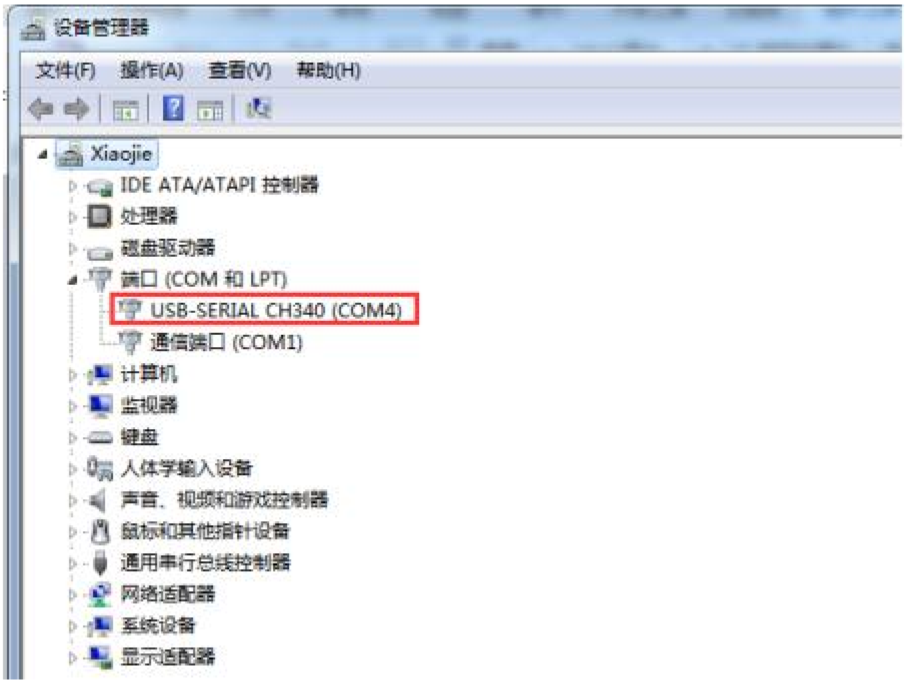


```
//Set motor port
//==============================
int Left_motor_back = 9;
int Left_motor_go = 5;
int Right_motor_go = 6;
int Right_motor_back = 10;
int Right_motor_en = 8;
int Left_motor_en = 7;

/*Set Button port*/
```

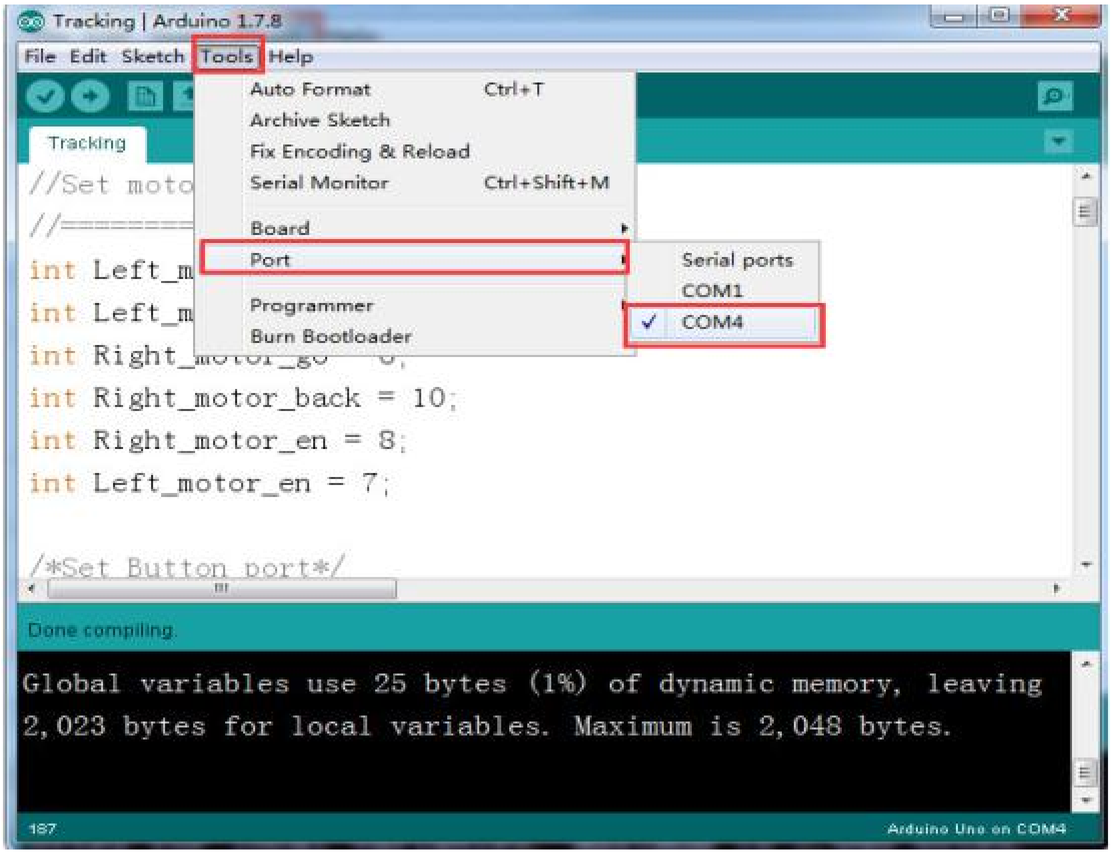
Done compiling.

```
Global variables use 25 bytes (1%) of dynamic memory, leaving
2,023 bytes for local variables. Maximum is 2,048 bytes.
```

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.



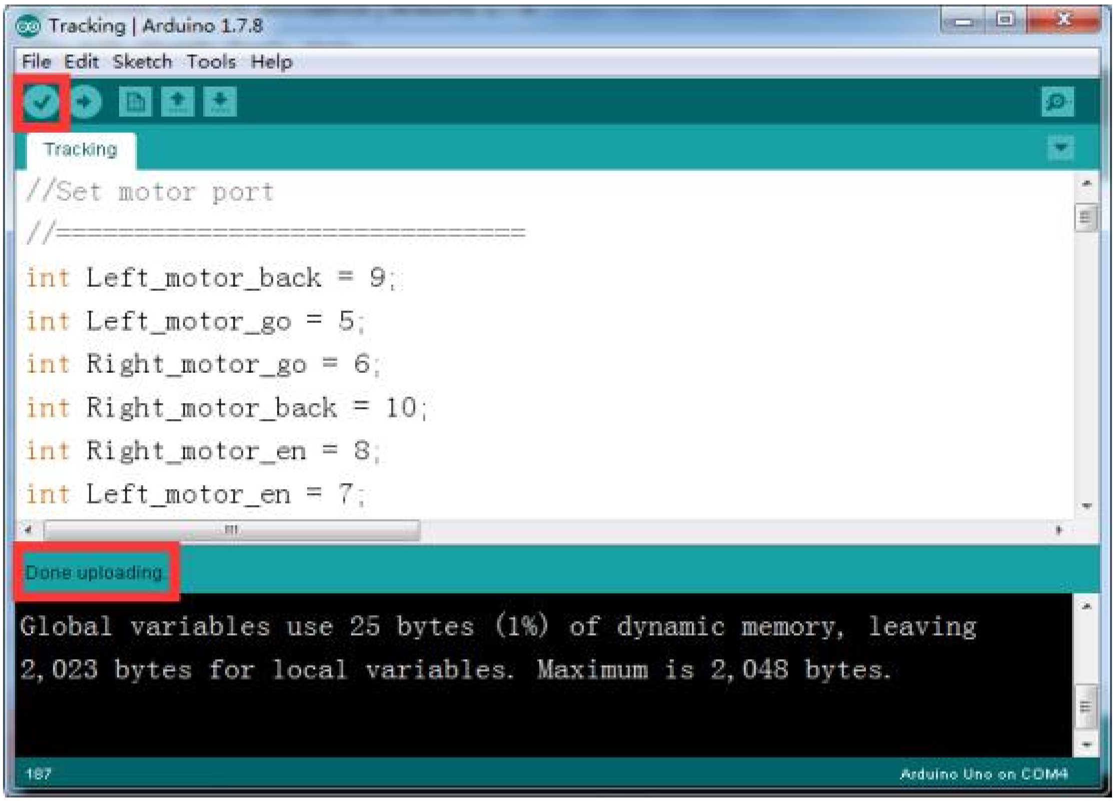
Xiaojie
- IDE ATA/ATAPI 控制器
- 处理器
- 磁盘驱动器
- 端口 (COM 和 LPT)
  - USB-SERIAL CH340 (COM4)
  - 通信端口 (COM1)
- 计算机
- 监视器
- 键盘
- 人体学输入设备
- 声音、视频和游戏控制器
- 鼠标和其他指针设备
- 通用串行总线控制器
- 网络适配器
- 系统设备
- 显示适配器



```
//Set moto
//========
int Left_m
int Left_m
int Right_motor_go = 6;
int Right_motor_back = 10;
int Right_motor_en = 8;
int Left_motor_en = 7;

/*Set Button port*/
```

```
Global variables use 25 bytes (1%) of dynamic memory, leaving
2,023 bytes for local variables. Maximum is 2,048 bytes.
```

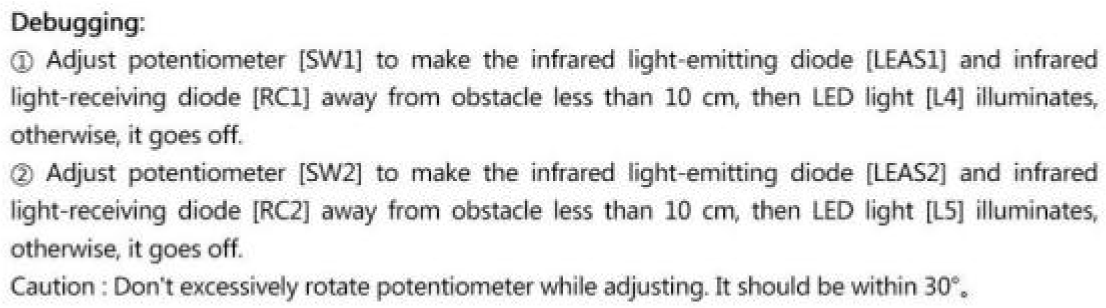
3. After the selection is completed, you need to click “→”under the menu bar to upload the code to the Arduino UNO board. When the word “**Done uploading**” appears in the lower left corner, the code has been successfully uploaded to the Arduino UNO board, as shown in the figure below.



```
//Set motor port
//==============================
int Left_motor_back = 9;
int Left_motor_go = 5;
int Right_motor_go = 6;
int Right_motor_back = 10;
int Right_motor_en = 8;
int Left_motor_en = 7;
```

```
Global variables use 25 bytes (1%) of dynamic memory, leaving
2,023 bytes for local variables. Maximum is 2,048 bytes.
```

4. After the program download is successful, debug potentiometers SW1 and SW2 as shown below.

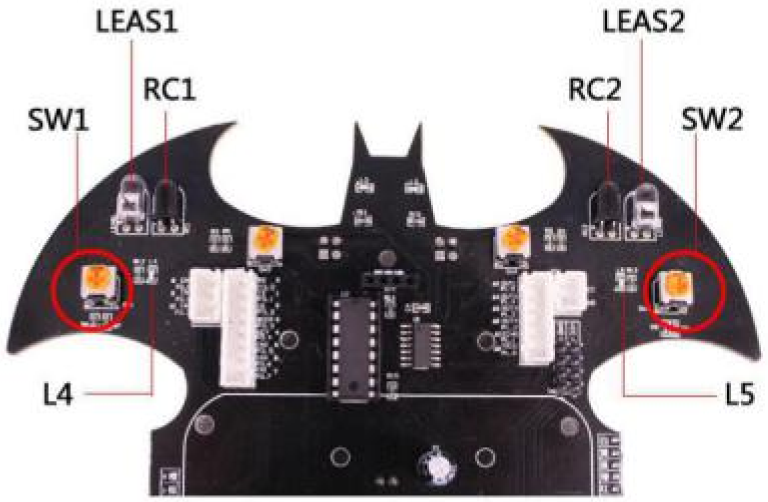


Debugging:

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

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

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



5.Turn on the BatCar's power switch, press the start button K1, and after hearing the whistle, BatCar starts to follow the previous object.