Arduino Smart little turtle Manual

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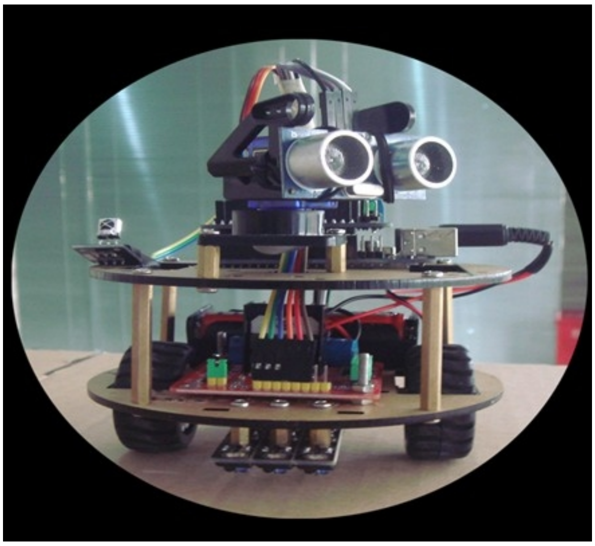


1.Brief introduction:

Arduino smart little turtle car is a MCU learning application development system.The arduino microcontroller series Atmega-328 as the core.Finish tracking,obstacle voidance,infrared remote and bluetooth function.This kits include a large of interesting code and extensible external circuit module.Thus increase more function.

2.Parameter:

1>.Motor parameter:
Voltage:1.5V-12V.
Motor axial length:10mm.
Rotate speed:100rpm/min(6V).
2>.L298N driver motor ,solate form MCU;
3>.Three channels tracking module,check black and white wire;
4>.Infrared remote control communication module,consist of remote system of smart car;
5>.Ultrasonic module is used in obstacle avoidance;
6>.Bluetooth wireless module,it can remote control smart car with mobile phone;
7>.It can be connect to 7V-12V power,can connect to more sensors as you can imagine.

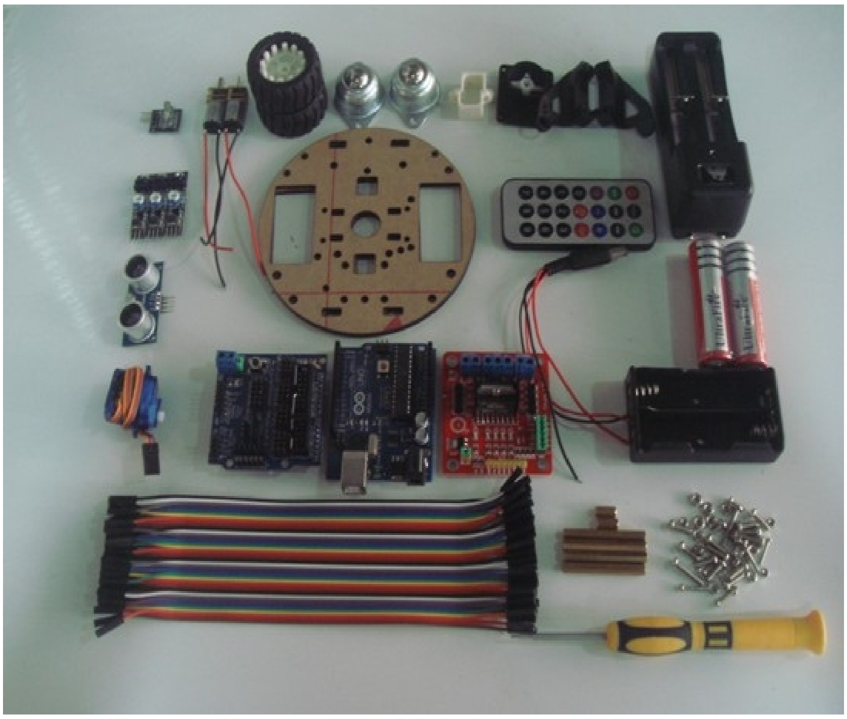
3.Experiment course introduction:

1>.Application of L298N motor driver module;
2>.Tracking smart car;
3>.Ultrasonic obstacle avoidance smart car;
4>.Infrared remote control smart car;
5>.Arduino bluetooth programmable smart car;
6>.Four functions in one code multifunction code.

4.Listing:

1>.Metal gear motor x2
2>.Wheel x2
3>.Motor fixed part x2
4>.Universal wheel x1
5>.Chassis x2
6>.L298N motor driver module x1
7>.Arduino UNO controller x1
8>.Arduino sensor shield x1
9>.PTZ x1
10>.Servo motor x1
11>.Ultrasonic module x1
12>.Three channels tracking module x1
13>.Infrared receive sensor x1
14>.Remote control x1
15>.2000MA 18650 battery x2
16>.18650 battery box x1
17>.18650 battery charger x1
18>.Dupont line 1P x40
19>.M3*35mm copper cylinder x4
20>.M3*10mm copper cylinder x2
21>.M3 screw and nut severals

5.Install instruction:



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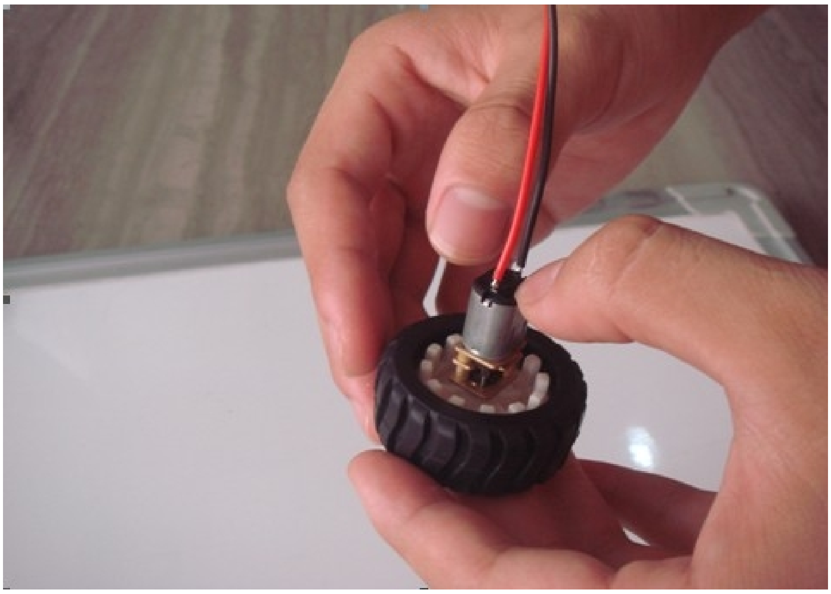
Step 1: connect gear motor and wheel.



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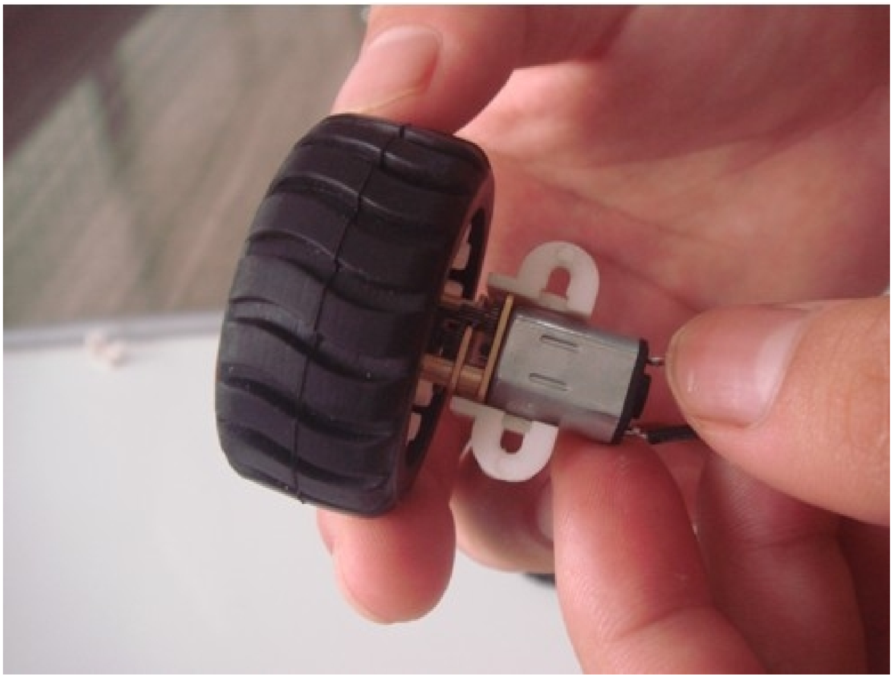
Step 2: install motor fixed parts.



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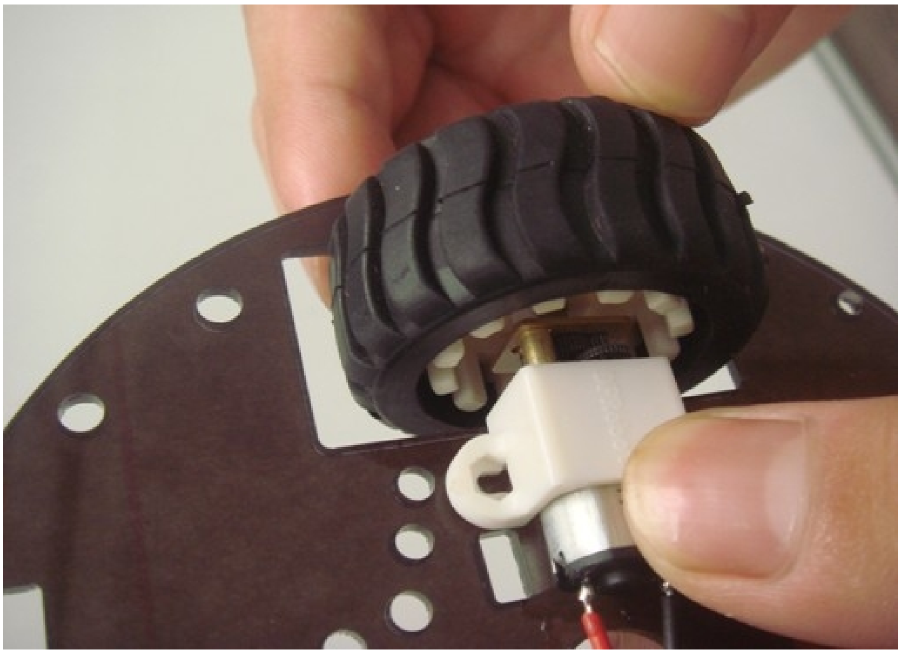
Step 3: install motor to chassis.



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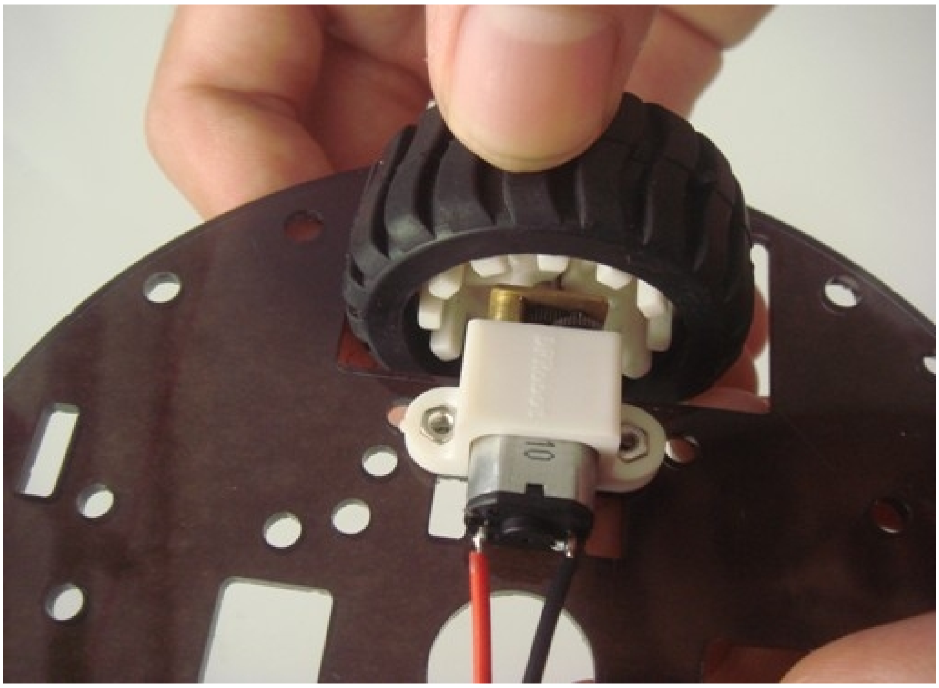
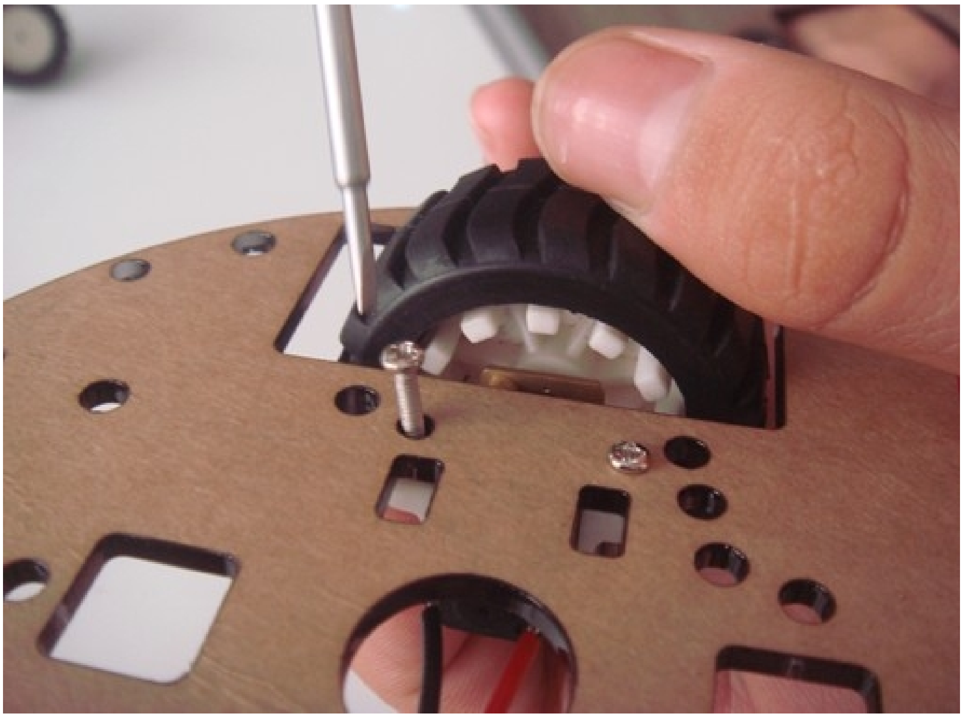
Step 4: fixed motor with nuts and screws.





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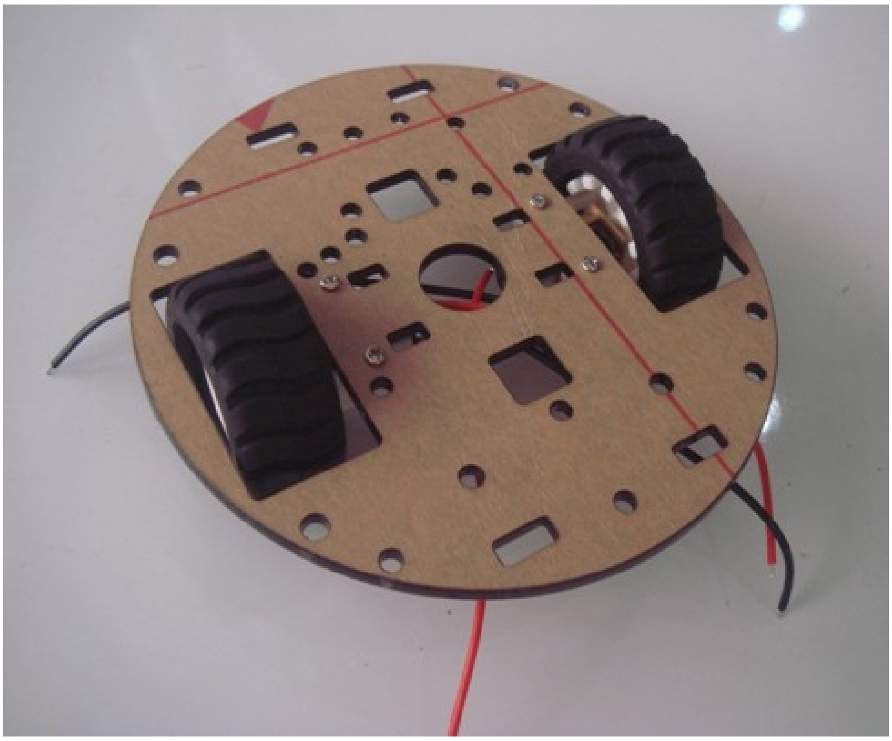
Step 5:   repeat steps above ,install another wheel and motor.



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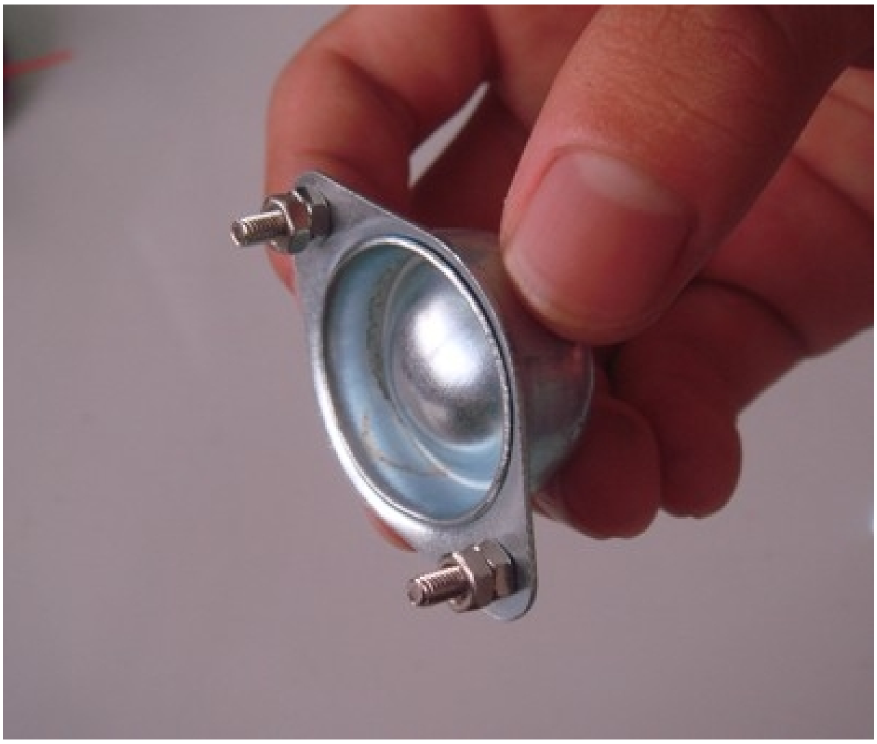
Step 6:   prepare universal wheel.



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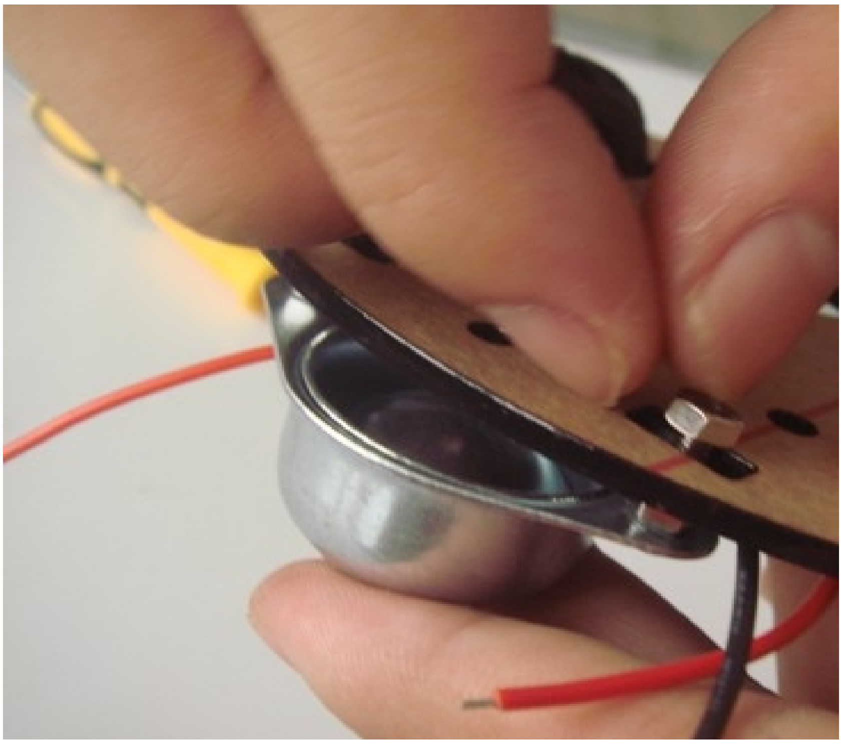
Step 7: fixed universal wheel.



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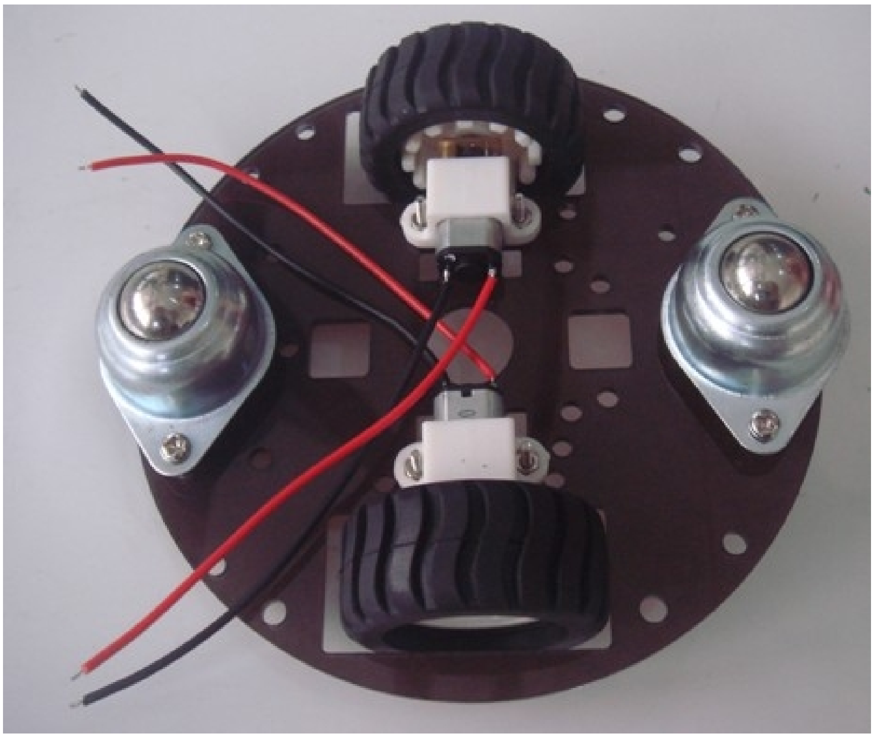
Step 8: repeat steps above ,install another universal wheel.



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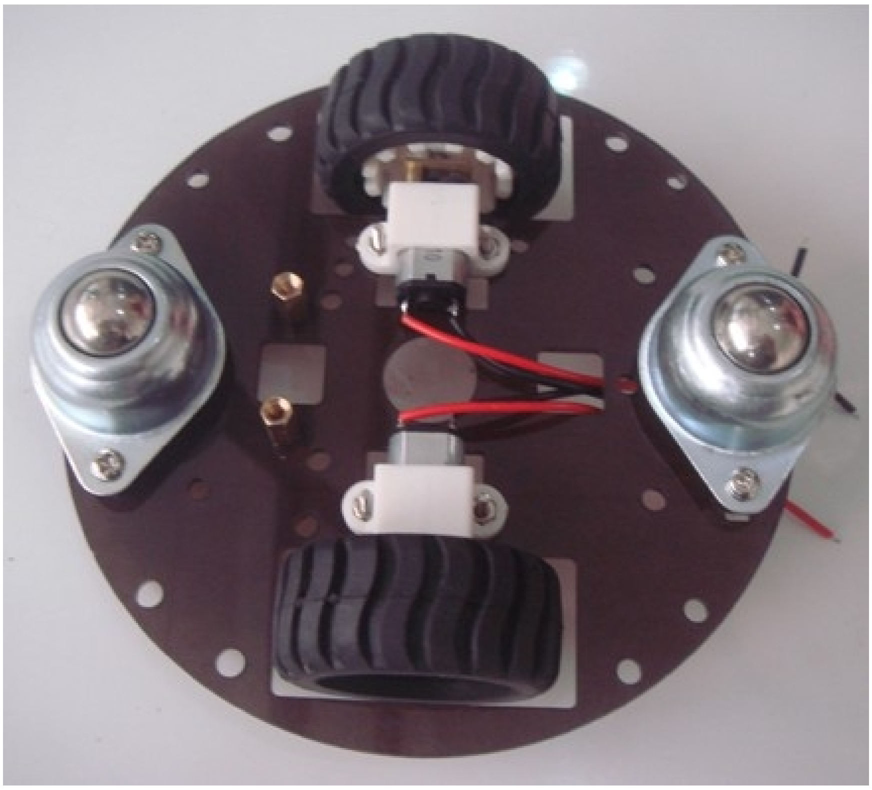
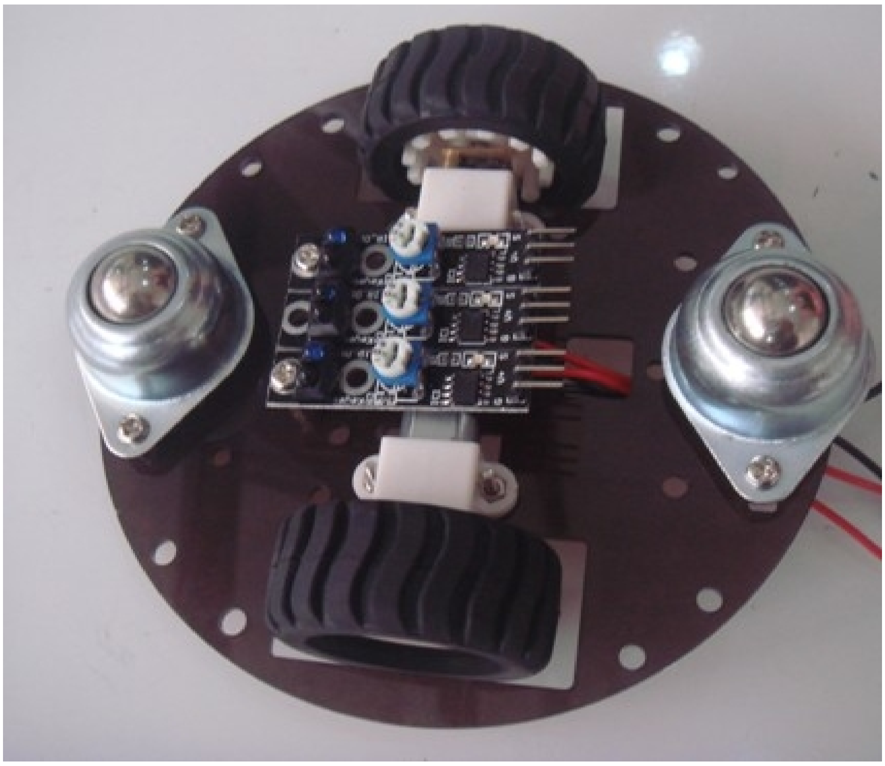
Step 9: install three channels tracking module.





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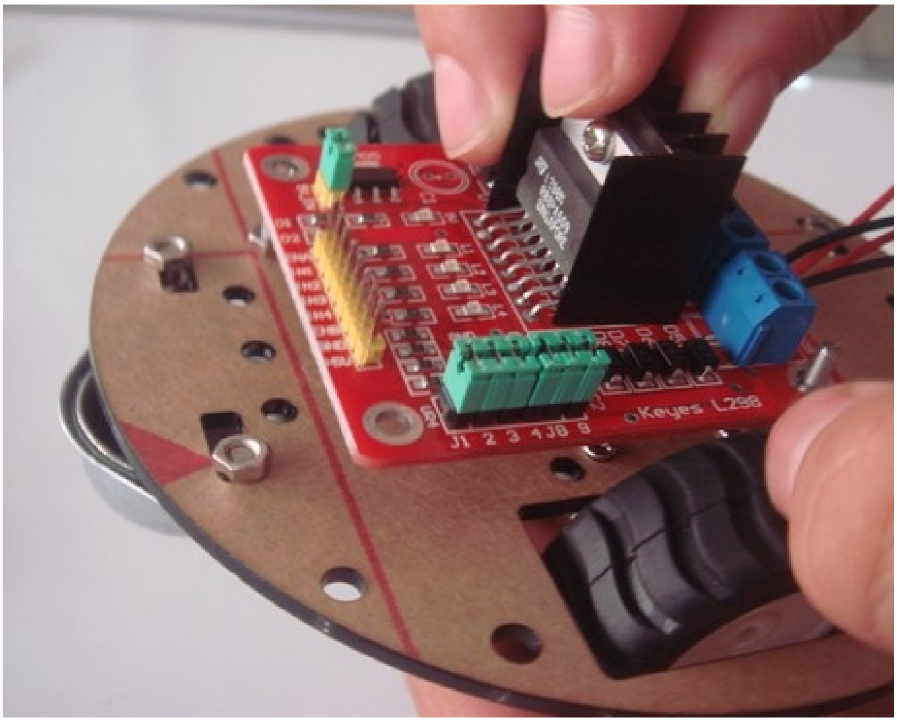
Step 10: install L298N module.



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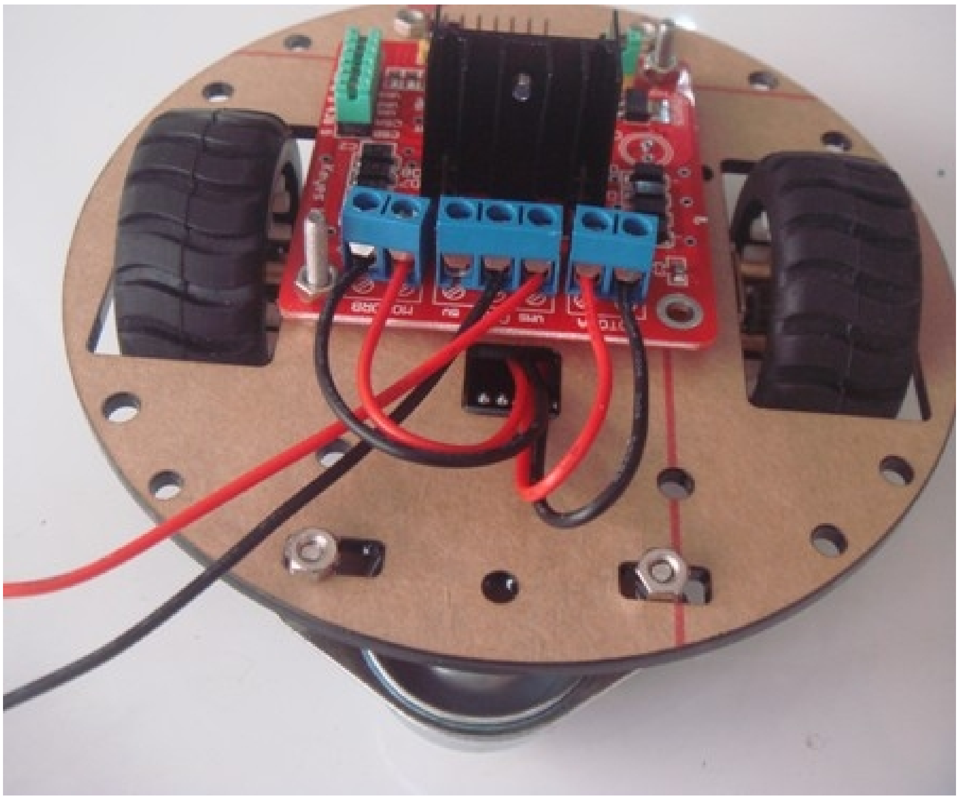
Step 11:connect right wire of motor and battery box.The positive pole of battery box connect to VMS of L298N module.The negative pole of battery box connect to GND of L298N module.



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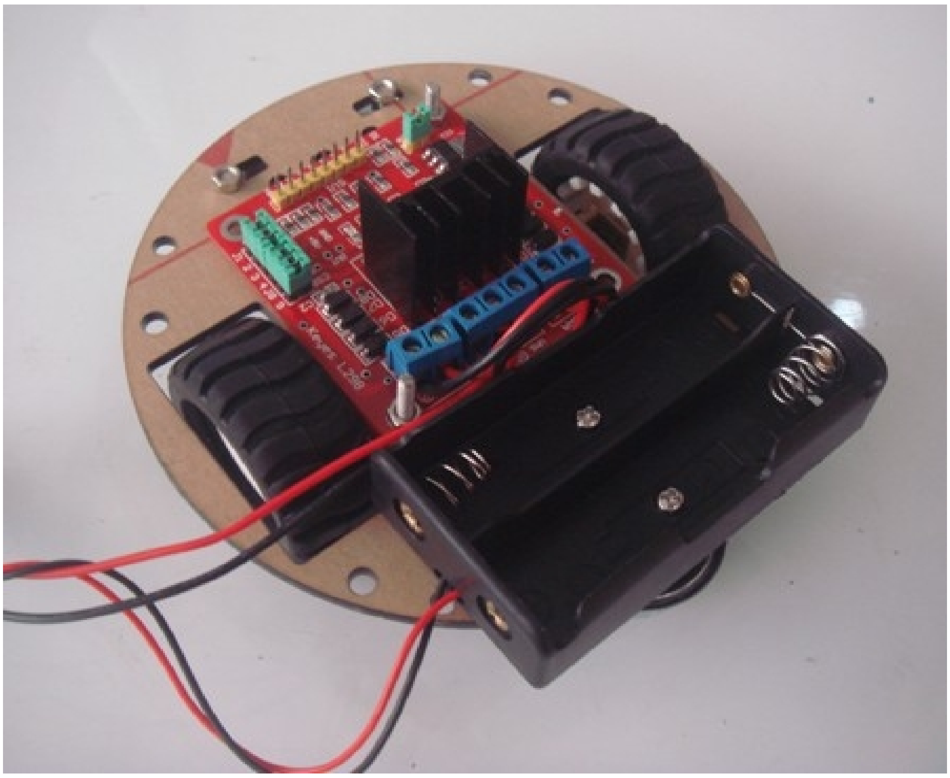
Step 12:install 18650 battery box with screw.



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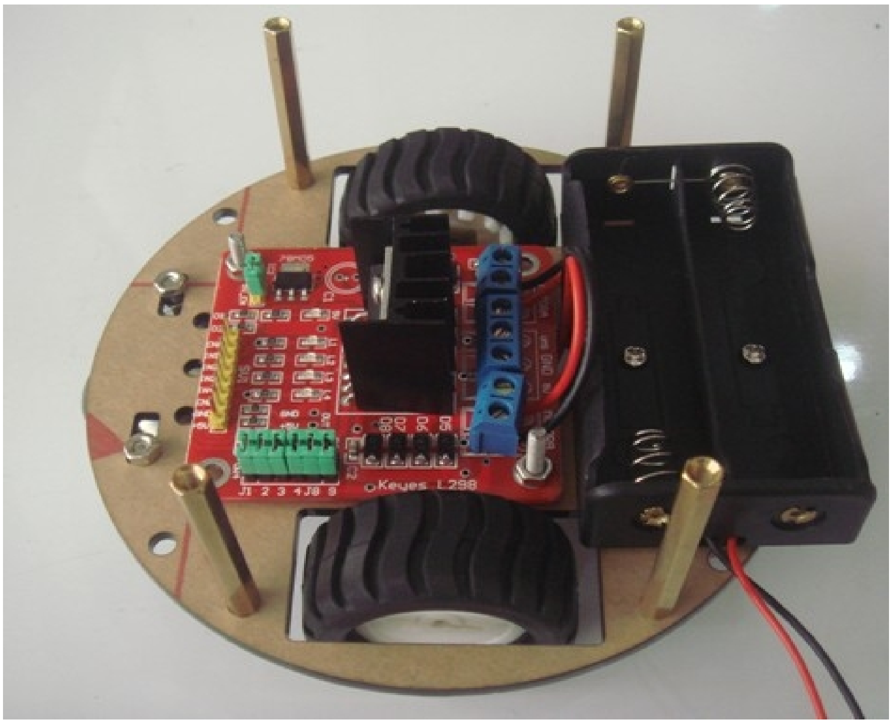
Step 13:install four M3*35mm copper cylinders for second chassis.



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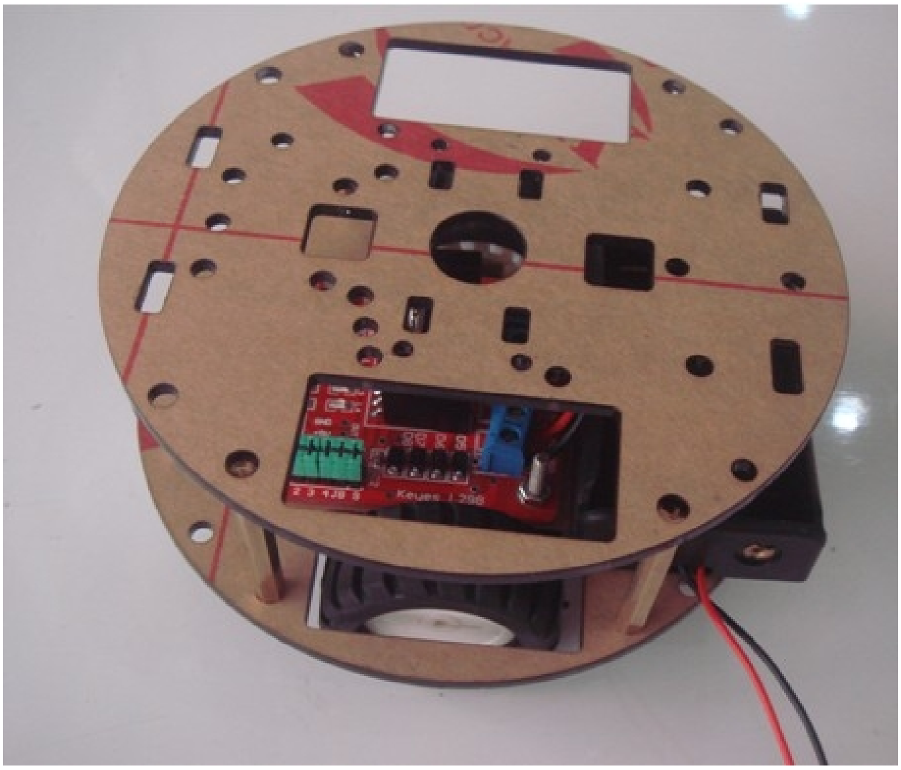
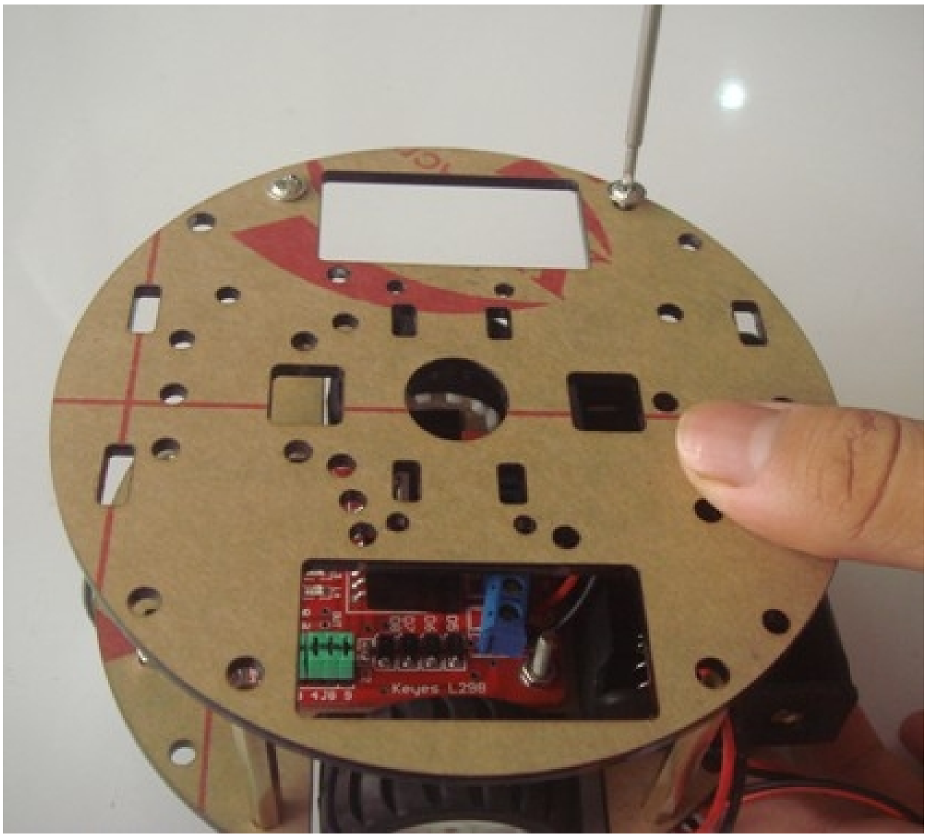
Step 14:install chassis.





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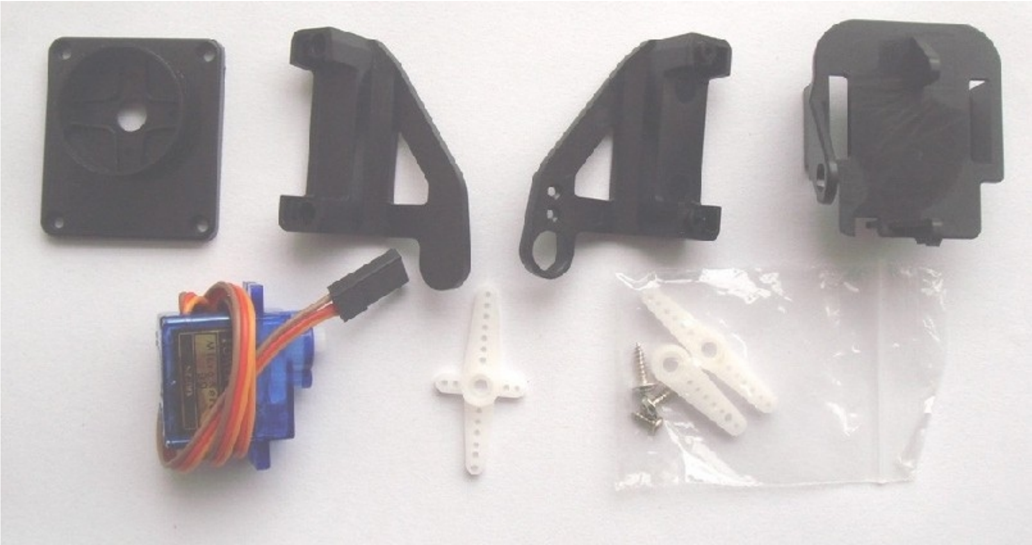
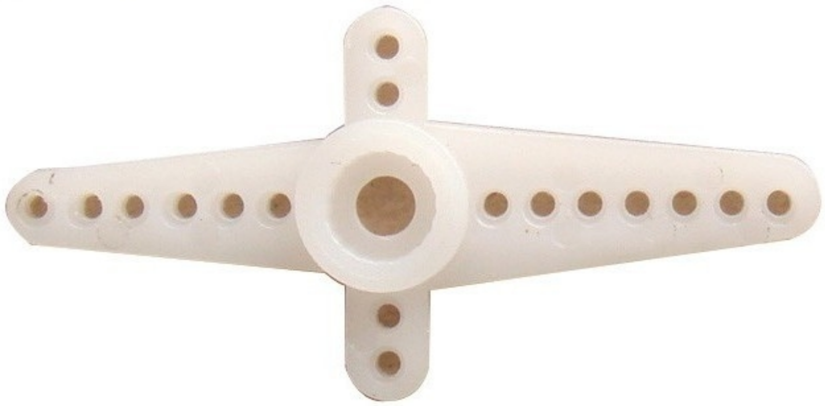
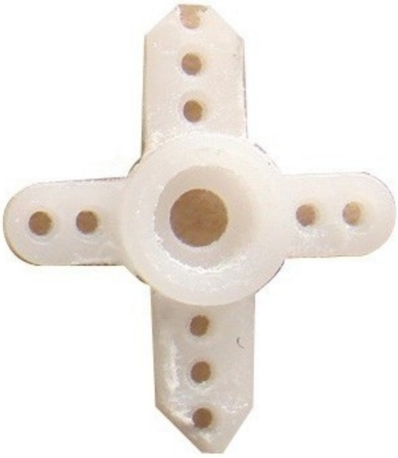
Step 15:install PTZ

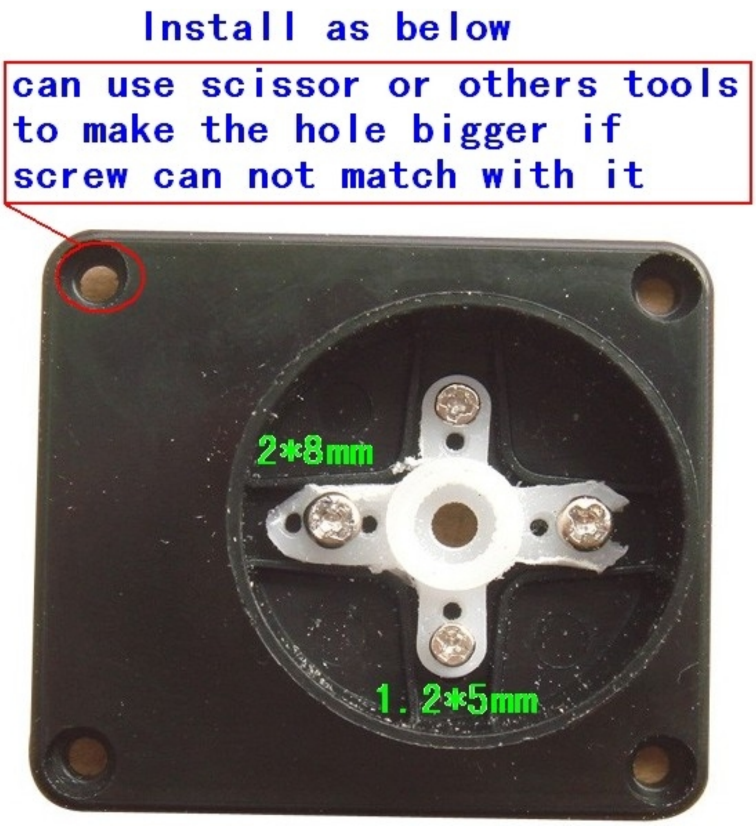


Pick up the cross colloid from accessory of serve



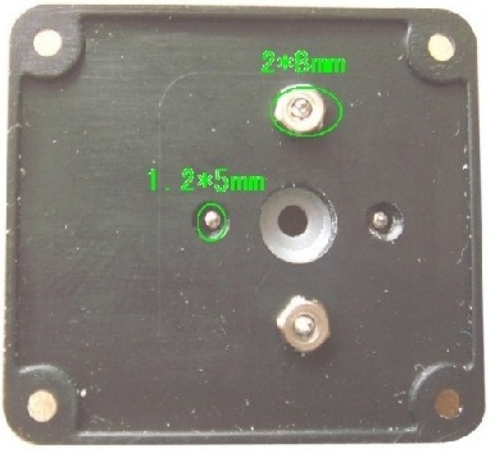
Process like below with Scissors and knives and some others tools

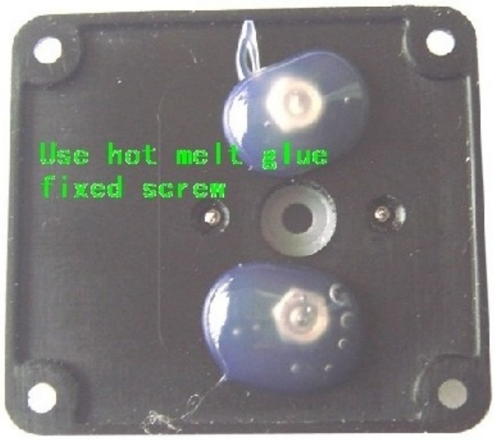




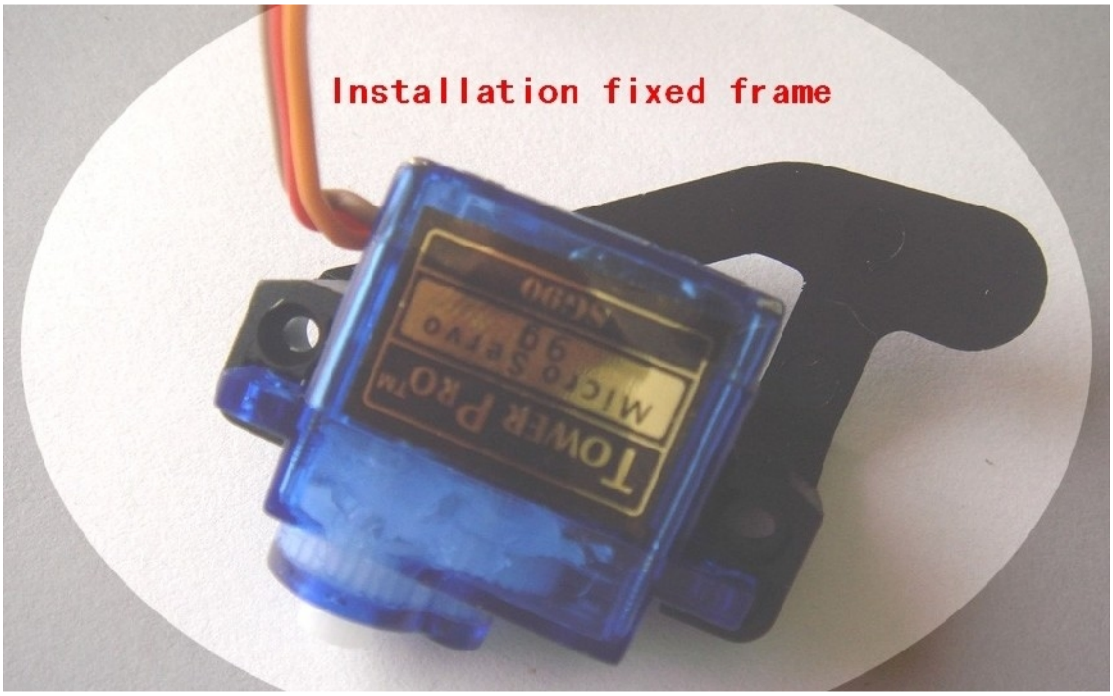
Install as below

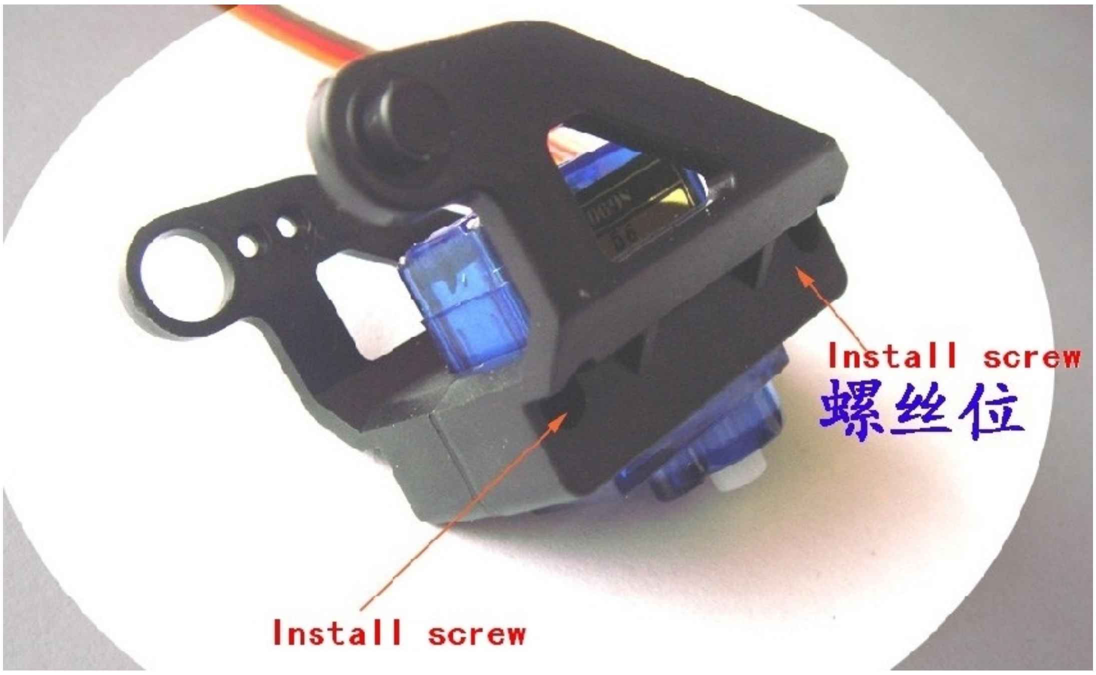
can use scissor or others tools to make the hole bigger if screw can not match with it

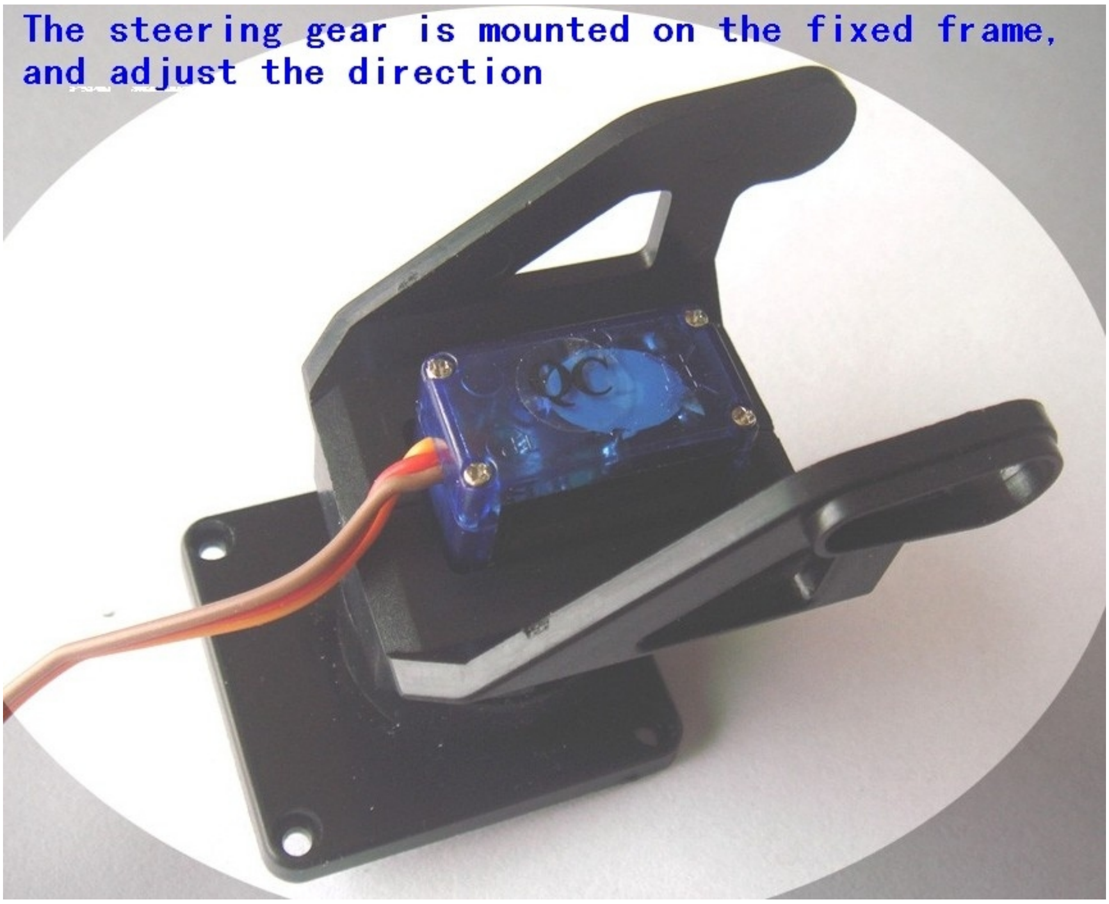




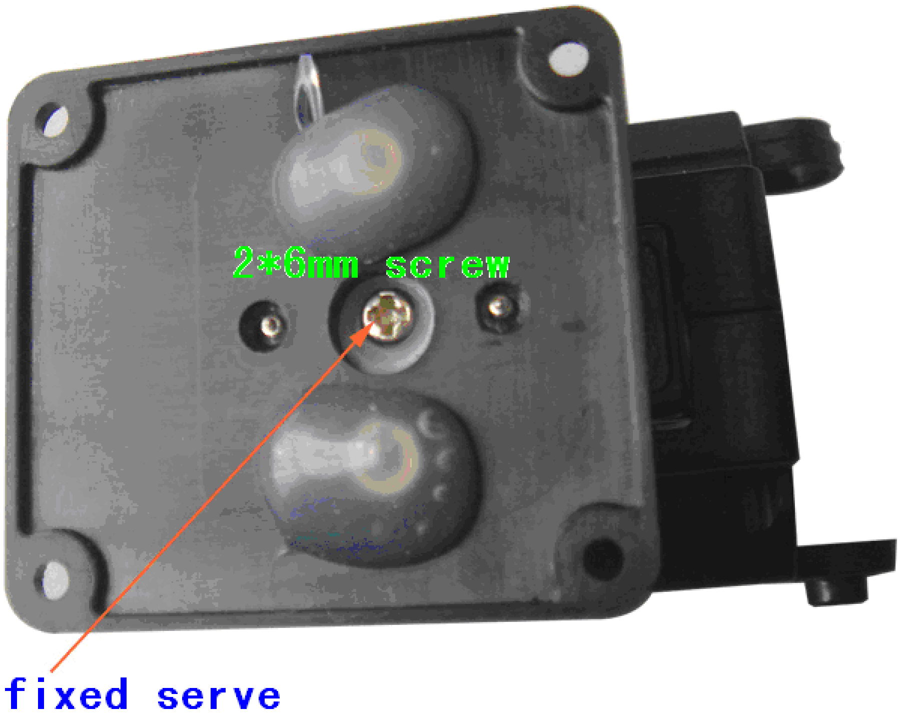
Use hot melt glue fixed screw

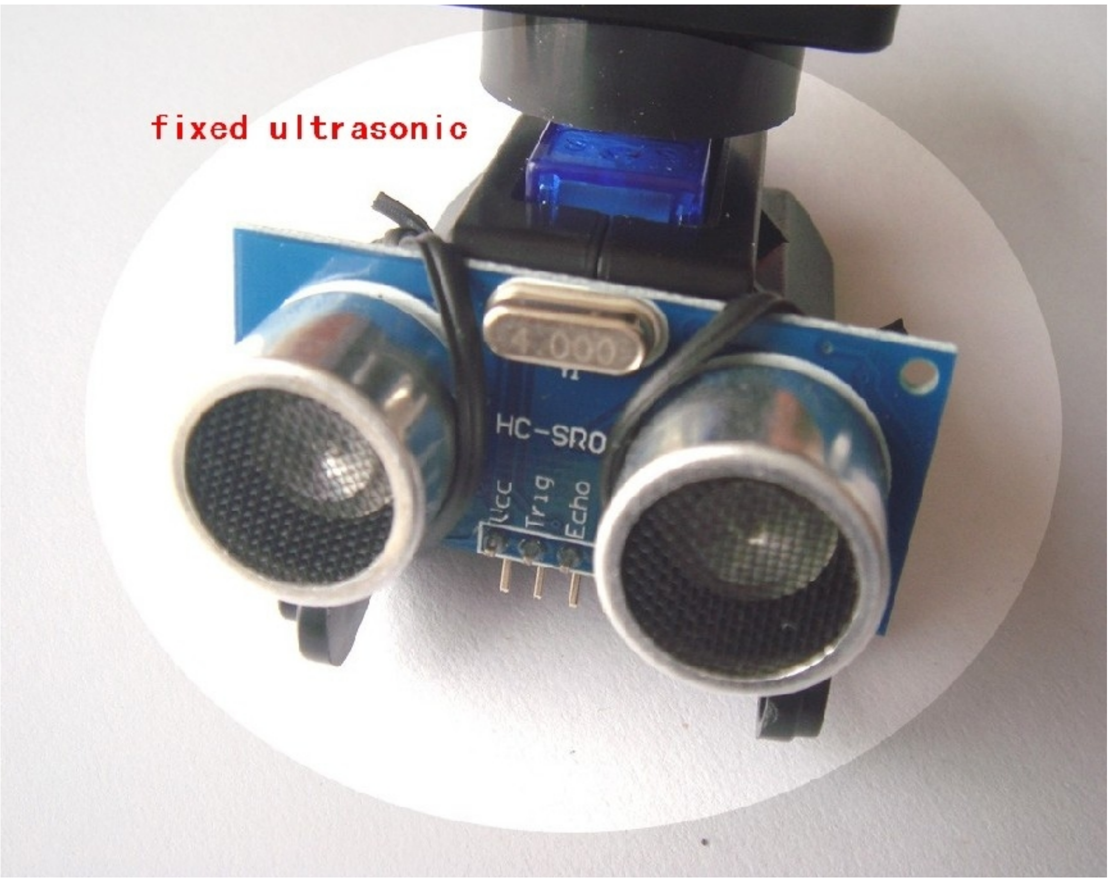

Installation fixed frame
TOWER PRO™
Micro Servo
9g
SG90

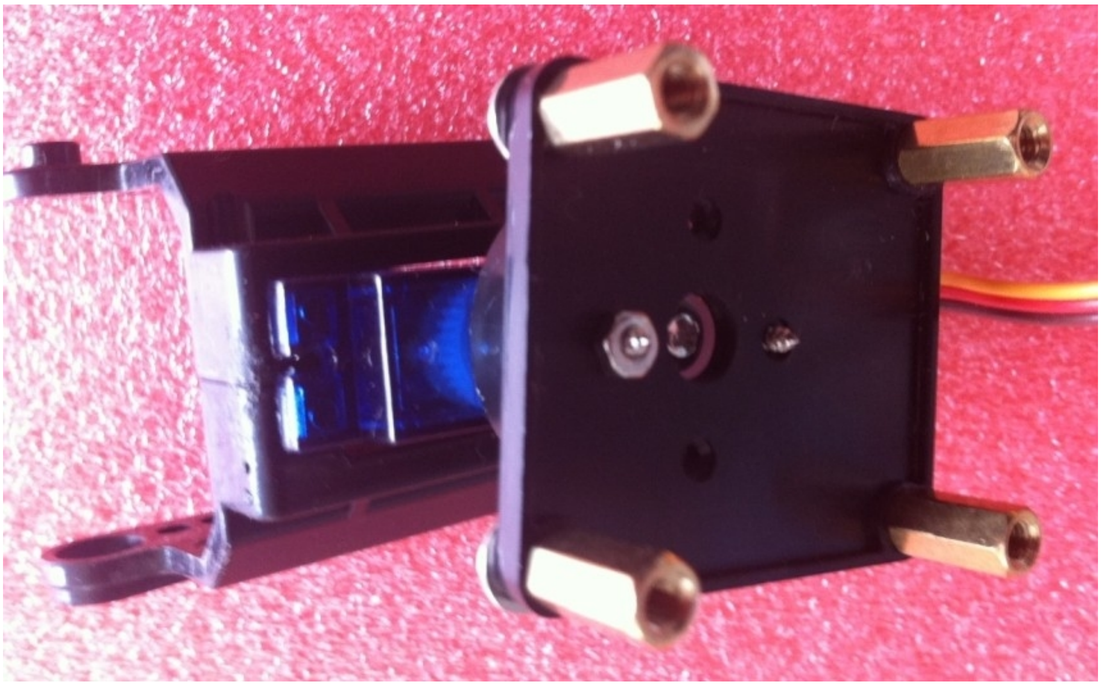

Install screw
螺丝位
Install screw

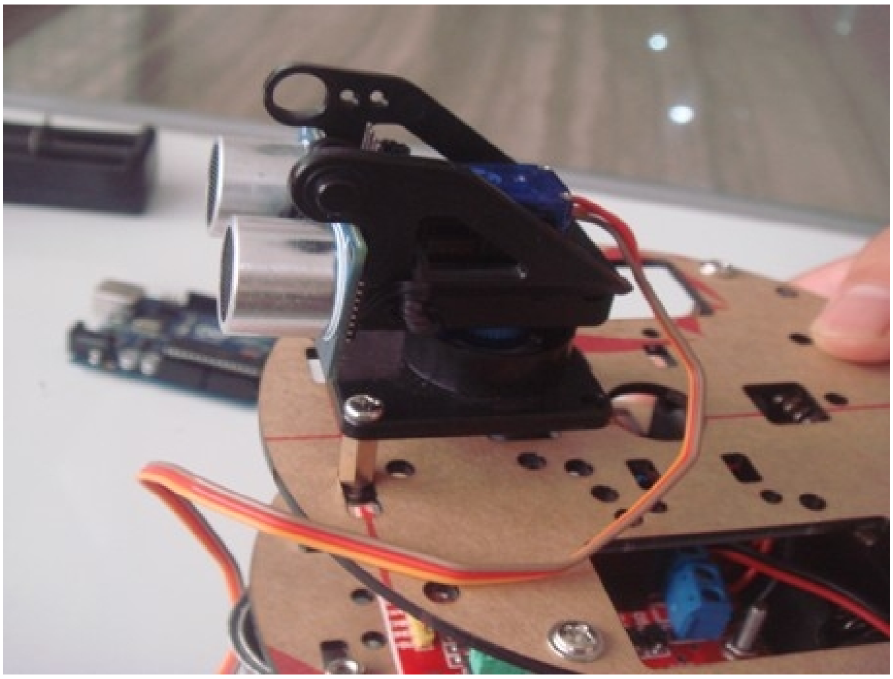


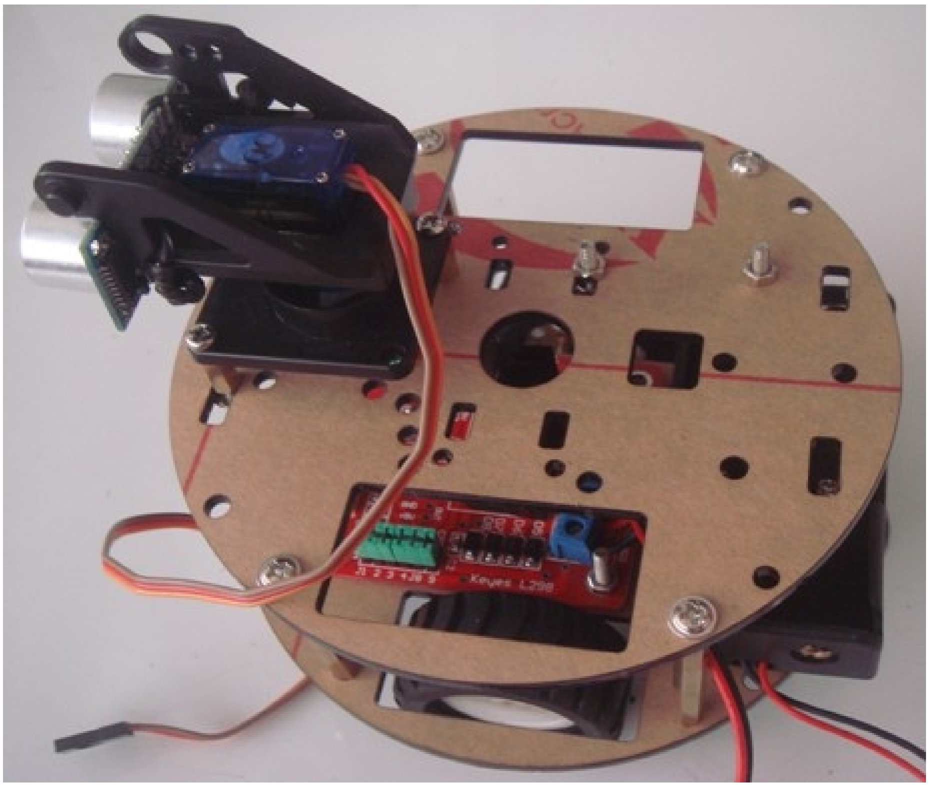
The steering gear is mounted on the fixed frame, and adjust the direction




fixed ultrasonic
4.000
HC-SR0
Vcc
Trig
Echo







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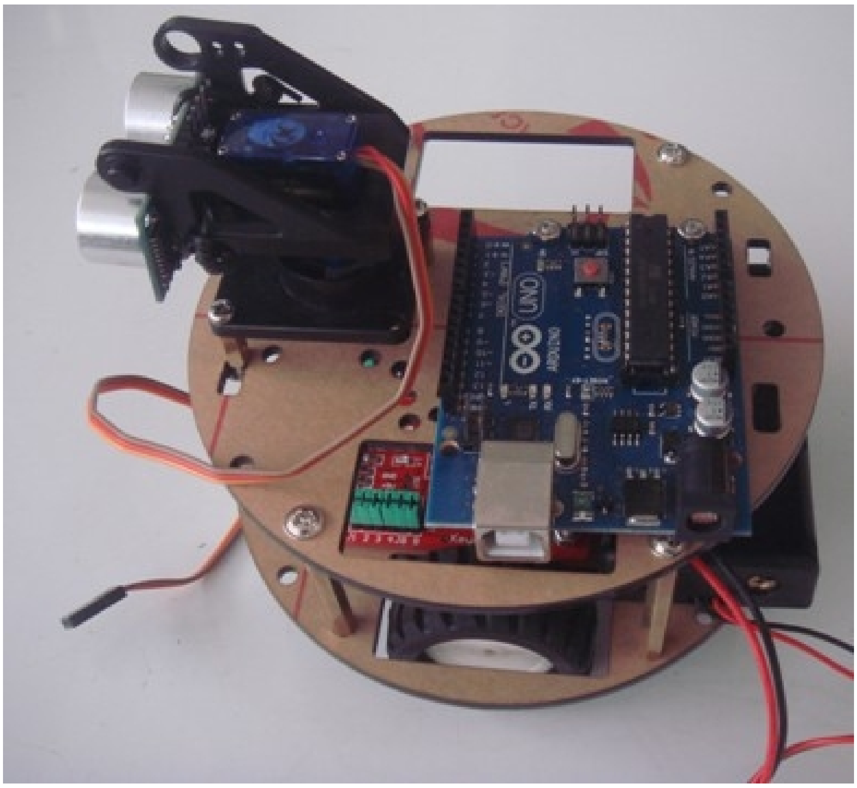
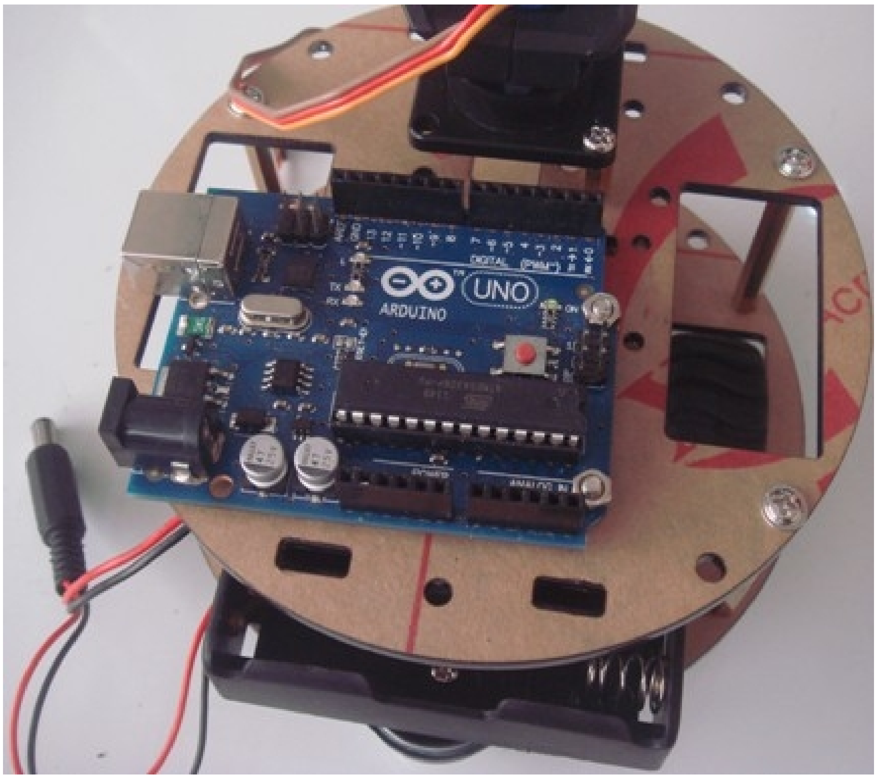
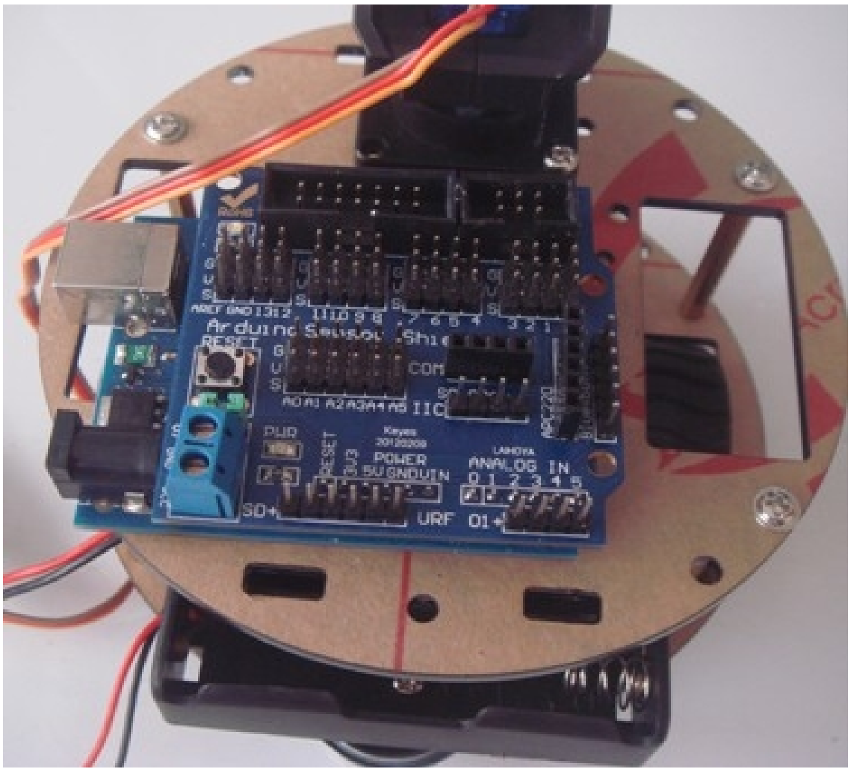
Step 16:install arduino uno controller.







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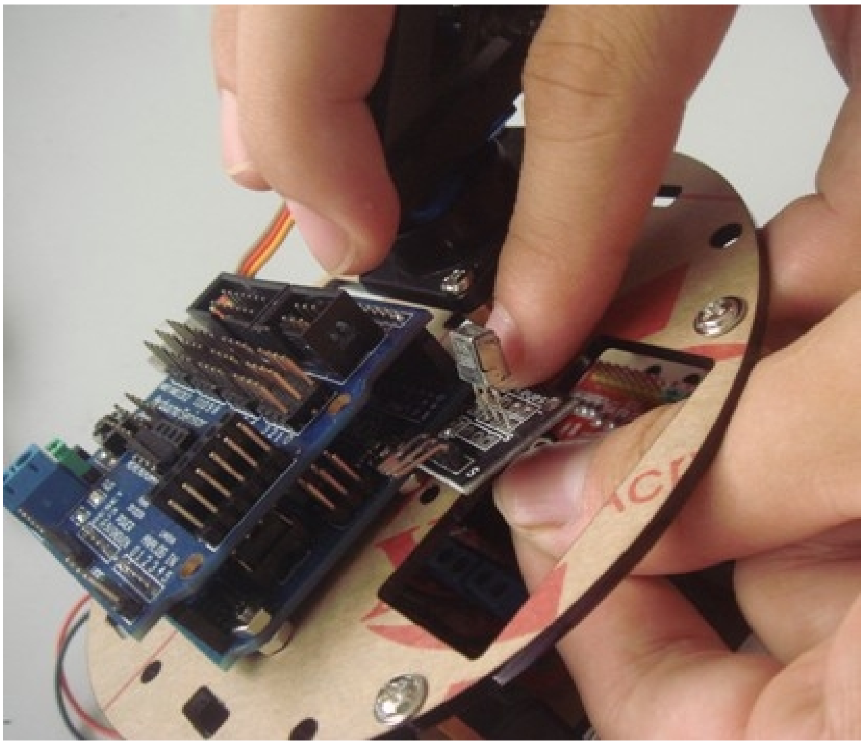
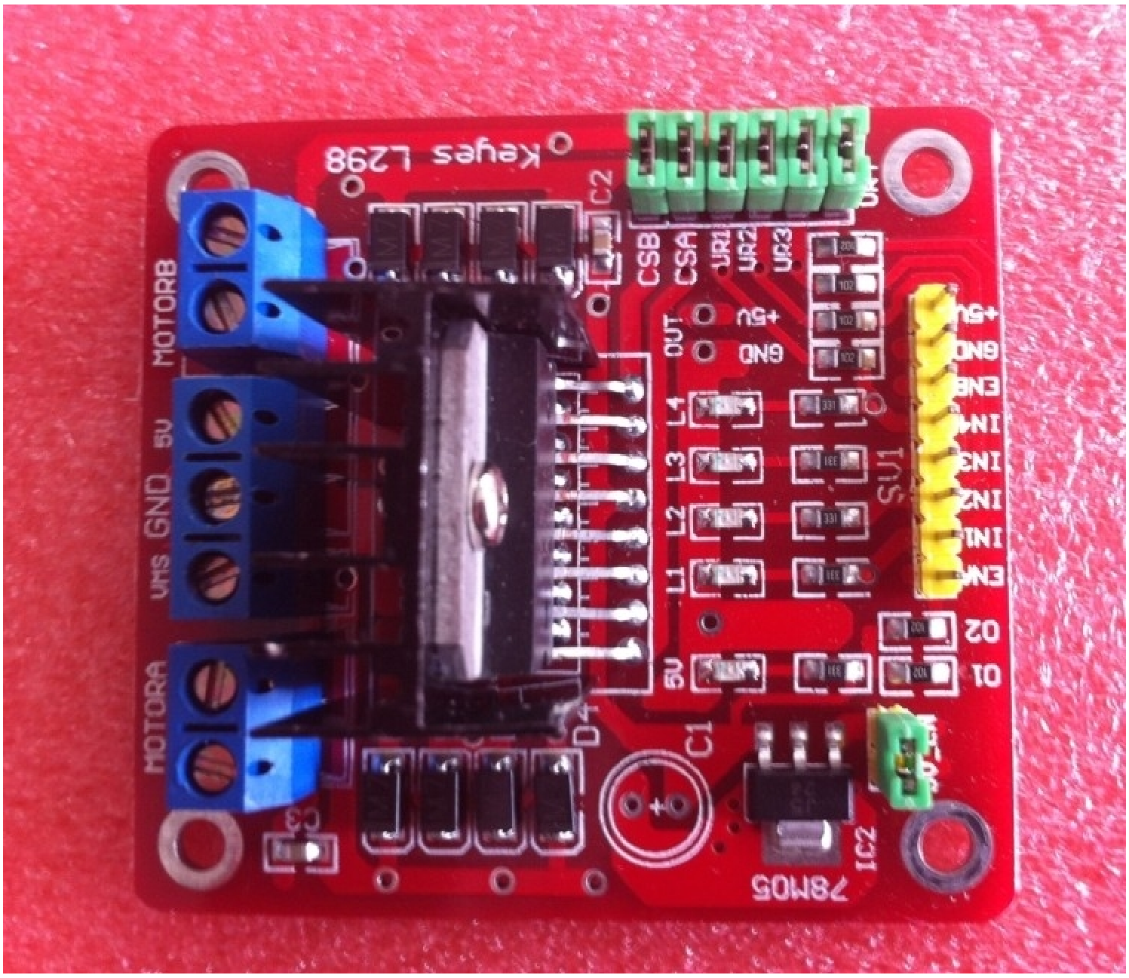
Step 17:install infrared remote control module.for new ,we have install this car.



6.Experiment in detail:

1>.L298N motor driver module



ENA(yellow in picture):

1(5V/PWM):enable motor A

0(GND/PWM):disenable motor A

IN1 to 5V,IN2 to GND,motor A
corotation IN1 to GND,IN2 to 5V,motor
A rollback ENB(yellow in picture):
1(5V/PWM):enable motor B

0(GND/PWM):disenable motor B

IN3 to 5V,IN4 to GND,motor A corotation

IN3 to GND,IN4 to 5V,motor A rollback

5V_EN(green in picture):

If use the jumper, chip 78 m05 provide power supply for modules

If do not use jumper, need to use 5v-pin & GND-pin provides power supply module for modules

CSA/CSB(green in picture):

Current test pins for motor A/B,can series connection resistance

If do not use jumper, detection of the current

If use the jumper,not detect current

UR1-UR4(green in picture)

Choose whether to use pull-up resistor

For I/O port driver ability of microcontroller, can short circuit, using pull-up resistor

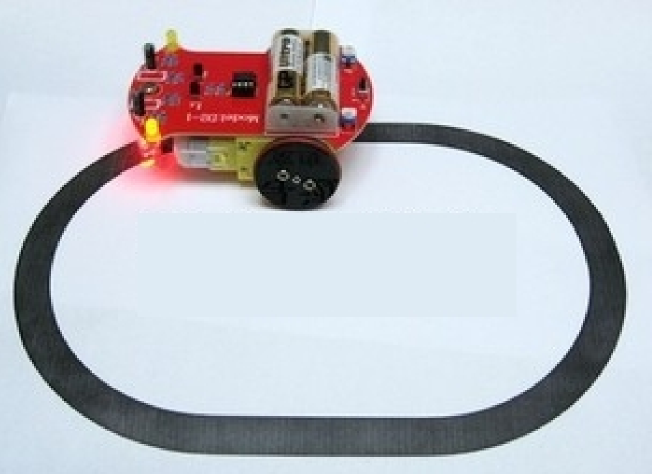
If use the jumper, Do not use the pull-up resistor.
If do not use jumper ,use the pull-up resistor

Test code:

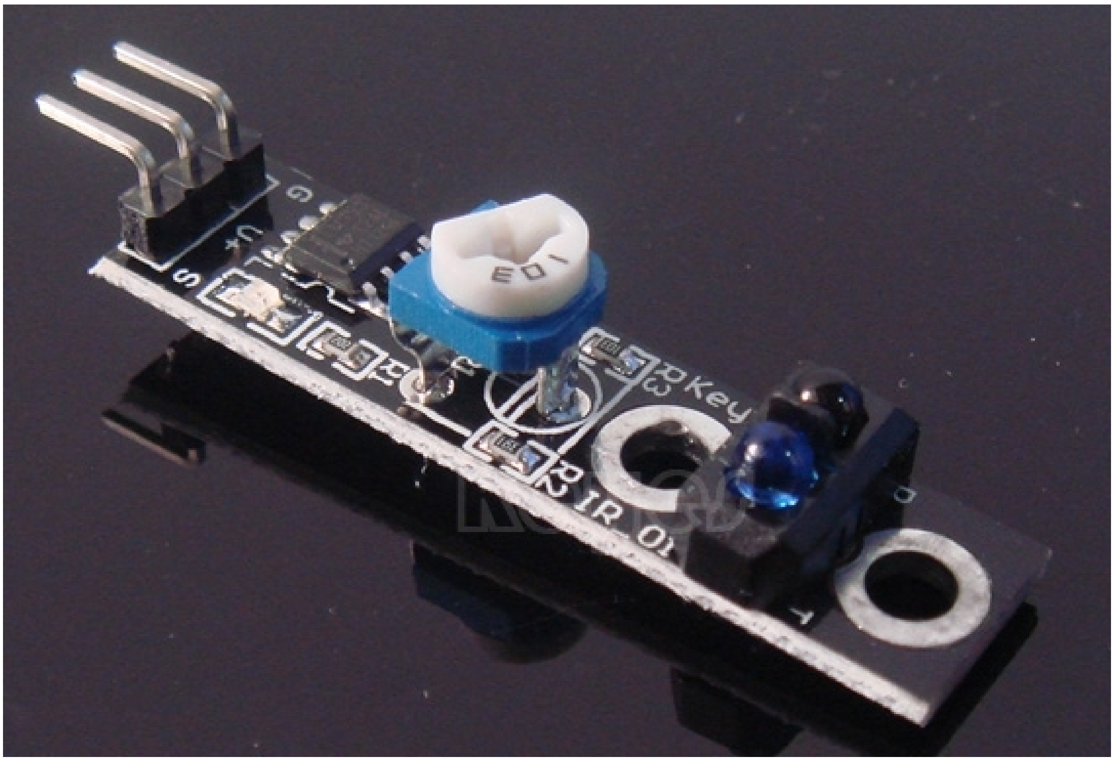
```
int pinI1=8;//define IN1 pin
int pinI2=9;//define IN2 pin
int speedpin=11;//define EA(PWM) pin
int pinI3=6;//define IN3 pin
int pinI4=7;//define IN4 pin
int speedpin1=10;//define EB(PWM) pin
void setup()
{
  pinMode(pinI1,OUTPUT);
  pinMode(pinI2,OUTPUT);
  pinMode(speedpin,OUTPUT);
  pinMode(pinI3,OUTPUT);
  pinMode(pinI4,OUTPUT);
  pinMode(speedpin1,OUTPUT);
}
void loop()
{
 //go straight
     analogWrite(speedpin,100);//define speed
     analogWrite(speedpin1,100);
     digitalWrite(pinI4,LOW);//right motor move in anticlockwise
     digitalWrite(pinI3,HIGH);
     digitalWrite(pinI1,LOW);//left motor move in clockwise
     digitalWrite(pinI2,HIGH);
     delay(2000);
 //go back
     analogWrite(speedpin,100);//define speed
     analogWrite(speedpin1,100);
     digitalWrite(pinI4,HIGH);//right motor move in clockwise
      digitalWrite(pinI3,LOW);
     digitalWrite(pinI1,HIGH);//left motor move in anticlockwise
     digitalWrite(pinI2,LOW);
     delay(2000);
 //turn left
     analogWrite(speedpin,60);//
     analogWrite(speedpin1,60);
     digitalWrite(pinI4,LOW);//
     digitalWrite(pinI3,HIGH);
     digitalWrite(pinI1,HIGH);//
     digitalWrite(pinI2,LOW);
     delay(2000);
 //turn right
     analogWrite(speedpin,60);//
     analogWrite(speedpin1,60);
     digitalWrite(pinI4,HIGH);//
     digitalWrite(pinI3,LOW);
     digitalWrite(pinI1,LOW);//
     digitalWrite(pinI2,HIGH);
     delay(2000);
 //stop
     digitalWrite(pinI4,HIGH);//
     digitalWrite(pinI3,HIGH);
     digitalWrite(pinI1,HIGH);//
     digitalWrite(pinI2,HIGH);
     delay(2000);
 }
```

NOTE:You can use other code to driver motor.

2>.Tracking smart car



Tracking module principle:TCRT5000 Using infrared reflectivity of color is different, the strength of the reflected signal is converted into electrical signals. Black and white tracing module in high level effectively detect black, white is detected for the low level, effectively detect 0-3 cm in height.



method of application:

1>>.There are 3 row needle sensor interfaces, is GND, VCC, OUT. VCC &gnd for power supply side, the OUT signal is output.

2>>.An object is detected, the output signal low level; Not detected objects, the output signal of high level.

3>>.Major judgment signal output is 0 or 1, will be able to determine whether an object exists.

performance parameter:

1>>.detect distance:Test white paper is about 2cm..Depending on the color of different distance is different.white is farthest

2>>.supply voltage:2.5V~12V,Not more than 12V(It is best to low voltage power supply, power supply voltage is too high will shorten the life of a sensor.5V power supply is preferred)

3>>.operating current:18-20mA when 5V.By a large number of tests, sensor hardware Settings for 18~20mA best performance when working current, main performance on anti-jamming capability

4>>.An object is detected, the output signal low level; Not detected objects, the output signal of high level.

5>>.Sensor output TTL level, can be directly connected to the 3.3 V or 5 V microcontroller IO port.

Black or white line detection principle:

1>>.Using black to light the reflectivity of the characteristics, when the surface color is not black, infrared sensors to launch out by most reflected. The sensor output low level 0.

2>>.When there is a black line plane, sensors in the black, because black reflection ability is very weak, very few reflected infrared light, short of sensor action level, so the sensor output 1.

3>>.Single chip microcomputer as long as we use to judge the sensor output is 0 or 1, will be able to detect the black line.

4>>.Detection principle of the white line and black line, the principle of the detection of the white line, white line around the color is close to black, then adjust the adjustable resistance of infrared sensor above, will lower sensitivity, has been transferred to the surrounding color just detect, it can detect the white line.

Test code:

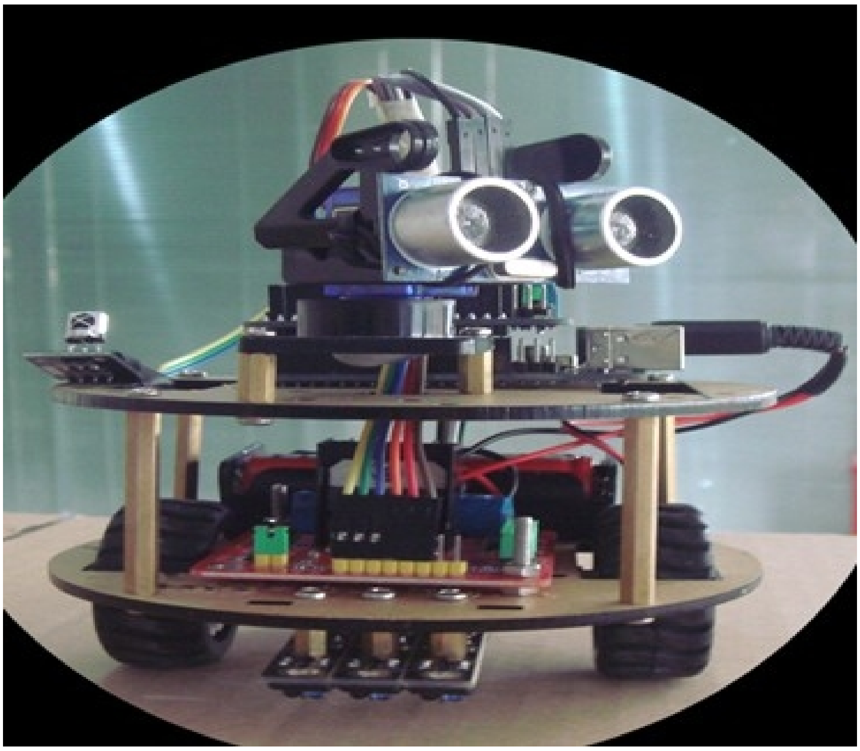
```
int pin=7;//
int val;//
void setup()
{
  pinMode(ledPin,OUTPUT);//
  Serial.begin(9600);//
}
void loop()
{
 val=digitalRead(pin);//
 Serial.println(val);//
}
```

Tracking smart test code:

```
int MotorRight1=5;
int MotorRight2=6;
int MotorLeft1=10;
int MotorLeft2=11;
const int SensorLeft = 7;          //left sensor input
const int SensorMiddle= 4 ;        //middle sensor input
const int SensorRight = 3;         //right sensor input
int SL;       //left sensor state
int SM;       //
int SR;       //

void setup()
{
   Serial.begin(9600);
   pinMode(MotorRight1, OUTPUT);   // pin 8 (PWM)
   pinMode(MotorRight2, OUTPUT);   // 9 (PWM)
   pinMode(MotorLeft1,   OUTPUT);   // 10 (PWM)
   pinMode(MotorLeft2,   OUTPUT);   // 11 (PWM)
   pinMode(SensorLeft, INPUT); //
   pinMode(SensorMiddle, INPUT);//
   pinMode(SensorRight, INPUT); //
}

void loop()
  {
  SL = digitalRead(SensorLeft);
  SM = digitalRead(SensorMiddle);
  SR = digitalRead(SensorRight);

            if (SM == HIGH)//middle sensor in black area
            {
                if (SL == LOW & SR == HIGH) // left sensor in black area,right sensor in white area,so turn left
                {
                    digitalWrite(MotorRight1,LOW);
                    digitalWrite(MotorRight2,HIGH);
                    analogWrite(MotorLeft1,0);
                    analogWrite(MotorLeft2,80);
                }
                else if (SR == LOW & SL == HIGH) //
                {
                    analogWrite(MotorRight1,0);//
                    analogWrite(MotorRight2,80);
                    digitalWrite(MotorLeft1,LOW);
                    digitalWrite(MotorLeft2,HIGH);
                }
              else   //
```

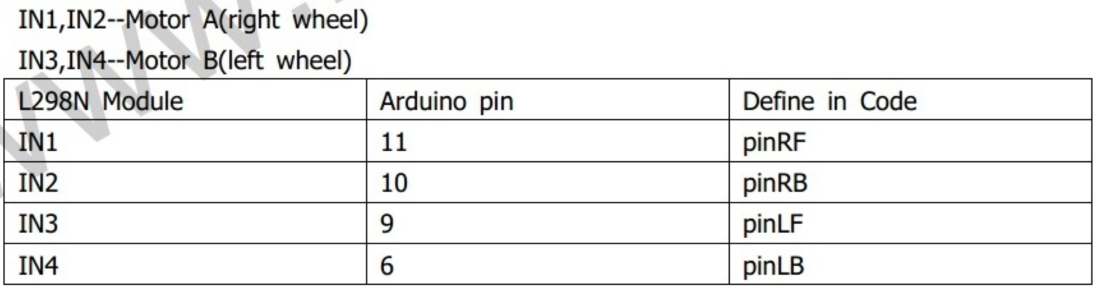
```
         {
              digitalWrite(MotorRight1,LOW);
              digitalWrite(MotorRight2,HIGH);
              digitalWrite(MotorLeft1,LOW);
              digitalWrite(MotorLeft2,HIGH);
              analogWrite(MotorLeft1,200);
              analogWrite(MotorLeft2,200);
              analogWrite(MotorRight1,200);
              analogWrite(MotorRight2,200);
       }
    }
   else //
  {
      if (SL == LOW & SR == HIGH)//
     {
            digitalWrite(MotorRight1,LOW);
            digitalWrite(MotorRight2,HIGH);
            digitalWrite(MotorLeft1,LOW);
            digitalWrite(MotorLeft2,LOW);
     }
      else if (SR == LOW & SL == HIGH) //
     {
          digitalWrite(MotorRight1,LOW);
          digitalWrite(MotorRight2,LOW);
          digitalWrite(MotorLeft1,LOW);
          digitalWrite(MotorLeft2,HIGH);
     }
      else //
     {
     digitalWrite(MotorRight1,HIGH);
     digitalWrite(MotorRight2,LOW);
     digitalWrite(MotorLeft1,HIGH);
     digitalWrite(MotorLeft2,LOW);;
     }}}
```

3>.Ultrasonic obstacle avoidance intelligent car



Obstacle avoidance intelligent ultrasonic is convenient, simple and easy to do real-time control, and can meet the practical requirements in terms of accuracy of measurement, thus become a commonly used method of obstacle avoidance. Ultrasonic method using reference (Arduino ultrasonic ranging).

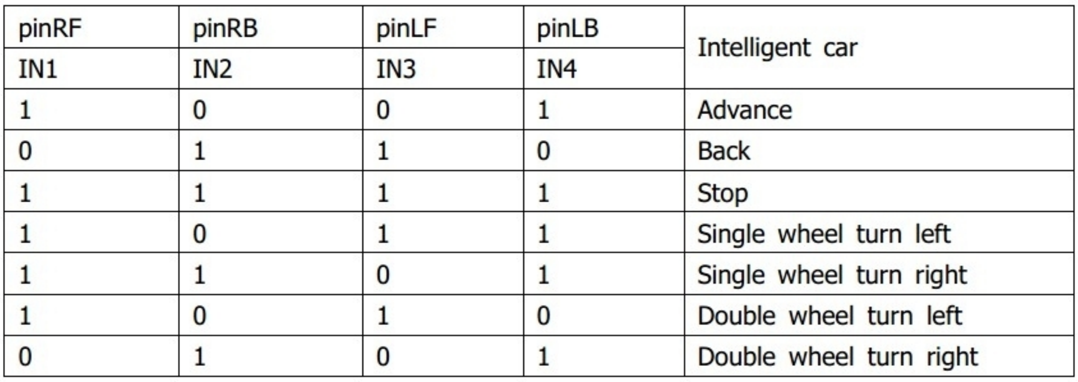
Ultrasonic smart wiring diagram;



IN1,IN2--Motor A(right wheel)

IN3,IN4--Motor B(left wheel)

L298N Module	Arduino pin	Define in Code
IN1	11	pinRF
IN2	10	pinRB
IN3	9	pinLF
IN4	6	pinLB



pinRF	pinRB	pinLF	pinLB	Intelligent car
IN1	IN2	IN3	IN4	
1	0	0	1	Advance
0	1	1	0	Back
1	1	1	1	Stop
1	0	1	1	Single wheel turn left
1	1	0	1	Single wheel turn right
1	0	1	0	Double wheel turn left
0	1	0	1	Double wheel turn right

Test code:

```
#include <Servo.h>
int pinLB=6;          // left back
int pinLF=9;          // left front

int pinRB=10;        // right back
int pinRF=11;        // left front

int inputPin = A0;    // ultrasonic echo
int outputPin =A1;    // ultrasonic trig

int Fspeedd = 0;            // front distance
int Rspeedd = 0;            // right distance
int Lspeedd = 0;            // left distance
int directionn = 0;      // Determine the direction of car turns
Servo myservo;                //    myservo
int delay_time = 250; // Stable steering servo motor

int Fgo = 8;                  // advance
int Rgo = 6;                  // turn right
int Lgo = 4;                  // turn left
int Bgo = 2;                  // back

void setup()
{
   pinMode(pinLB,OUTPUT); // pin 6 (PWM)
   pinMode(pinLF,OUTPUT); // pin 9 (PWM)
   pinMode(pinRB,OUTPUT); // pin 10 (PWM)
   pinMode(pinRF,OUTPUT); // pin 11 (PWM)

   pinMode(inputPin, INPUT);        // Define ultrasound input pin
   pinMode(outputPin, OUTPUT);    // Define ultrasound output pin

   myservo.attach(5);        // Define the servo motor output pin5 (PWM)
}
void advance(int a)          // advance
      {                                  //In the mid-point of the two wheels as a reference
        digitalWrite(pinRB,LOW);    //right wheel advance
        digitalWrite(pinRF,HIGH);
```

```
     digitalWrite(pinLB,HIGH);    //left wheel advance
     digitalWrite(pinLF,LOW);
     delay(a);
    }
void right(int b)               //turn right (single wheel)
    {
     digitalWrite(pinRB,HIGH);      //right stop
     digitalWrite(pinRF,HIGH);
     digitalWrite(pinLB,HIGH);    //left advance
     digitalWrite(pinLF,LOW);
     delay(b);
    }
void left(int c)                 //turn left(single wheel)
    {
     digitalWrite(pinRB,LOW); //righ wheel advance
     digitalWrite(pinRF,HIGH);
     digitalWrite(pinLB,HIGH);      //left stop
     digitalWrite(pinLF,HIGH);
     delay(c);
    }
void turnR(int d)               //turn right(double wheels)
    {
     digitalWrite(pinRB,HIGH);    //right wheel back
     digitalWrite(pinRF,LOW);
     digitalWrite(pinLB,HIGH); //left wheel advance
     digitalWrite(pinLF,LOW);
     delay(d);
    }
void turnL(int e)               //turn left (double wheels)
    {
     digitalWrite(pinRB,LOW);      //right wheel advance
     digitalWrite(pinRF,HIGH);
     digitalWrite(pinLB,LOW);      //left wheel back
     digitalWrite(pinLF,HIGH);
     delay(e);
    }
void stopp(int f)                 //stop
    {
     digitalWrite(pinRB,HIGH);
```

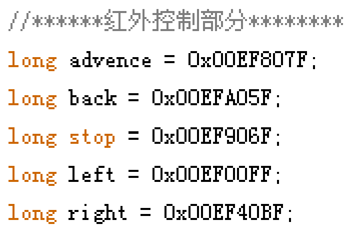
```
      digitalWrite(pinRF,HIGH);
      digitalWrite(pinLB,HIGH);
      digitalWrite(pinLF,HIGH);
      delay(f);
     }
void back(int g)            //back
     {
      digitalWrite(pinRB,HIGH);    //right wheel back
      digitalWrite(pinRF,LOW);
      digitalWrite(pinLB,LOW);    //left wheel back
      digitalWrite(pinLF,HIGH);
      delay(g);
     }
void detection()          //Measuring three angles(2.90.178)
     {
      myservo.write(90); //measure distance in the front
      delay(delay_time);         // Waiting for servo motor stable
      ask_pin_F();              // Read the distance of front

      if(Fspeedd < 20)          // If the distance is less than 20cm in front
      {
           stopp(1);                   // clear output ,motor stop
           myservo.write(178);         //measure left distance
           delay(delay_time);
           ask_pin_L();

           myservo.write(2);        //measure right distance
           delay(delay_time);
           ask_pin_R();

           if(Lspeedd > Rspeedd)     //compare distance of right and left
           {
              directionn = Lgo;         //turn left
           }
           if(Lspeedd <= Rspeedd)     //if the distance is less than or equal to the distance at the right
           {
              directionn = Rgo;         //turn right
           }
```

```
            }
            else
            {
                directionn = Fgo;
              }
              myservo.write(90);
              delay(delay_time);
        }
void ask_pin_F()      // Measure the distance in front
        {
            digitalWrite(outputPin, LOW);      //Ultrasonic launch 2us low level
            delayMicroseconds(2);
            digitalWrite(outputPin, HIGH);   // ultrasound transmitting high voltage 10us, there is at least 10us
            delayMicroseconds(11);
            digitalWrite(outputPin, LOW);        // Ultrasonic launch low level
            float Fdistance = pulseIn(inputPin, HIGH);    //measure time
            Fdistance= Fdistance/5.8/10;              // time to distance ︵cm︶
            Fspeedd = Fdistance;                           //
        }
  void ask_pin_L()      //
        {
            delay(delay_time);
            digitalWrite(outputPin, LOW);      //
            delayMicroseconds(2);
            digitalWrite(outputPin, HIGH);    //
            delayMicroseconds(11);
            digitalWrite(outputPin, LOW);        //
            float Ldistance = pulseIn(inputPin, HIGH);    //
            Ldistance= Ldistance/5.8/10;              //
            Lspeedd = Ldistance;                           //
        }
void ask_pin_R()      //
        {
            delay(delay_time);
            digitalWrite(outputPin, LOW);      //
            delayMicroseconds(2);
            digitalWrite(outputPin, HIGH);    //
            delayMicroseconds(11);
        digitalWrite(outputPin, LOW);        //
        float Rdistance = pulseIn(inputPin, HIGH);    //
        Rdistance= Rdistance/5.8/10;              //
        Rspeedd = Rdistance;                          //
      }

void loop()
 {
   detection();              //Measure the Angle and determine which direction to go to
   if(directionn == 2)
   {
     back(600);
   }
   if(directionn == 6)
   {
     turnR(350);
     stopp(1);
   }
   if(directionn == 4)
   {
     turnL(350);
     stopp(1);
   }
   if(directionn == 8)
   {
     advance(10);
     ask_pin_F();
     if(Fspeedd < 20) stopp(1);
   }
 }
```

4>.Infrared remote control of intelligent car

Test code:

```
#include <IRremote.h>                              //
const int irReceiverPin = 2;                //
IRrecv irrecv(irReceiverPin);               //
decode_results results;                     //
void setup()
{
    Serial.begin(9600);                                    //
    irrecv.enableIRIn();                                 //
}

//
void showIRProtocol(decode_results *results)
{
    Serial.print("Protocol: ");

    //
    switch(results->decode_type) {
      case NEC:
          Serial.print("NEC");
          break;
      case SONY:
          Serial.print("SONY");
          break;
      case RC5:
          Serial.print("RC5");
          break;
      case RC6:
          Serial.print("RC6");
          break;
      default:
          Serial.print("Unknown encoding");
    }

    //
    Serial.print(", irCode: ");
    Serial.print(results->value, HEX);        //
    Serial.print(",    bits: ");
    Serial.println(results->bits);              //
}

void loop()
{
    if (irrecv.decode(&results)) {                 //
        showIRProtocol(&results);                       //
        irrecv.resume();                                   //
    }
}
```



```
//******红外控制部分********
long advence = 0x00EF807F;
long back = 0x00EFA05F;
long stop = 0x00EF906F;
long left = 0x00EF00FF;
long right = 0x00EF40BF;
```

Test code:

```
//******Infrared remote smart car code*******
#include <IRremote.h>
int RECV_PIN = A0;
int pinLB=6;//
int pinLF=9;//
int pinRB=3;//
int pinRF=5;//
//******
long advence = 0x00EF807F;
long back = 0x00EFA05F;
long stop = 0x00EF906F;
long left = 0x00EF00FF;
long right = 0x00EF40BF;

IRrecv irrecv(RECV_PIN);
decode_results results;
void dump(decode_results *results) {
  int count = results->rawlen;
  if (results->decode_type == UNKNOWN)
    {
     Serial.println("Could not decode message");
    }
  else
   {
    if (results->decode_type == NEC)
      {
       Serial.print("Decoded NEC: ");
      }
    else if (results->decode_type == SONY)
      {
       Serial.print("Decoded SONY: ");
      }
    else if (results->decode_type == RC5)
      {
       Serial.print("Decoded RC5: ");
      }
```

```
        else if (results->decode_type == RC6)
            {
              Serial.print("Decoded RC6: ");
            }
          Serial.print(results->value, HEX);
          Serial.print(" (");
          Serial.print(results->bits, DEC);
          Serial.println(" bits)");
      }
          Serial.print("Raw (");
          Serial.print(count, DEC);
          Serial.print("): ");

    for (int i = 0; i < count; i++)
          {
            if ((i % 2) == 1) {
            Serial.print(results->rawbuf[i]*USECPERTICK, DEC);
          }
        else
          {
            Serial.print(-(int)results->rawbuf[i]*USECPERTICK, DEC);
          }
        Serial.print(" ");
          }
            Serial.println("");
          }

void setup()
  {
    pinMode(RECV_PIN, INPUT);
    pinMode(pinLB,OUTPUT);
    pinMode(pinLF,OUTPUT);

    pinMode(pinRB,OUTPUT);
    pinMode(pinRF,OUTPUT);

Serial.begin(9600);
    irrecv.enableIRIn(); // Start the receiver
  }

int on = 0;
unsigned long last = millis();

void loop()
```

```
{
  if (irrecv.decode(&results))
   {
    // If it's been at least 1/4 second since the last
    // IR received, toggle the relay
    if (millis() - last > 250)
      {
       on = !on;
//           digitalWrite(8, on ? HIGH : LOW);
       digitalWrite(13, on ? HIGH : LOW);
       dump(&results);
      }
    if (results.value == advence )
    {digitalWrite(pinRB,LOW);//
    digitalWrite(pinRF,HIGH);
    digitalWrite(pinLB,LOW);//
    digitalWrite(pinLF,HIGH);}

    if (results.value == back )


     {digitalWrite(pinRB,HIGH);//︶BACK
     digitalWrite(pinRF,LOW);}

    if (results.value == left )
    { digitalWrite(pinRB,LOW);// STOP
     digitalWrite(pinRF,HIGH);
     digitalWrite(pinLB,HIGH);//GO
     digitalWrite(pinLF,LOW);}


    if (results.value == right )
    { digitalWrite(pinRB,HIGH);//︶GO
     digitalWrite(pinRF,LOW);
     digitalWrite(pinLB,HIGH);//STOP
     digitalWrite(pinLF,HIGH);}

    if (results.value == stop )
      {
     digitalWrite(pinRB,HIGH);//STOP
     digitalWrite(pinRF,HIGH);
     digitalWrite(pinLB,HIGH);//STOP
     digitalWrite(pinLF,HIGH);
   }
```

```
        last = millis();
        irrecv.resume(); // Receive the next value
    }
}
```

5>.Mobile phone bluetooth intelligent car

Bluetooth (Bluetooth) technology, is actually a short-range radio technology, using the" Bluetooth "technology, can effectively simplify the handheld computers, laptops and mobile phones for communication between mobile phones and other mobile communication terminal equipment, also can successfully simplify the above communication between the devices and the Internet (Internet), so that the modern communication equipment and data transmission between the Internet become more efficiently, to broaden the way with wireless communications.

Because today is the first time to deal with the bluetooth module, or to a profound, let the Arduino and PC communication success. Wiring, first connect bluetooth motherboard + 5 v VCC, bluetooth motherboard GND connection - GND, motherboard TX connected bluetooth RX, RX connected bluetooth TX. When the success of the bluetooth module when the power is connected to the PC, the bluetooth module power will flashing lights, connect light green light will light up.

Test code:

```
char val;
int ledpin=13;
void setup()
{
   Serial.begin(9600);
   pinMode(ledpin,OUTPUT);
}
void loop()
{
   val=Serial.read();
   if(val=='r')
   {
     digitalWrite(ledpin ’HIGH);
     delay((500);
     digitalWrite(ledpin ’LOW);
     delay(500);
    Serial.println("keyes");
   }
 }
```

Let's learn the Arduino bluetooth remote control programmable intelligent car. Through bluetooth control forward, backward, turn left, turn right, buttons, computers and mobile phones, two kinds of control mode. (mobile phone operating system support Android 2.3.7 above. The computer must bring their own bluetooth)

When used for the first time to mobile phone with bluetooth car matching (pairing for the first time after the later don't have in wireless location), first take a look at the following steps:

1>>.Remember to open mobile phone bluetooth oh, open the software will remind users open the bluetooth

2>>.Then the text as shown in figure tips, connect a bluetooth device, scan matching bluetooth oh, otherwise not be able to connect to the car.

3>>.Match the car, the password is "1234" try it

Test code:

```
int MotorRight1=5;
int MotorRight2=6;
int MotorLeft1=10;
int MotorLeft2=11;



void setup()
{
   Serial.begin(9600);
   pinMode(MotorRight1, OUTPUT);    //    pin 8 (PWM)
   pinMode(MotorRight2, OUTPUT);    //    9 (PWM)
   pinMode(MotorLeft1,    OUTPUT);    //    10 (PWM)
   pinMode(MotorLeft2,    OUTPUT);    //    11 (PWM)
}

void go()//
{
            digitalWrite(MotorRight1,LOW);
            digitalWrite(MotorRight2,HIGH);
            digitalWrite(MotorLeft1,LOW);
            digitalWrite(MotorLeft2,HIGH);

}

void left() //
{
         digitalWrite(MotorRight1,HIGH);
         digitalWrite(MotorRight2,LOW);
         digitalWrite(MotorLeft1,LOW);
         digitalWrite(MotorLeft2,HIGH);

}
void right() //
```

```
{
            digitalWrite(MotorRight1,LOW);
            digitalWrite(MotorRight2,HIGH);
            digitalWrite(MotorLeft1,HIGH);
            digitalWrite(MotorLeft2,LOW);

}
void stop() //
{
          digitalWrite(MotorRight1,LOW);
          digitalWrite(MotorRight2,LOW);
          digitalWrite(MotorLeft1,LOW);
          digitalWrite(MotorLeft2,LOW);

}
void back() //
{
                digitalWrite(MotorRight1,HIGH);
                digitalWrite(MotorRight2,LOW);
                digitalWrite(MotorLeft1,HIGH);
                digitalWrite(MotorLeft2,LOW);;

}
void loop()
{
    char val = Serial.read();
    Serial.write(val);
    if (-1 != val) {
        if ('W' == val)
        go();
        else if ('A' ==val)
        left();
        else if ('D' == val)
        right();
        else if ('S' == val)
        back();
        else if ('Q' == val)
            stop();
        delay(500);
        }
    else
    {
        //stop();
        delay(500);
    }
}
```

6>.Multi_Function

Test code:

```
//*******************************
#include <IRremote.h>
#include <Servo.h>
//************************define motor pin**************************
int MotorRight1=5;
int MotorRight2=6;
int MotorLeft1=10;
int MotorLeft2=11;
int counter=0;
const int irReceiverPin = 2; //Infrared receive sensor

char val;
//************************set detection IRcode**************************
long IRfront= 0x00FFA25D;               //go straight
long IRback=0x00FF629D;                 //go back
long IRturnright=0x00FFC23D;        //turn right
long IRturnleft= 0x00FF02FD;          //turn left
long IRstop=0x00FFE21D;                  //stop
long IRcny70=0x00FFA857;               //CNY70 automatic mode
long IRAutorun=0x00FF906F;            //Ultrasonic automatic mode
long IRturnsmallleft= 0x00FF22DD;
//**************************define CNY70 pin****************************
const int SensorLeft = 7;            //left sensor input
const int SensorMiddle= 4 ;        //middle sensor input
const int SensorRight = 3;          //right sensor input
int SL;        //left sensor state
int SM;        //middle sensor state
int SR;        //right sensor state
IRrecv irrecv(irReceiverPin);    // define IRrecv receive signal
decode_results results;              // decoderesults
//**************************define ultrasonic pin*****************
int inputPin =13 ; // ultrasonic receive pin
int outputPin =12; //ultrasonic echo pin
int Fspeedd = 0; // front distance
int Rspeedd = 0; // right distance
int Lspeedd = 0; // left distance
int directionn = 0; // front=8; back=2; left=4; right=6
```

```
Servo myservo; // define myservo
int delay_time = 250; // servo motor go back state time
int Fgo = 8; // go straight
int Rgo = 6; // turn right
int Lgo = 4; // turn left
int Bgo = 2; // go back
//**********************************(SETUP)
void setup()
{
    Serial.begin(9600);
    pinMode(MotorRight1, OUTPUT);    // pin 8 (PWM)
    pinMode(MotorRight2, OUTPUT);    //pin 9 (PWM)
    pinMode(MotorLeft1,    OUTPUT);    // pin 10 (PWM)
    pinMode(MotorLeft2,    OUTPUT);    // pin 11 (PWM)
    irrecv.enableIRIn();          // start infrared decode
      pinMode(SensorLeft, INPUT); //
    pinMode(SensorMiddle, INPUT);//
    pinMode(SensorRight, INPUT); //
    digitalWrite(2,HIGH);
    pinMode(inputPin, INPUT); //
    pinMode(outputPin, OUTPUT); //
    myservo.attach(9); //


  }
//**************************************************(Void)
void advance(int a) // go straight
{
                digitalWrite(MotorRight1,LOW);
                digitalWrite(MotorRight2,HIGH);
                digitalWrite(MotorLeft1,LOW);
                digitalWrite(MotorLeft2,HIGH);
                delay(a * 100);
}
void right(int b) //turn right(single wheel)
{
              digitalWrite(MotorLeft1,LOW);
              digitalWrite(MotorLeft2,HIGH);
              digitalWrite(MotorRight1,LOW);
              digitalWrite(MotorRight2,LOW);
              delay(b * 100);
}
void left(int c) //turn left(single wheel)
{
```

```
            digitalWrite(MotorRight1,LOW);
            digitalWrite(MotorRight2,HIGH);
            digitalWrite(MotorLeft1,LOW);
            digitalWrite(MotorLeft2,LOW);
            delay(c * 100);
}
void turnR(int d) //turn right(two wheels)
{
            digitalWrite(MotorRight1,HIGH);
            digitalWrite(MotorRight2,LOW);
            digitalWrite(MotorLeft1,LOW);
            digitalWrite(MotorLeft2,HIGH);
            delay(d * 100);
}
void turnL(int e) //turn left(two wheels)
{
            digitalWrite(MotorRight1,LOW);
            digitalWrite(MotorRight2,HIGH);
            digitalWrite(MotorLeft1,HIGH);
            digitalWrite(MotorLeft2,LOW);
            delay(e * 100);
}
void stopp(int f) //stop
{
          digitalWrite(MotorRight1,LOW);
          digitalWrite(MotorRight2,LOW);
          digitalWrite(MotorLeft1,LOW);
          digitalWrite(MotorLeft2,LOW);
          delay(f * 100);
}
void back(int g) //go back
{
                digitalWrite(MotorRight1,HIGH);
                digitalWrite(MotorRight2,LOW);
                digitalWrite(MotorLeft1,HIGH);
                digitalWrite(MotorLeft2,LOW);;
                delay(g * 100);
}
void detection() //measurement 3 angle(front ,left,right)
{
        int delay_time = 250; //
        ask_pin_F(); // detection distance in front

        if(Fspeedd < 10) // if distance less than 10mm
```

```
    {
        stopp(1); // clear output
        back(2); // go back 0.2s
    }
     if(Fspeedd < 25) //    if distance less than 25mm
    {
        stopp(1); // clear output
        ask_pin_L(); // detection distance in left
        delay(delay_time); // Waiting for the servo motor is stable
        ask_pin_R(); // detection distance in right
        delay(delay_time); // waiting for servo motor state

        if(Lspeedd > Rspeedd) //if left distance greater than right
       {
           directionn = Lgo; //go left
       }

        if(Lspeedd <= Rspeedd) //if left distance less than right
        {
           directionn = Rgo; //go right
        }

        if (Lspeedd < 15 && Rspeedd < 15) //if distance less 10mm both right and left
       {
           directionn = Bgo; //go back
        }
     }
     else //if distance greater than 25mm
    {
        directionn = Fgo; //go straight
    }
}
//**********************************************
void ask_pin_F() // detection distance in front
{
myservo.write(90);
digitalWrite(outputPin, LOW); // ultrasonic echo low level in 2us
delayMicroseconds(2);
digitalWrite(outputPin, HIGH); // ultrasonic echo high level in 10us, At least 10us
delayMicroseconds(10);
digitalWrite(outputPin, LOW); // ultrasonic echo low leve
float Fdistance = pulseIn(inputPin, HIGH); // read time
Fdistance= Fdistance/5.8/10; // turn time to distance
Serial.print("F distance:"); //output distance (mm)
Serial.println(Fdistance); //display distance
Fspeedd = Fdistance; // write distance to Fspeed
}
//****************************************************
void ask_pin_L() // detection distance in left
{
myservo.write(177);
delay(delay_time);
digitalWrite(outputPin, LOW); // ultrasonic echo low level in 2us
delayMicroseconds(2);
digitalWrite(outputPin, HIGH); // ultrasonic echo high level in 10us, At least 10us
delayMicroseconds(10);
digitalWrite(outputPin, LOW); // ultrasonic echo low level
float Ldistance = pulseIn(inputPin, HIGH); // read time
Ldistance= Ldistance/5.8/10; // turn time to distance
Serial.print("L distance:"); //output distance (mm)
Serial.println(Ldistance); //display distance
Lspeedd = Ldistance; // write distance to Lspeed
}
//************************************************************************
*
void ask_pin_R() // detection distance in right
{
myservo.write(5);
delay(delay_time);
digitalWrite(outputPin, LOW); //
delayMicroseconds(2);
digitalWrite(outputPin, HIGH); //
delayMicroseconds(10);
digitalWrite(outputPin, LOW); //
float Rdistance = pulseIn(inputPin, HIGH); //
Rdistance= Rdistance/5.8/10; //
Serial.print("R distance:"); //
Serial.println(Rdistance); //
Rspeedd = Rdistance; //
}
//**********************************(LOOP)
void loop()
{
        SL = digitalRead(SensorLeft);
        SM = digitalRead(SensorMiddle);
        SR = digitalRead(SensorRight);
        performCommand();
//*****************************normal remote control mode
```

```
  if (irrecv.decode(&results))
    {             // Decoding success ’receive infrared signal
/*********************************************/
        if (results.value == IRfront)//go straight
         {
          advance(10);//go straight
         }
/***************************************/
        if (results.value ==   IRback)//go back
         {
          back(10);//go back
         }
/**********************************************************************/
        if (results.value == IRturnright)//turn right
        {
          right(6); // turn right
        }
/**********************************************************************/
       if (results.value == IRturnleft)//turn left
       {
         left(6); // turn left;
       }
/**********************************************************************/
      if (results.value == IRstop)//stop
     {
       digitalWrite(MotorRight1,LOW);
       digitalWrite(MotorRight2,LOW);
       digitalWrite(MotorLeft1,LOW);
       digitalWrite(MotorLeft2,LOW);
      }
//************************************cny70 automatic mode
      if (results.value == IRcny70)
     {
       while(IRcny70)
       {
         SL = digitalRead(SensorLeft);
         SM = digitalRead(SensorMiddle);
         SR = digitalRead(SensorRight);

         if (SM == HIGH)//middle sensor in black area
         {
            if (SL == LOW & SR == HIGH) // left sensor in black area,right sensor in white area ,so turn left
            {
                  digitalWrite(MotorRight1,LOW);
                  digitalWrite(MotorRight2,HIGH);
                  analogWrite(MotorLeft1,0);
                  analogWrite(MotorLeft2,80);
            }
            else if (SR == LOW & SL == HIGH) //left white,right black ,turn right
            {
                  analogWrite(MotorRight1,0);//
                  analogWrite(MotorRight2,80);
                  digitalWrite(MotorLeft1,LOW);
                  digitalWrite(MotorLeft2,HIGH);
            }
          else    // left and right both in white ,go straight
            {
                  digitalWrite(MotorRight1,LOW);
                  digitalWrite(MotorRight2,HIGH);
                  digitalWrite(MotorLeft1,LOW);
                  digitalWrite(MotorLeft2,HIGH);
                  analogWrite(MotorLeft1,200);
                  analogWrite(MotorLeft2,200);
                  analogWrite(MotorRight1,200);
                  analogWrite(MotorRight2,200);
          }
         }
         else // middle sensor in white area
        {
          if (SL == LOW & SR == HIGH)// left black,right white,turn left
          {
                  digitalWrite(MotorRight1,LOW);
                  digitalWrite(MotorRight2,HIGH);
                  digitalWrite(MotorLeft1,LOW);
                  digitalWrite(MotorLeft2,LOW);
          }
          else if (SR == LOW & SL == HIGH) // left white,right black ,turn right
          {
                digitalWrite(MotorRight1,LOW);
                digitalWrite(MotorRight2,LOW);
                digitalWrite(MotorLeft1,LOW);
                digitalWrite(MotorLeft2,HIGH);
          }
          else // left and right both in white ,stop
          {
          digitalWrite(MotorRight1,HIGH);
          digitalWrite(MotorRight2,LOW);
```

```
        digitalWrite(MotorLeft1,HIGH);
        digitalWrite(MotorLeft2,LOW);;
        }
      }
       if (irrecv.decode(&results))
       {
             irrecv.resume();
                  Serial.println(results.value,HEX);
             if(results.value ==IRstop)
             {
               digitalWrite(MotorRight1,HIGH);
               digitalWrite(MotorRight2,HIGH);
               digitalWrite(MotorLeft1,HIGH);
               digitalWrite(MotorLeft2,HIGH);
               break;
             }
       }
     }
      results.value=0;
   }
//********************************ultracsonic automaitc mode
 if (results.value ==IRAutorun )
      {
           while(IRAutorun)
        {
            myservo.write(90); //make the servo motor reset
            detection(); //
             if(directionn == 8) //directionn = 8(go straight)
            {
              if (irrecv.decode(&results))
           {
             irrecv.resume();
             Serial.println(results.value,HEX);
             if(results.value ==IRstop)
             {
               digitalWrite(MotorRight1,LOW);
               digitalWrite(MotorRight2,LOW);
               digitalWrite(MotorLeft1,LOW);
               digitalWrite(MotorLeft2,LOW);
               break;
             }
           }
                results.value=0;
                advance(1); //
```

```
          Serial.print(" Advance "); //
          Serial.print(" ");
      }
    if(directionn == 2) //2(go back)
  {
      if (irrecv.decode(&results))
    {
        irrecv.resume();
        Serial.println(results.value,HEX);
        if(results.value ==IRstop)
        {
            digitalWrite(MotorRight1,LOW);
            digitalWrite(MotorRight2,LOW);
            digitalWrite(MotorLeft1,LOW);
            digitalWrite(MotorLeft2,LOW);
            break;
        }
    }
          results.value=0;
          back(8); //
          turnL(3); //To prevent the jammed
          Serial.print(" Reverse "); //
  }
      if(directionn == 6) // 6(turn right)
  {
    if (irrecv.decode(&results))
    {
          irrecv.resume();
          Serial.println(results.value,HEX);
        if(results.value ==IRstop)
        {
            digitalWrite(MotorRight1,LOW);
            digitalWrite(MotorRight2,LOW);
            digitalWrite(MotorLeft1,LOW);
            digitalWrite(MotorLeft2,LOW);
            break;
        }
    }
        results.value=0;
            back(1);
            turnR(6); //
            Serial.print(" Right "); //
  }
      if(directionn == 4) // 4(turn left)
```

```
          {
             if (irrecv.decode(&results))
           {
             irrecv.resume();
             Serial.println(results.value,HEX);
             if(results.value ==IRstop)
             {
               digitalWrite(MotorRight1,LOW);
               digitalWrite(MotorRight2,LOW);
               digitalWrite(MotorLeft1,LOW);
               digitalWrite(MotorLeft2,LOW);
               break;
             }
           }
                results.value=0;
                back(1);
                turnL(6); //
                Serial.print(" Left "); //
           }

             if (irrecv.decode(&results))
           {
             irrecv.resume();
             Serial.println(results.value,HEX);
             if(results.value ==IRstop)
             {
               digitalWrite(MotorRight1,LOW);
               digitalWrite(MotorRight2,LOW);
               digitalWrite(MotorLeft1,LOW);
               digitalWrite(MotorLeft2,LOW);
               break;
             }
           }
         }
               results.value=0;
       }
/*********************************************************************/
     else
    {
           digitalWrite(MotorRight1,LOW);
           digitalWrite(MotorRight2,LOW);
           digitalWrite(MotorLeft1,LOW);
           digitalWrite(MotorLeft2,LOW);
     }
```

```
                irrecv.resume();        //
      }
}

void performCommand() {
    if (Serial.available()) {
        val = Serial.read();
    }
        if (val == 'f') { // Forward
            advance(10);
        } else if (val == 'z') { // Stop Forward
            stopp(10) ;
        } else if (val == 'b') { // Backward
            back(10);
        } else if (val == 'y') { // Stop Backward
              back(10);
        }    else if (val == 'l') { // Right
            turnR(10);
        } else if (val == 'r') { // Left
            turnL(10);
        } else if (val == 'v') { // Stop Turn
            stopp(10) ;
        } else if (val == 's') { // Stop
            stopp(10) ;
        }
}
```