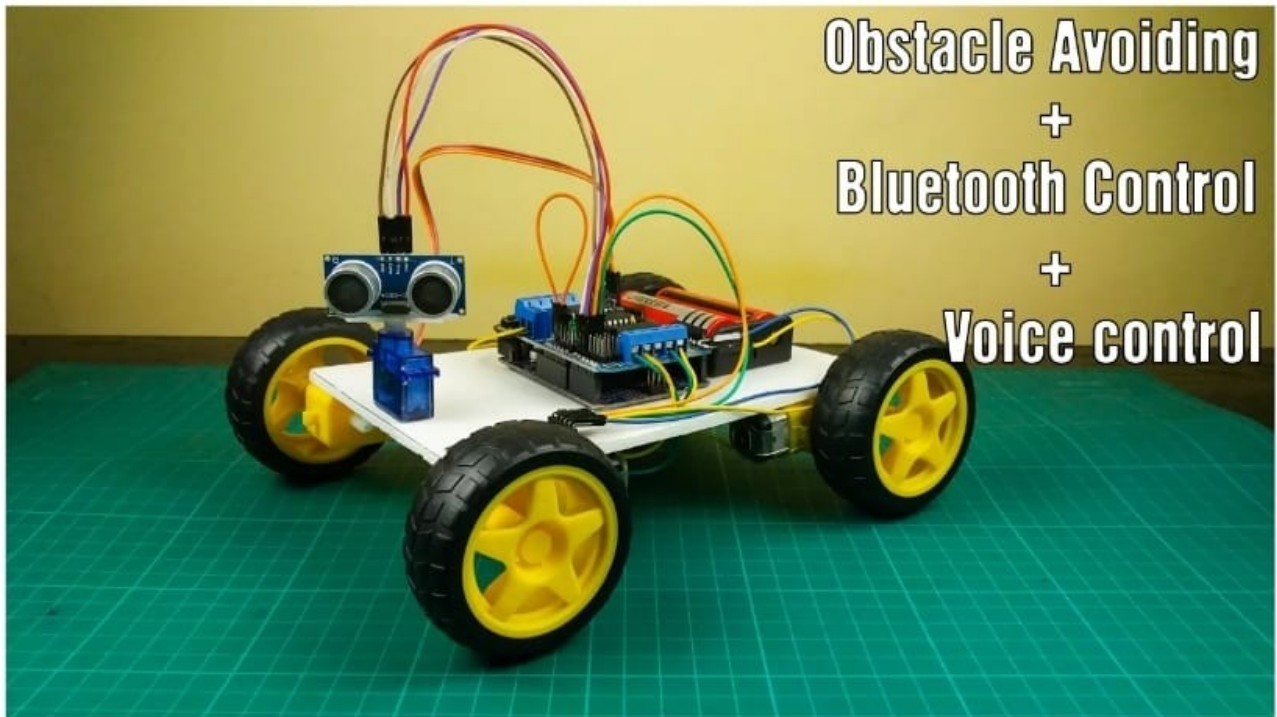


Multi-functional Remote Car Robot



The process of this robot :

We can control this robot car using three methods. That is,

1. Obstacle avoidance

In this case, the robot car moves along using the obstacle avoiding. The ultrasonic sensor is mainly used for this purpose. Study the previous articles for more information.

2. Bluetooth control

In this case, we can control the robot through an app on the smartphone. The Bluetooth module is used for this.

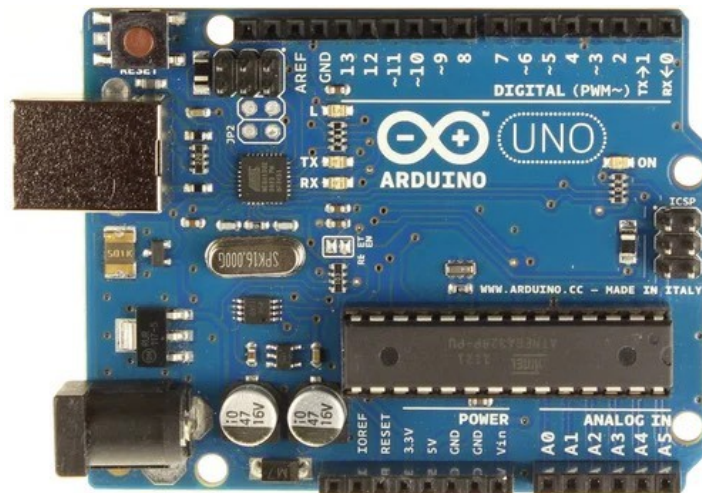
3. Voice control

In this case, we can control this robot using several voice commands. This also requires a Bluetooth module and mobile app.

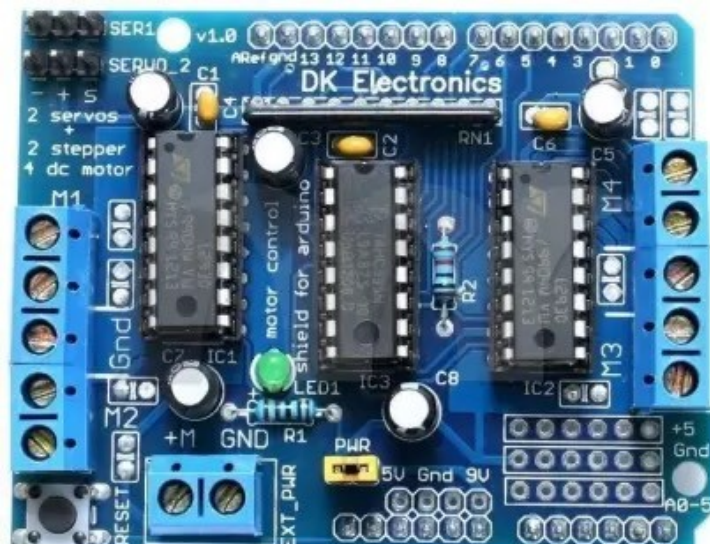
The required components are given below.

Arduino UNO board x 1
L293D motor driver x 1
Ultrasonic sensor x 1
Bluetooth module x 1
Servo motor x 1
Gear motor x 4
Robot wheel x 4
Li-ion battery holder x 1
Li-ion battery x 2
Jumper wires
Car chassis x 1

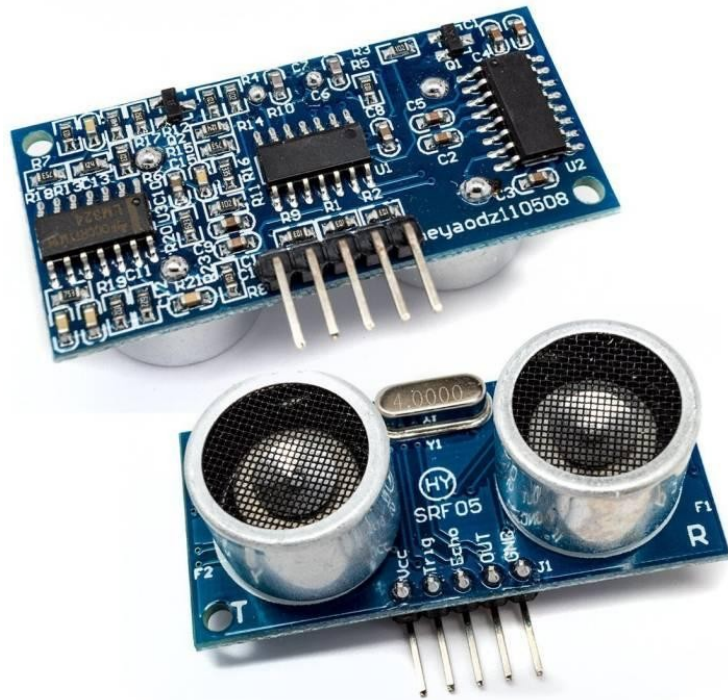
Arduino UNO board :



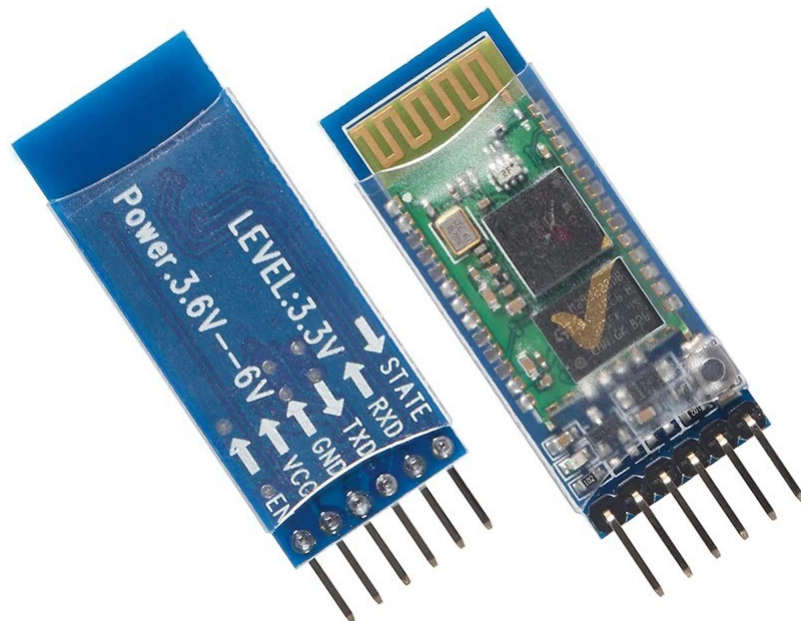
L293D motor driver :



Ultrasonic sensor :



Bluetooth module :



Servo motor :



Gear motor :



Robot wheel :



Li-ion battery holder :



Li-ion battery :



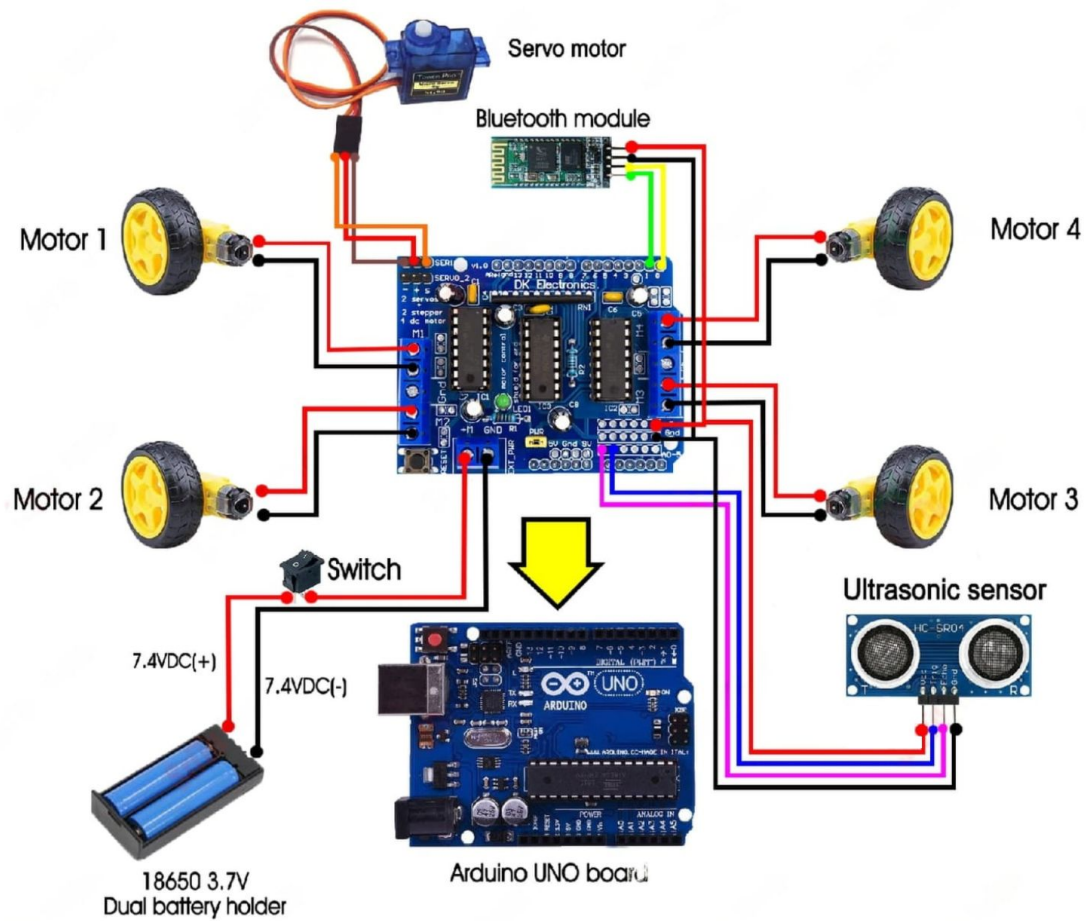
Jumper wires :



Car chassis :



Circuit :



Arduino Code :

```
/*obstacle avoiding,bluetooth control,voice control robot car.
*/
#include <Servo.h>
#include <AFMotor.h>

#define Echo A0
#define Trig A1
#define motor 10
#define Speed 170
#define spoint 103

char value;
int distance;
int Left;
int Right;
int L = 0;
int R = 0;
int L1 = 0;
int R1 = 0;

Servo servo;
AF_DCMotor M1(1);
AF_DCMotor M2(2);
AF_DCMotor M3(3);
AF_DCMotor M4(4);

void setup() {
  Serial.begin(9600);
  pinMode(Trig, OUTPUT);
  pinMode(Echo, INPUT);
  servo.attach(motor);
  M1.setSpeed(Speed);
  M2.setSpeed(Speed);
  M3.setSpeed(Speed);
  M4.setSpeed(Speed);
}

void loop() {
  //Obstacle();
  //Bluetoothcontrol();
  voicecontrol();
}

void Bluetoothcontrol() {
  if (Serial.available() > 0) {
    value = Serial.read();
    Serial.println(value);
  }
  if (value == 'F') {
    forward();
  } else if (value == 'B') {
    backward();
  }
}
```



```

    } else if (value == 'L') {
        left();
    } else if (value == 'R') {
        right();
    } else if (value == 'S') {
        Stop();
    }
}

```

```

void Obstacle() {
    distance = ultrasonic();
    if (distance <= 12) {
        Stop();
        backward();
        delay(100);
        Stop();
        L = leftsee();
        servo.write(spoint);
        delay(800);
        R = rightsee();
        servo.write(spoint);
        if (L < R) {
            right();
            delay(500);
            Stop();
            delay(200);
        } else if (L > R) {
            left();
            delay(500);
            Stop();
            delay(200);
        }
    } else {
        forward();
    }
}

```

```

}

```

```

void voicecontrol() {
    if (Serial.available() > 0) {
        value = Serial.read();
        Serial.println(value);
        if (value == '^') {
            forward();
        } else if (value == '-') {
            backward();
        } else if (value == '<') {
            L = leftsee();
            servo.write(spoint);
            if (L >= 10 ) {
                left();
                delay(500);
                Stop();
            } else if (L < 10) {
                Stop();
            }
        }
    }
}

```

```

    }
    } else if (value == '>') {
        R = rightsee();
        servo.write(spoint);
        if (R >= 10 ) {
            right();
            delay(500);
            Stop();
        } else if (R < 10) {
            Stop();
        }
    } else if (value == '*') {
        Stop();
    }
}
}
}

```

```

int ultrasonic() {
    digitalWrite(Trig, LOW);
    delayMicroseconds(4);
    digitalWrite(Trig, HIGH);
    delayMicroseconds(10);
    digitalWrite(Trig, LOW);
    long t = pulseIn(Echo, HIGH);
    long cm = t / 29 / 2; //time convert distance
    return cm;
}

```

```

void forward() {
    M1.run(FORWARD);
    M2.run(FORWARD);
    M3.run(FORWARD);
    M4.run(FORWARD);
}

void backward() {
    M1.run(BACKWARD);
    M2.run(BACKWARD);
    M3.run(BACKWARD);
    M4.run(BACKWARD);
}

void right() {
    M1.run(BACKWARD);
    M2.run(BACKWARD);
    M3.run(FORWARD);
    M4.run(FORWARD);
}

void left() {
    M1.run(FORWARD);
    M2.run(FORWARD);
    M3.run(BACKWARD);
    M4.run(BACKWARD);
}

void Stop() {
    M1.run(RELEASE);
    M2.run(RELEASE);

```

```

    M3.run(RELEASE);
    M4.run(RELEASE);
}

int rightsee() {
    servo.write(20);
    delay(800);
    Left = ultrasonic();
    return Left;
}

int leftsee() {
    servo.write(180);
    delay(800);
    Right = ultrasonic();
    return Right;
}

```

Code explanation :

Firstly, libraries are included.

```

#include <Servo.h>
#include <AFMotor.h>

```

Secondly, ultrasonic sensor pins, servo motor pin, motor speed, and servo motor starting point are defined.

```

#define Echo A0
#define Trig A1
#define motor 10
#define Speed 170
#define spoint 103

```

Thirdly, some variables have been created to help the program.

```

char value;
int
distance;int
Left;
int Right;
int L = 0;
int R = 0;
int L1 =
0;int R1 =
0;

```

Then, objects are created for the Servo Library and the AFMotor Library.

```

Servo servo;
AF_DCMotor M1(1);
AF_DCMotor M2(2);
AF_DCMotor M3(3);
AF_DCMotor M4(4);

```

In the setup function, Ultrasonic pins are set to INPUT and OUTPUT. Also, the gear motor speeds have been included.

```
void setup()
{
  Serial.begin(9600);
  pinMode(Trig,
  OUTPUT);pinMode(Echo,
  INPUT);
  servo.attach(motor);
  M1.setSpeed(Speed);
  M2.setSpeed(Speed);
  M3.setSpeed(Speed);
  M4.setSpeed(Speed);
}
```

In the loop function, the three main functions are included. we can run these functions one by one. These are described below.

```
void loop() {
  //Obstacle();
  //Bluetoothcontrol();
  //voicecontrol();
}
```

This function includes the Bluetooth control code. The code lines are described one by one in the code

```
void Bluetoothcontrol() {
//gets the serial communication values and puts them into the char
variable.
  if (Serial.available() > 0)
    {value = Serial.read();
    Serial.println(value);
  }
//Next, these values are checked using the IF condition.
//Then, if the char value is 'F', the car moves forward.
  if (value == 'F') {
    forward();
  }
//If the char value is "B", the car moves backward.
  } else if (value == 'B')
    {backward();
  }
//If the char value is "L", the car moves left.
  } else if (value == 'L')
    {left();
  }
//If the char value is "R", the car moves right.
  } else if (value == 'R')
    {right();
  }
//If the char value is "S", the car is stopped.
  } else if (value == 'S')
    {Stop();
  }
}
```

This function includes the obstacle-avoiding code. The code lines are described one by one in the code.

```
void Obstacle() {

//gets the ultrasonic sensor reading and puts it into the variable.
```



```

    distance = ultrasonic();

//then, these values are checked using the IF condition.
//If the value is less than or equal to 12,
//the robot is stopped and the servo motor rotate left and right.

// Also, gets both side distance.
    if (distance <= 12) {
        Stop();
        backward()
        ;
        delay(100)
        ;Stop();
        L = leftsee();
        servo.write(spoint)
        ;delay(800);
        R = rightsee();
        servo.write(spoint);

//After, if the left side distance less than the right side distance.
The robot turns right.
        if (L < R) {
            right();
            delay(500)
            ;Stop();
            delay(200);

//After, if the left side distance more than the right side distance.
The robot turns left.
        } else if (L > R) {
            left();
            delay(500)
            ;Stop();
            delay(200);
        }

//Otherwise, the robot moves forward.
    } else
    { forward(
    );
    }
}

```

This function includes the voice control code. The code lines are described one by one in the code.

```

void voicecontrol() {

//gets the serial communication values and puts them into the char
variable.
    if (Serial.available() > 0)
        {value = Serial.read();
        Serial.println(value);

//If the char value is "^", the car moves forward.
        if (value == '^') {
            forward();

//If the char value is "-", the car moves backward.
        } else if (value == '-')

```

```

        {backward()};

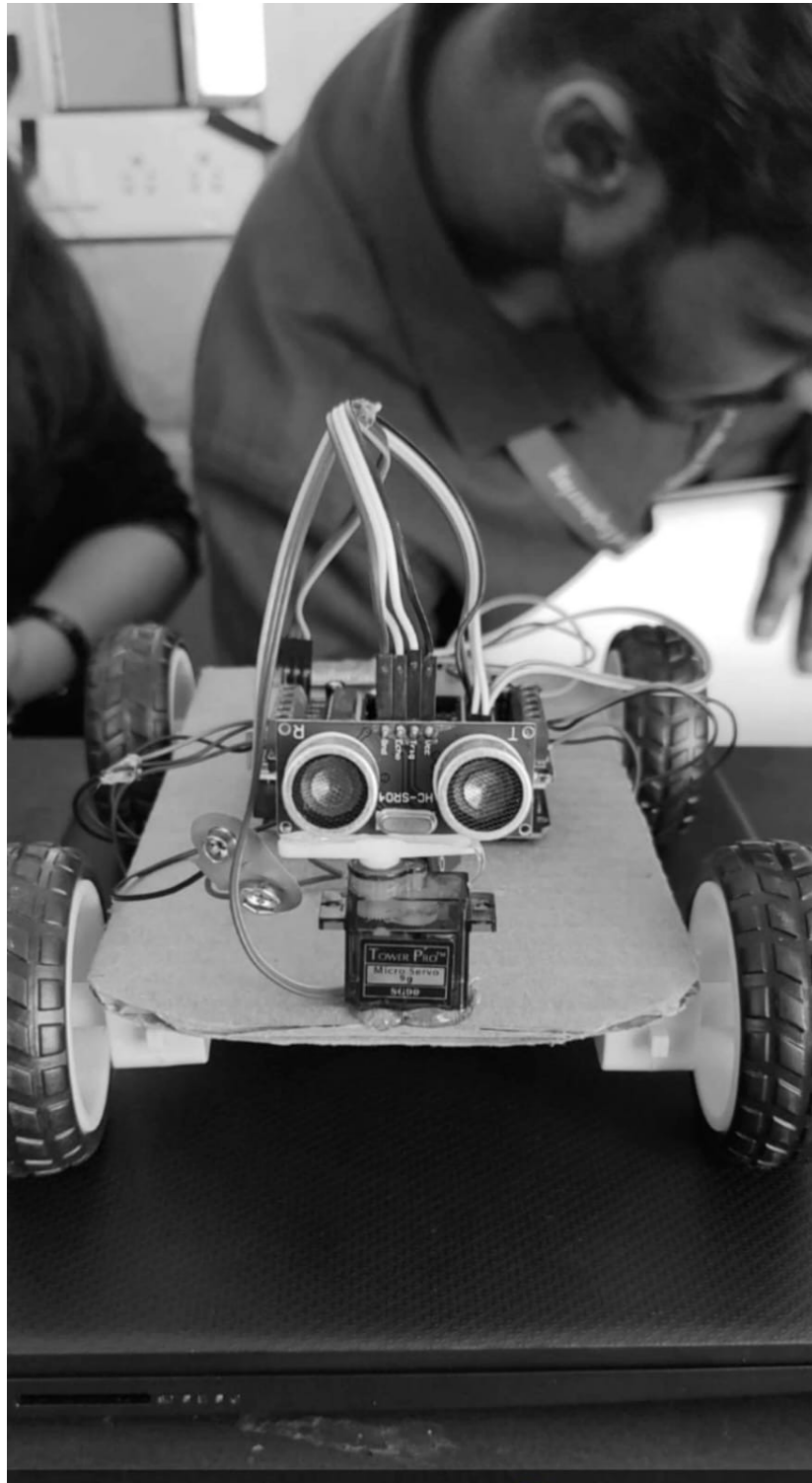
//If the char value is "<", the car moves left.
    } else if (value == '<')
    {L = leftsee();
    servo.write(spoint);
    if (L >= 10 ) {
        left();
        delay(500)
        ;Stop();
    } else if (L < 10)
    {Stop();
    }

//If the char value is ">", the car moves right.
    } else if (value == '>')
    {R = rightsee();
    servo.write(spoint);
    if (R >= 10 ) {
        right();
        delay(500)
        ;Stop();
    } else if (R < 10)
    {Stop();
    }

//If the char value is "*", the car is stopped.
    } else if (value == '*')
    {Stop();
    }
}
}

```

The final prototype :



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