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# Bluetooth Controlled Obstacle Avoider

# Computer Architecture Project

## Computer and Control Engineering



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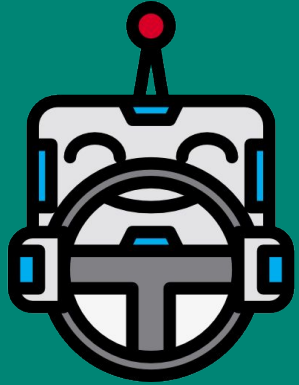
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# Bluetooth Controlled Obstacle Avoider

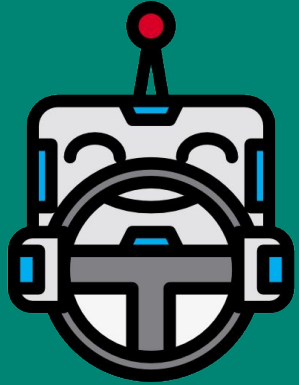


## INTRODUCTION

# Arduino

- ▶ Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor - and turn it into an output - activating a motor, turning on an LED, or publishing something online.
- ▶ Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

# Bluetooth Controlled Obstacle Avoider

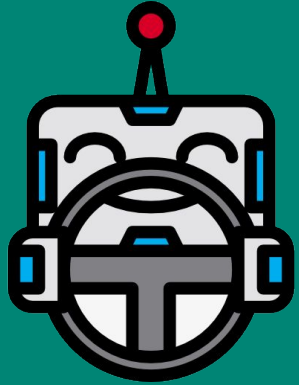


PROJECT DESCRIPTION

# Project Description

- ▷ Bluetooth Controlled Obstacle Avoider is a robot car integrated with an Arduino Board, Bluetooth Module, and Ultrasonic Sensors to get the information from the surrounding area and avoid any obstacle collisions.

# Bluetooth Controlled Obstacle Avoider



HARDWARE COMPONENTS

# Hardware Components

## Main Hardware Components

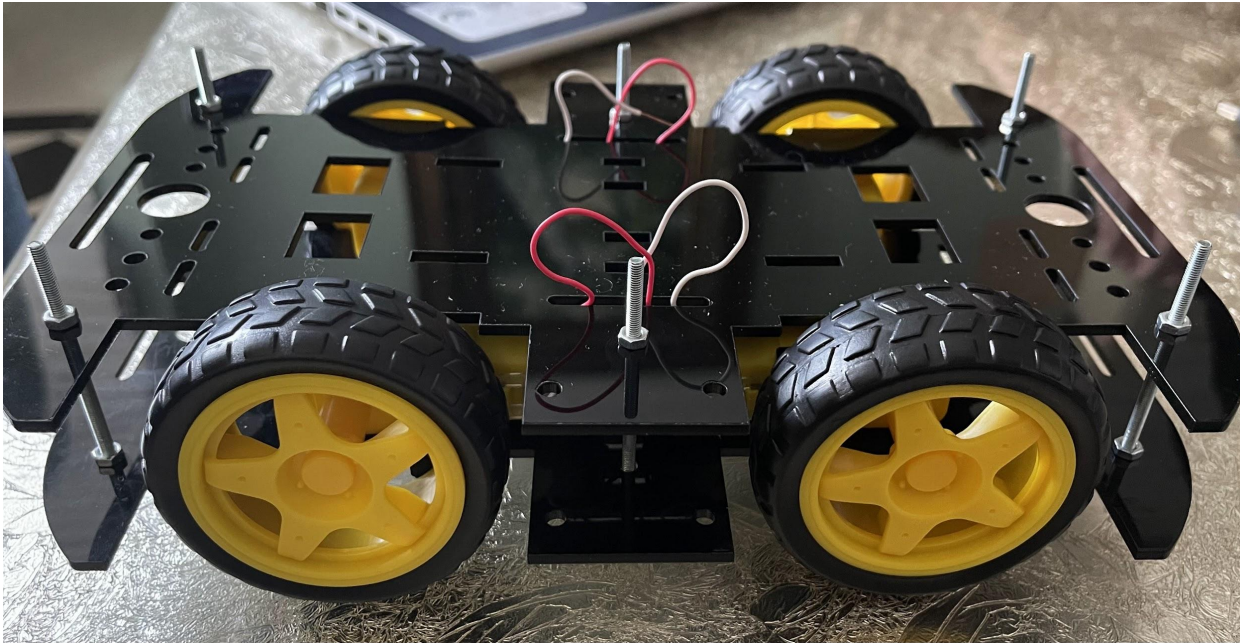
Robot Smart Car 4WD	1
Motor Driver Shield L293D	1
Arduino Uno Board	1
Ultrasonic Sensor & Distance Measurement HC-SR04	1
Servo Motor Micro	1
Bluetooth Module HC-05	1



# Hardware Components



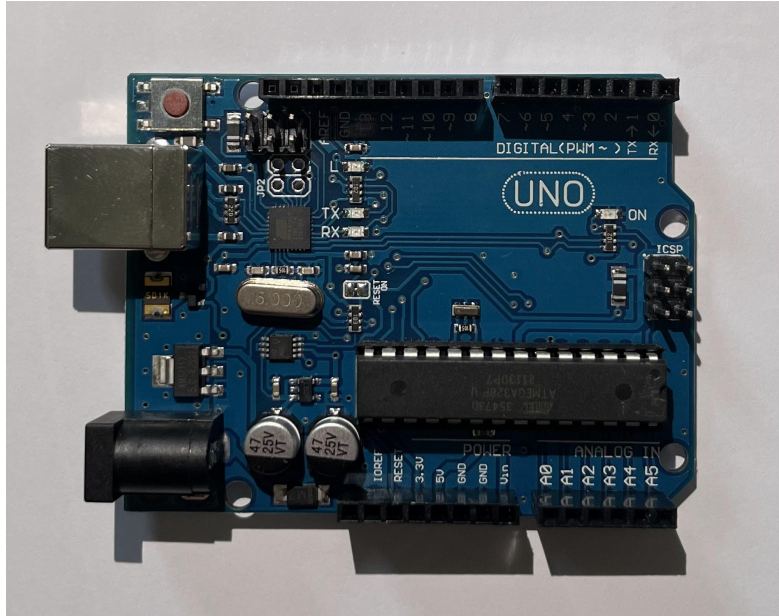
# Hardware Components



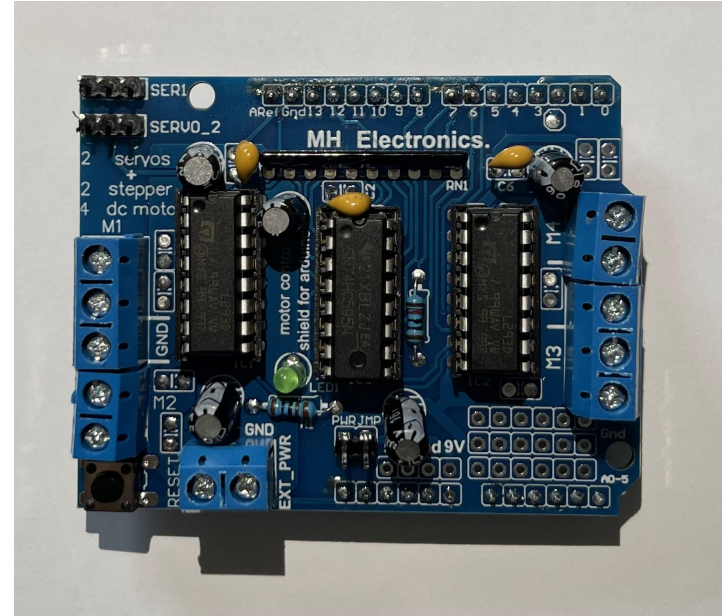
4 Wheels Robotic Car



# Hardware Components

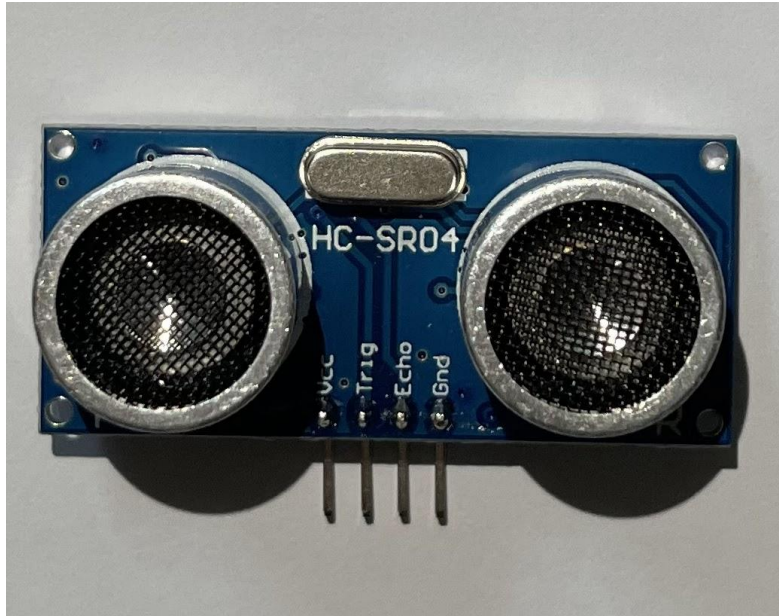


Arduino Uno Board

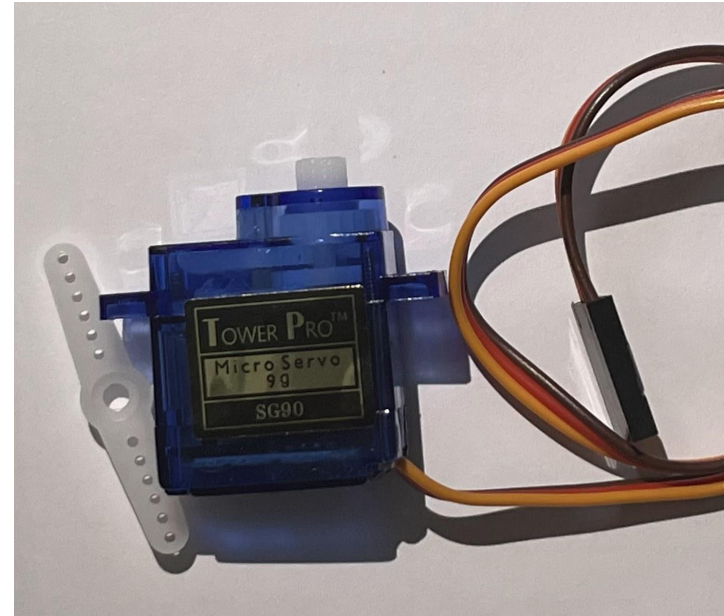


Motor Driver Shield L293D

# Hardware Components

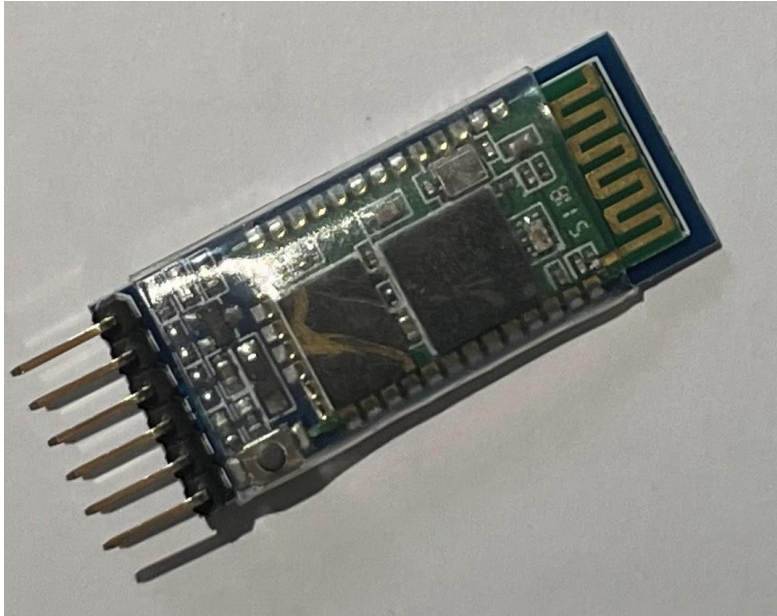


Ultrasonic Sensor & Distance Measurement  
HC-SR04

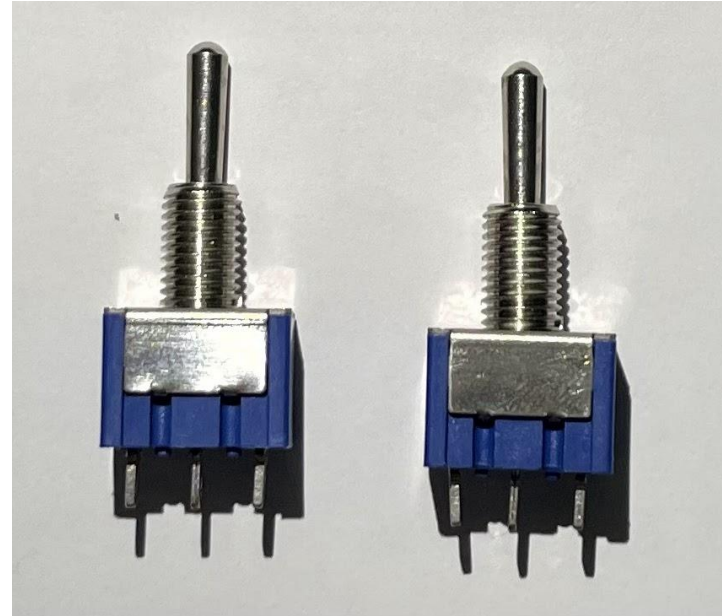


Servo Motor Micro

# Hardware Components

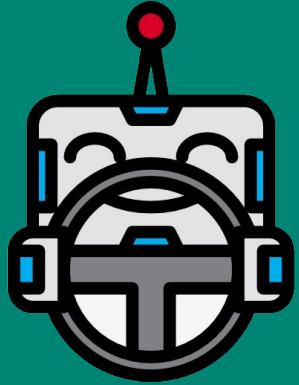


Bluetooth Module HC-05



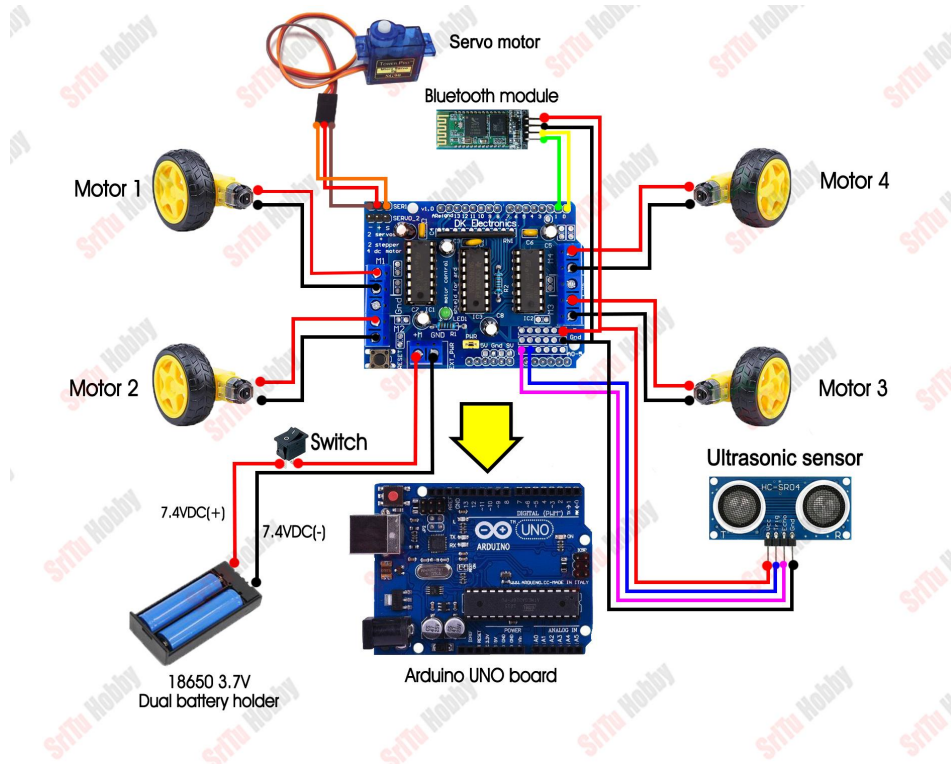
On/Off Toggles

# Bluetooth Controlled Obstacle Avoider



CIRCUIT OPERATION

# Circuit Diagram





# Circuit Connections

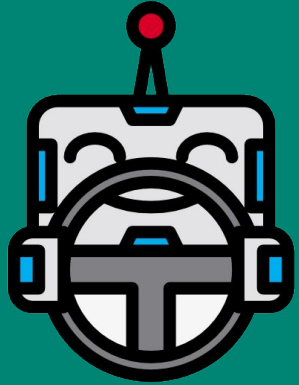
- ▷ Firstly, we connect the 4 DC motors to the Motor driver shield L293D, to do this we use the circuit diagram above.
- ▷ We connect two motors (M1,M2) to the channels for DC motors (1&2) and the other two (M3,M4) to the channels for DC motors (3&4).
- ▷ Then, we attach the Servo motor and Ultrasonic sensor to the channels for servo motors where GND → GND, echo → AO, Trig → A1, Vcc → 9v voltage source.



# Circuit Connections

- ▶ Afterward, we connect the Bluetooth module to the Motor driver shield L293D by welding the RXD → TX(D1), TXD → RX(D0) and connecting the GND → GND, Vcc → 9v voltage source.
- ▶ Next, we connect the Arduino Uno board to our Arduino IDE and upload our Arduino code. After uploading the code, we connect the Arduino Uno board to the motor driver shield L293D by pressing them together.
- ▶ Finally we connect the battery socket to the power port negative to the GND and positive to +M.

# Bluetooth Controlled Obstacle Avoider



ARDUINO CODE

# Arduino Code Explanation

Firstly, we include libraries used.

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

# Arduino Code Explanation

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
```

---

# Arduino Code Explanation

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;
```

# Arduino Code Explanation

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);
```

# Arduino Code Explanation

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);  
}
```

# Arduino Code Explanation

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();  
}
```



# Arduino Code Explanation

- Obstacle Avoider Function

```
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(); }  
}
```

# Arduino Code Explanation

- Bluetooth Control Function

---

```
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(); } }
```

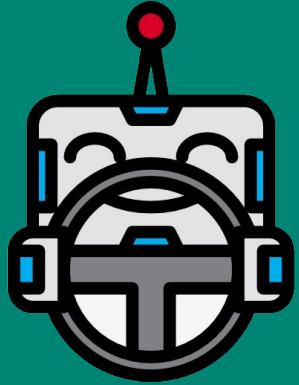
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# Arduino Code Explanation

- Voice Control Function

```
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(); } }  
}
```

# Bluetooth Controlled Obstacle Avoider

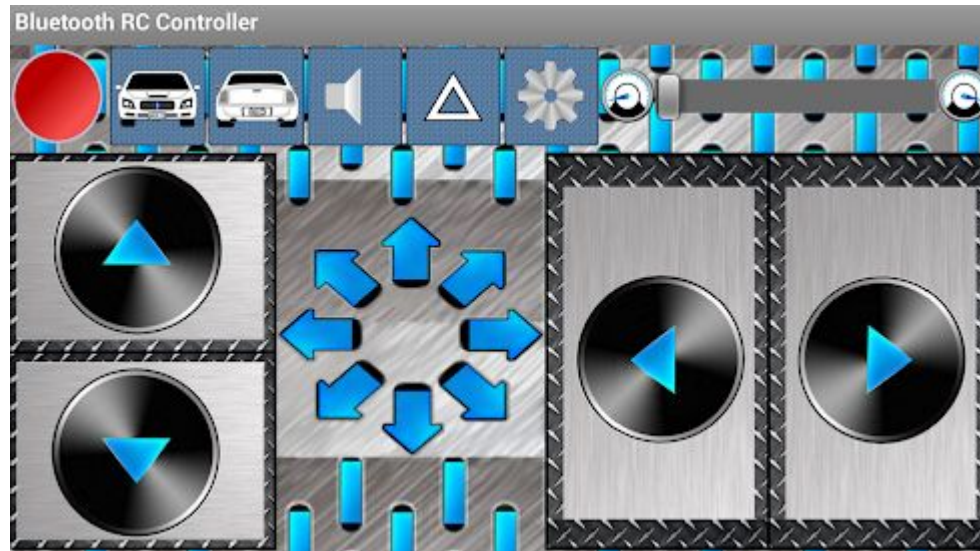


MOBILE APPLICATION

# Mobile Application

## Bluetooth Control

- ▷ Android app Bluetooth RC Car



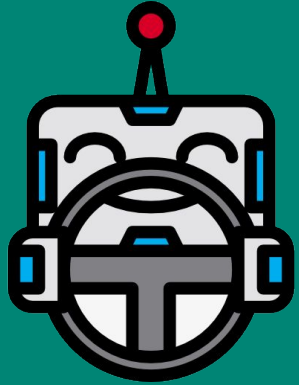
# Mobile Application

## Voice Control

- ▷ Android app Arduino Bluetooth Control



# Bluetooth Controlled Obstacle Avoider



PROJECT PROCESS





Thanks you!  
Any questions?

