

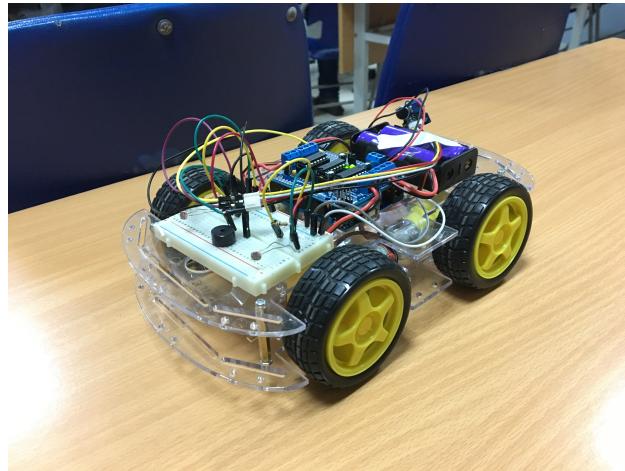
Light, Sound and Remote Controlled Robot

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1 Introduction

In this project, we make a controlled robot moving using **light**, **sound** and **bluetooth**.

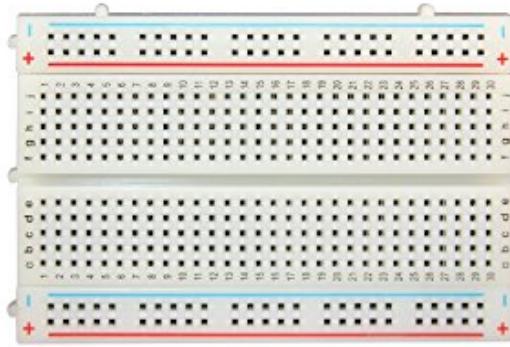


2 Components

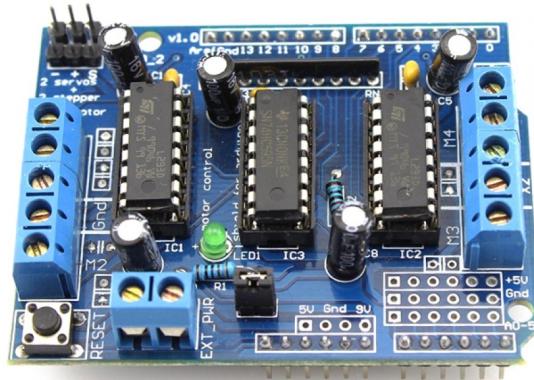
1. Arduino UNO R3



2. Breadboard



3. Motor Shield L293D



4. 4 wheels



5. Car frame



6. DC Motor V1 1:120



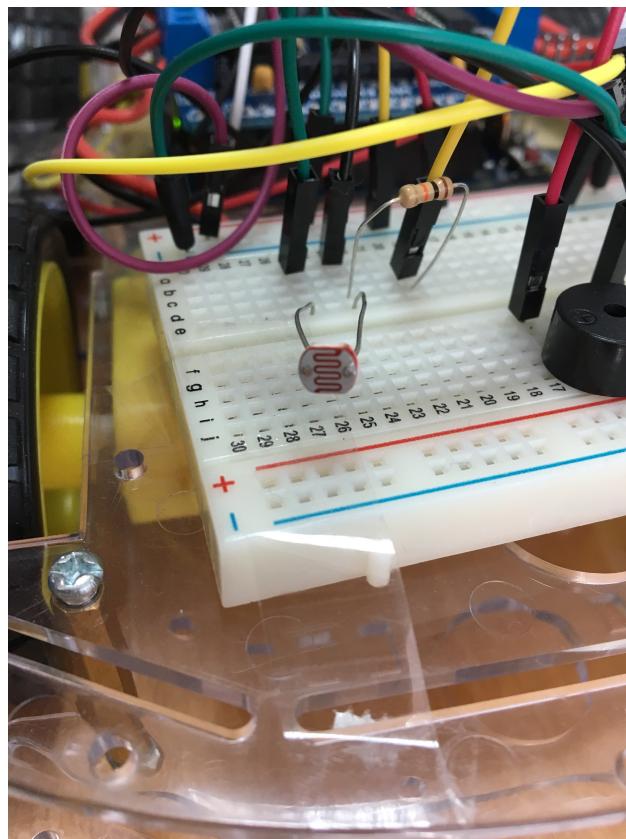
7. 2 Batteries UltraFire 18650 1200mAH 3.7V



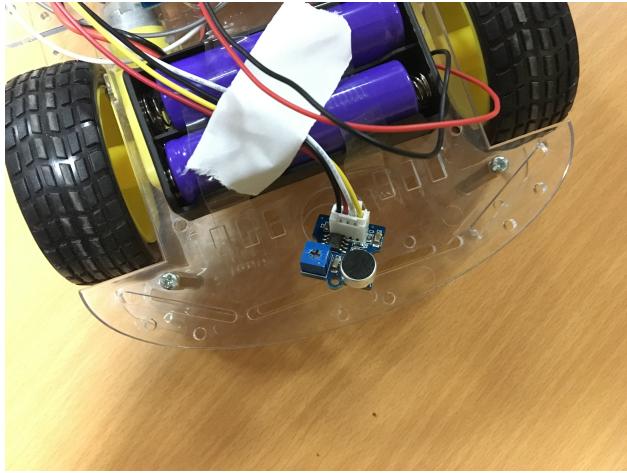
8. 2 Batteries UltraFire 18650 1200mAH 3.7V



9. 2 light sensors



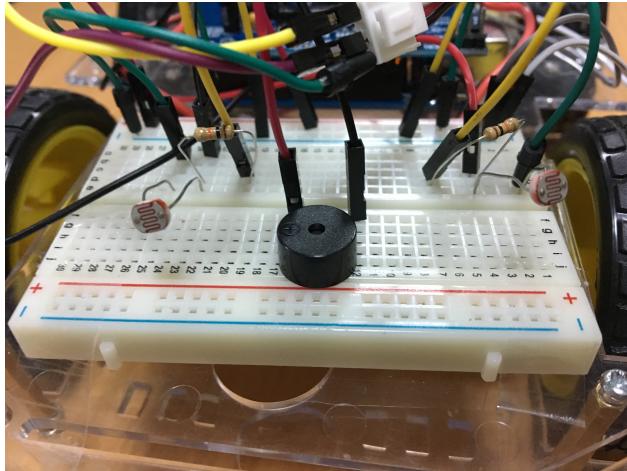
10. 1sound sensor v1.1



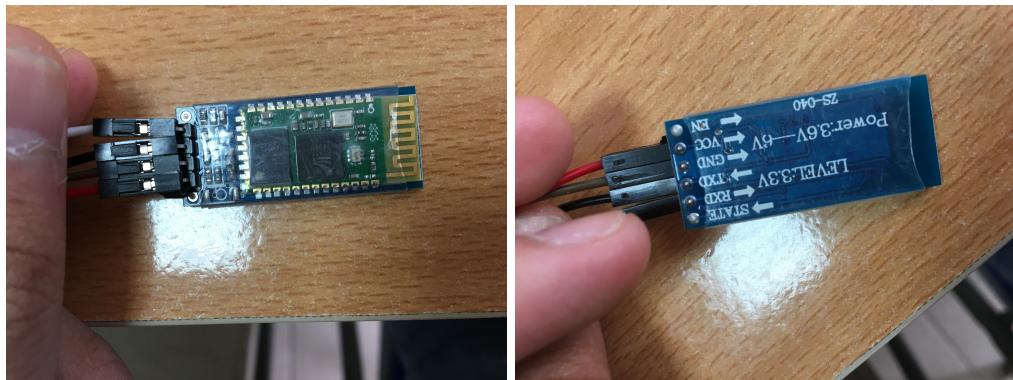
11. 2 10k Ohm Resistors



12. Speaker



13. Bluetooth sensor



3 How does it work?

4 Concept

Our robot will have 2 moving mode: **Following light** and **Run away from Sound**. Following light is the default mode. When the ambient sound is not too big, the robot will follow the light. When the intensity of ambient sound is large, the robot will try to run away from the sound by moving forward for 2 seconds, trigger the alarm and ignore the light.

In addition, we have another code to **control the robot remotely via bluetooth**. We use the mobile application from the Google Play named Bluetooth RC controller to connect to the bluetooth sensor of the robot.

4.1 Following light

We will place 2 light sensor at the front of the robot - 1 on the left and the other on the right as the figure below.

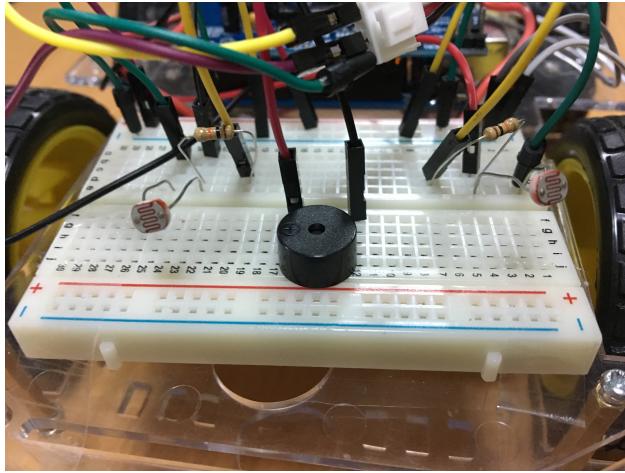


Figure 1: 2 light sensors on the left and right

After that, we measure the light intensity from the left and right in front of the robot using the two light sensors.

- If the difference between 2 sensors below 100 and both of them higher than 700, the robot move forward.
- If the left sensor higher than right sensor more than 100 value, the robot turn left, thus, the left sensor will move away from the light and the right sensor will move close to the light and when their different will be smaller than 100, the robot stop turning.
- If the right sensor higher than left sensor more than 100 value, the robot turn right, thus, the right sensor will move away from the light and the left sensor will move close to the light and when their different will be smaller than 100, the robot stop turning.

```

1 if (lightLeft > 700 || lightRight > 700) {
2     int sub = lightLeft - lightRight;
3     if (abs(sub) < 100) {
4         forward();
5     } else if (sub > 100) {
6         left();
7     } else {
8         right();
9     }
10 }
```

4.2 Sound control

We measure the value of the sound sensor, when the value is higher than a threshold, in our case we take 500. The robot will ignore the light, trigger the speaker and move forward for 2 seconds. After that, the robot will return to their normal mode: Following light.

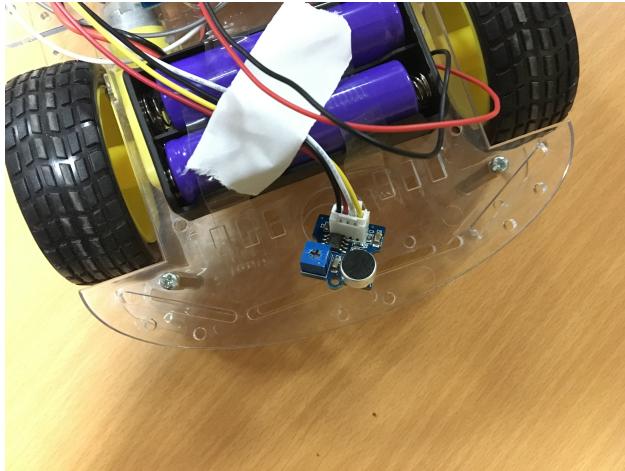


Figure 2: The sound sensor in the back of the robot

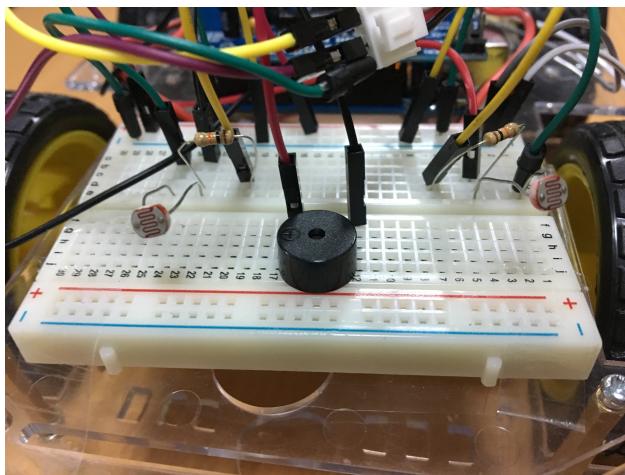


Figure 3: The Speaker triggered when the ambient sound is too large

```
1 int soundRec = analogRead(A2);
2 Serial.println(soundRec);
3 if(soundRec > 500) {
4     forward();
5     analogWrite(alarm, 100);
6     delay(500);
7     analogWrite(alarm, 255);
8     delay(1500);
9 }
```

4.3 Bluetooth Remote Control

We read the bluetooth signal from the mobile application sent through the bluetooth sensor to the robot. Base on the signal value: F, B, L, R, we will move the robot respectively.

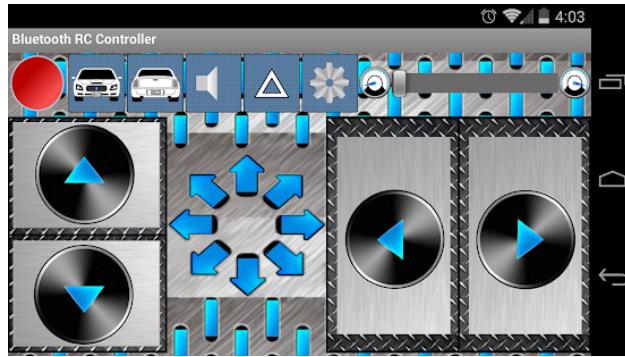


Figure 4: The Remote Control Application

```

1 if ( Serial.available() > 0){
2     command = Serial.read();
3     Stop();
4     switch(command){
5         case 'F':
6             forward();
7             break;
8         case 'B':
9             back();
10            break;
11        case 'L':
12            left();
13            break;
14        case 'R':
15            right();
16            break;
17    }
18 }
```

4.4 Navigation Code

4.4.1 Move Forward

```

1 void forward() {
2     motor4.setSpeed(150);
3     motor4.run(FORWARD);
4     motor2.setSpeed(150);
5     motor2.run(FORWARD);
6     motor3.setSpeed(150);
7     motor3.run(BACKWARD);
8     motor1.setSpeed(150);
9     motor1.run(BACKWARD);
10 }
```

4.4.2 Move Backward

```

1 void back() {
2     motor3.setSpeed(150);
3     motor3.run(FORWARD);
4     motor1.setSpeed(150);
5     motor1.run(FORWARD);
6     motor4.setSpeed(150);
```

```
7   motor4.run(BACKWARD);  
8   motor2.setSpeed(150);  
9   motor2.run(BACKWARD);  
10 }
```

4.4.3 Stop

```
1 void Stop() {  
2   motor1.setSpeed(0);  
3   motor1.run(RELEASE);  
4   motor2.setSpeed(0);  
5   motor2.run(RELEASE);  
6   motor3.setSpeed(0);  
7   motor3.run(RELEASE);  
8   motor4.setSpeed(0);  
9   motor4.run(RELEASE);  
10 }
```

4.4.4 Turn right

```
1 void right() {  
2   motor1.setSpeed(150);  
3   motor1.run(BACKWARD);  
4   motor2.setSpeed(150);  
5   motor2.run(FORWARD);  
6   motor3.setSpeed(150);  
7   motor3.run(FORWARD);  
8   motor4.setSpeed(150);  
9   motor4.run(BACKWARD);  
10 }
```

4.4.5 Turn left

```
1 void left() {  
2   motor1.setSpeed(150);  
3   motor1.run(FORWARD);  
4   motor2.setSpeed(150);  
5   motor2.run(BACKWARD);  
6   motor3.setSpeed(150);  
7   motor3.run(BACKWARD);  
8   motor4.setSpeed(150);  
9   motor4.run(FORWARD);  
10 }
```

5 Resouces

5.1 Code Repository

Our code: <https://github.com/caoquan95/Light-Sound-and-Remote-Controlled-arduino-Robot>

5.2 Some images of our robot

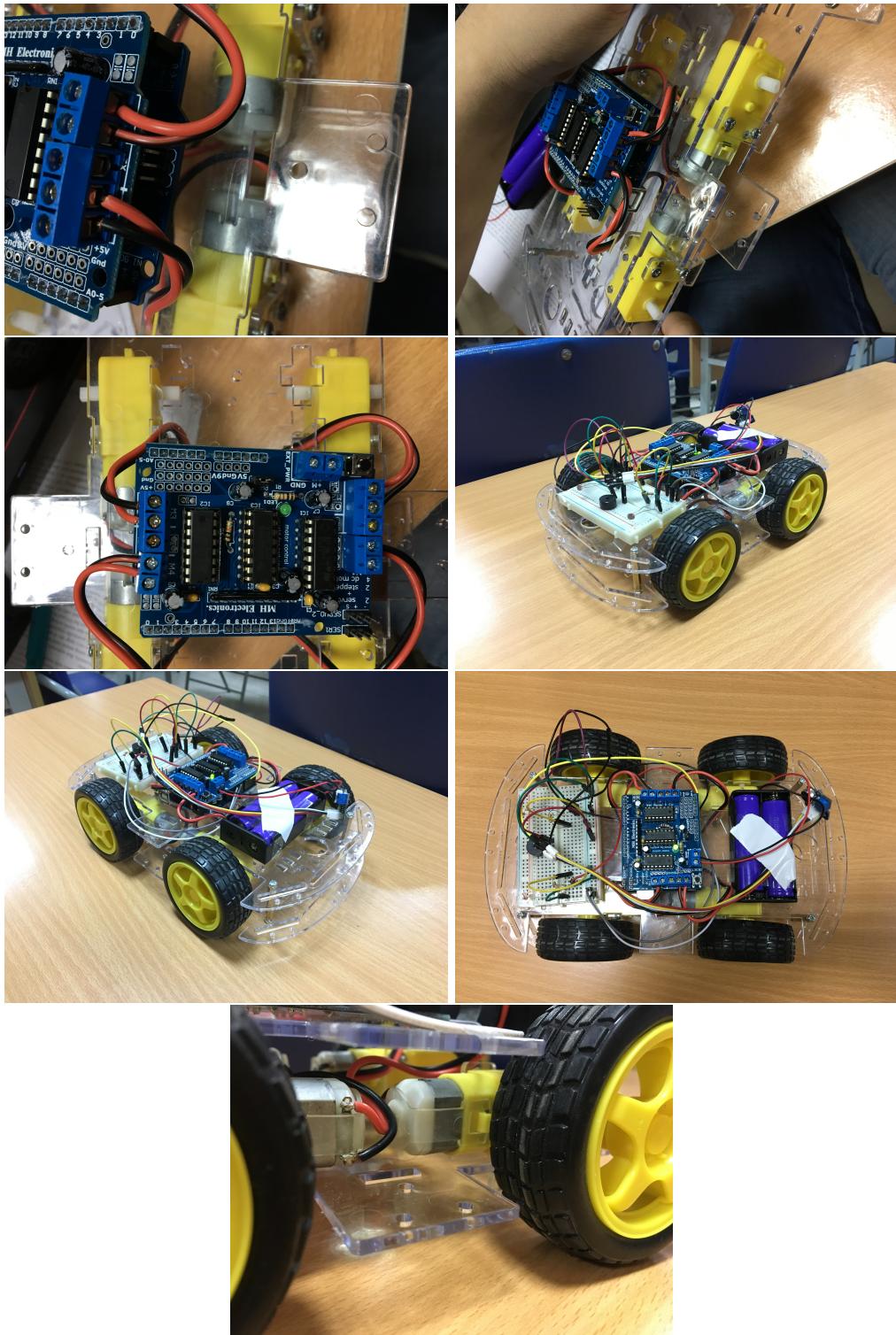


Figure 5: Some images of our robot

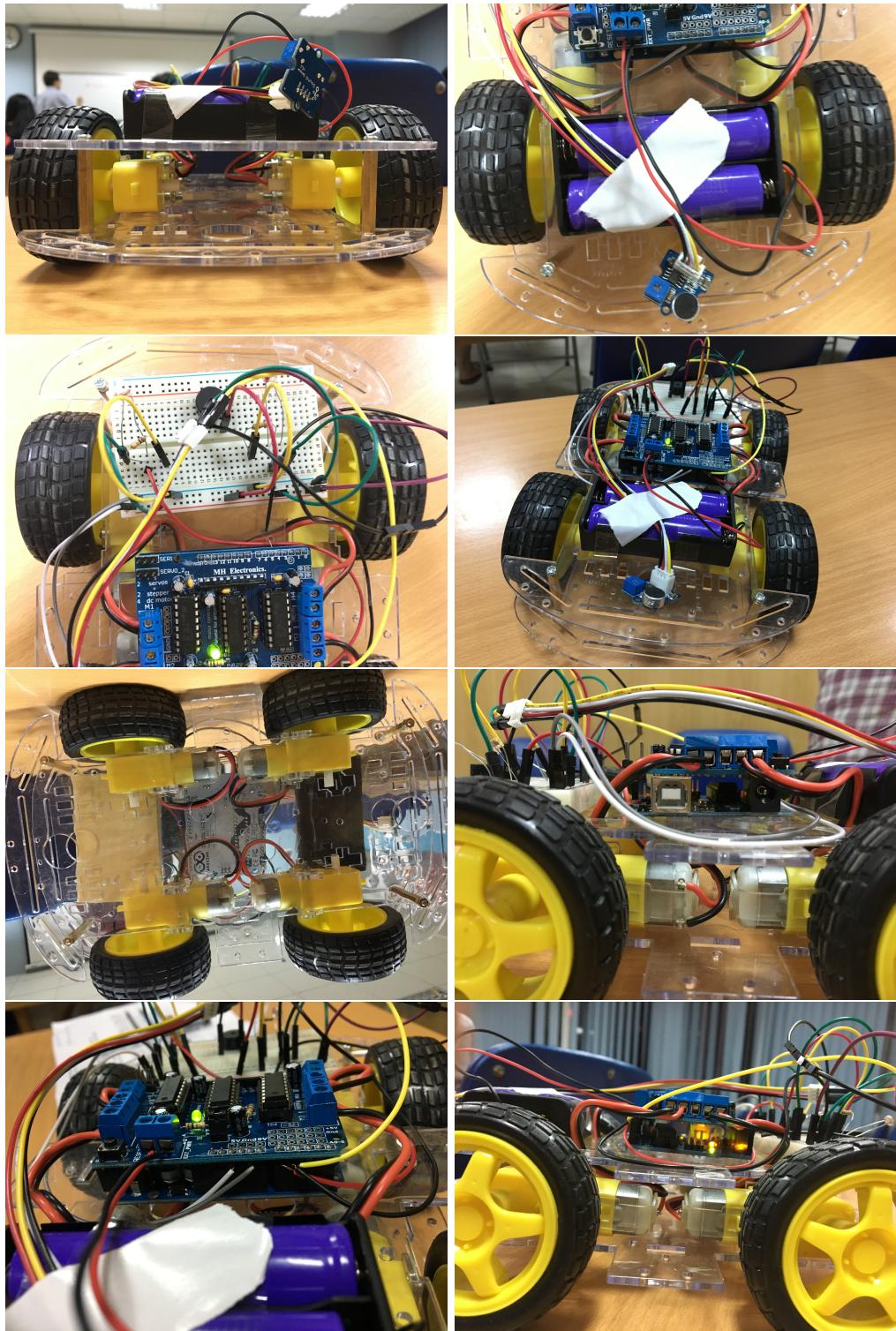


Figure 6: Some images of our robot

5.3 Some videos of our robot

- Following light <https://youtu.be/1tsyB0b0w3c>

- Run away from sound https://youtu.be/VDh_JN8s3qU
- Both following light and run away from sound <https://youtu.be/egxK66p-Jx0>
- Bluetooth Remote control <https://youtu.be/VQYGV-9KfVE>