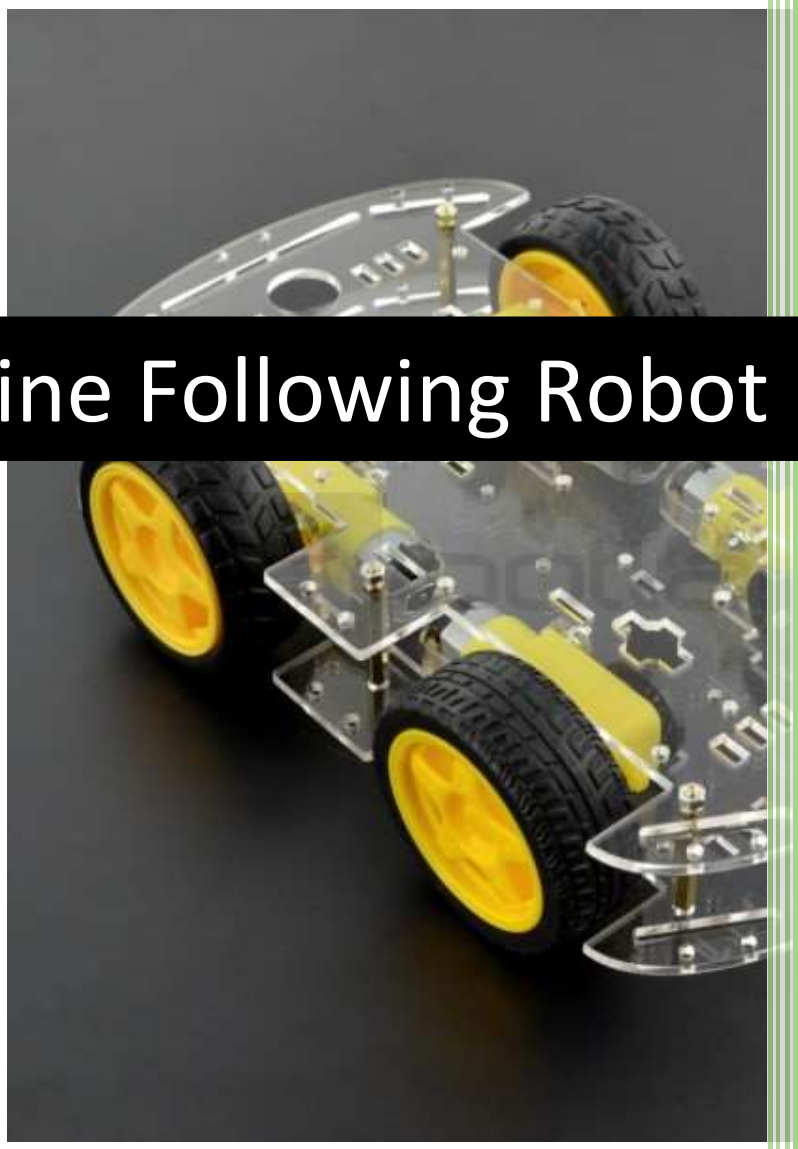
HDSE 21.1F



Line Following Robot Document

S.R.W.Wellala (MAHDSE21.1F-006)

NIBM Matara Campus

HDSE 21.1F

Table of Content

Contents

Table of Figures

Hardware Requirements

1. Arduino Mega / Uno / Nano Board
2. 4 Wheels chassis (4 Wheels, 4 Motors, 4 Battery holder, Bolt & Nuts)
3. Motor Shied Drive (L293D)
4. Battery (18650 model - 2 Batteries)
5. Battery Charger
6. Battery Holder (18650 model - 2 Battery holder)
7. Switch
8. IR Sensors (5 IR Sensors)
9. Jumper Wires (F-F & M-F & M-M)

Arduino Uno Board

Figure 1 Arduino Uno Board

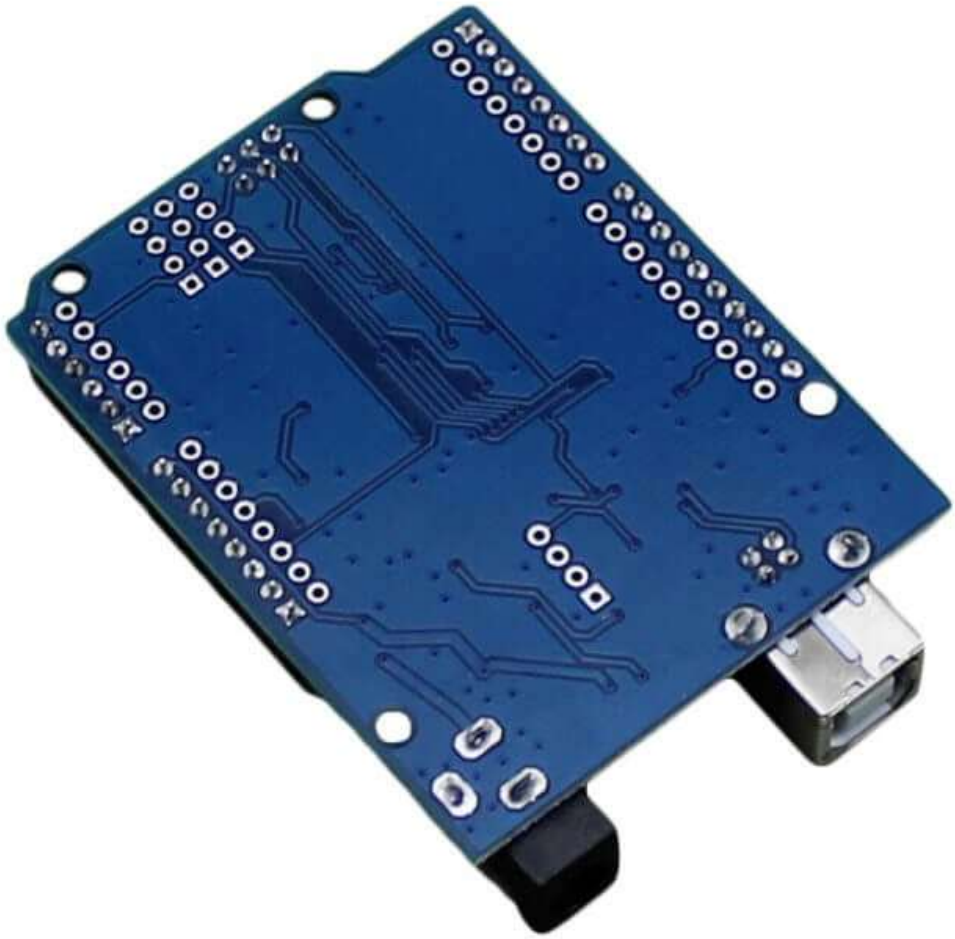


Figure 2 Arduino Uno Board - Other Side

4 Wheel chassis (in package)

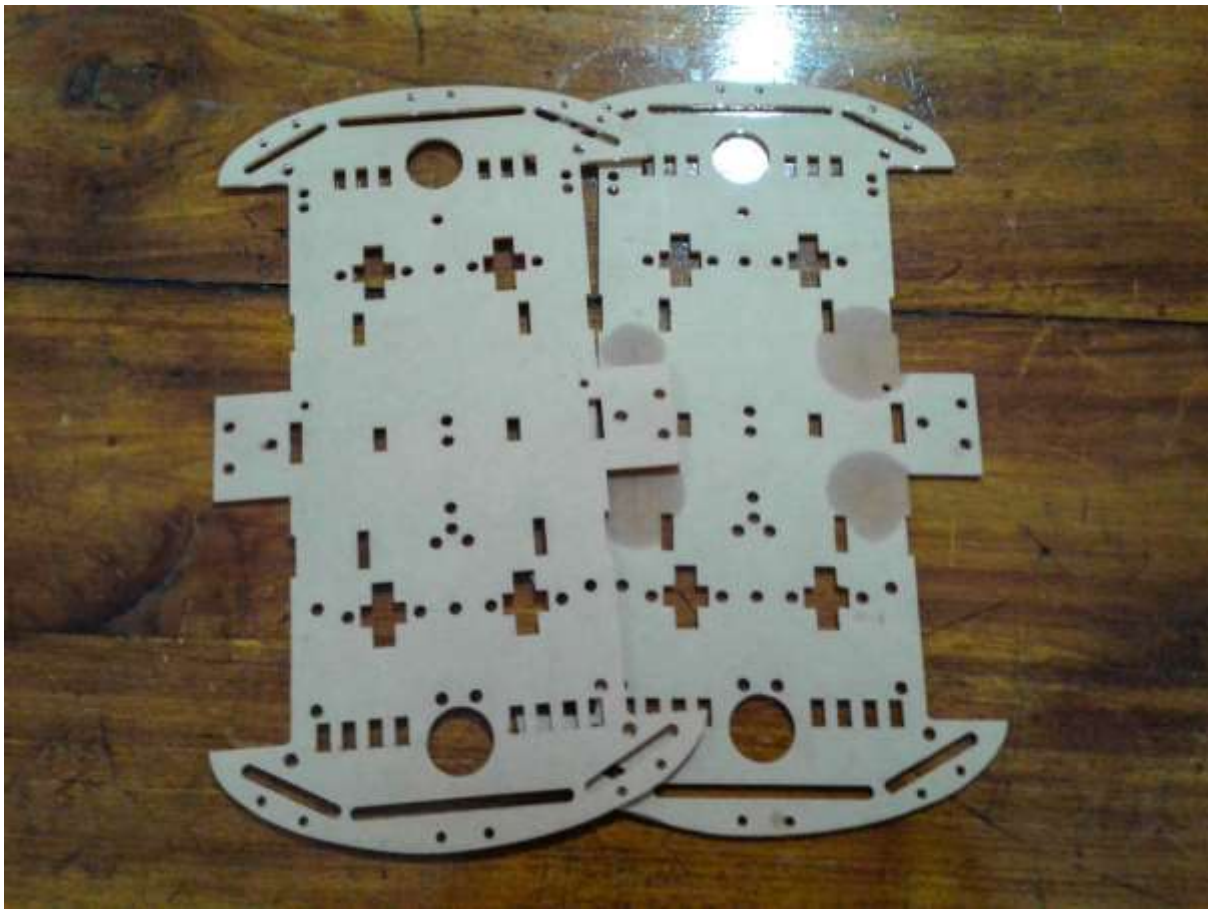


Figure 3

Figure 4 Four Wheels

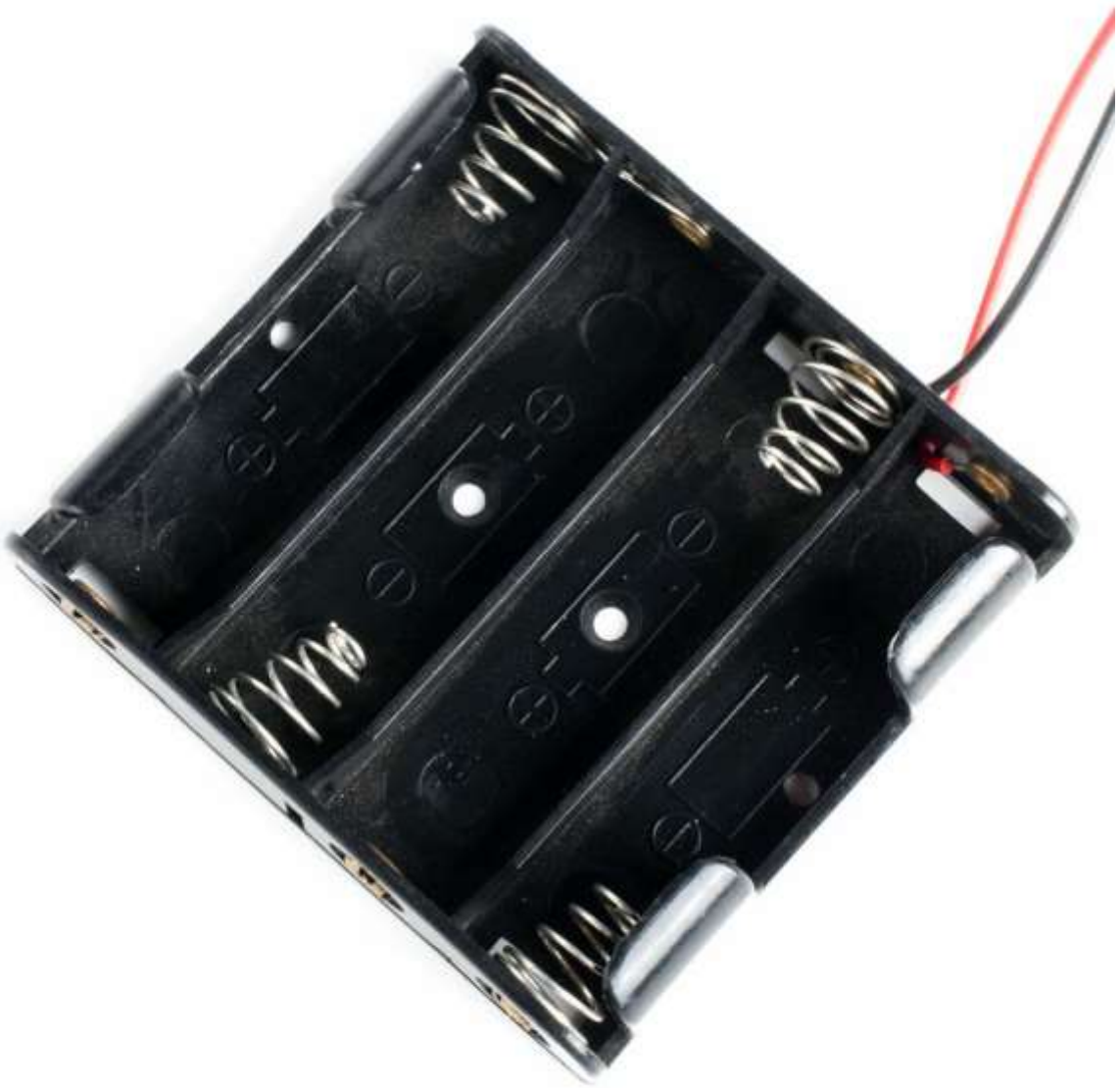


Figure 5 Four Battery Holder

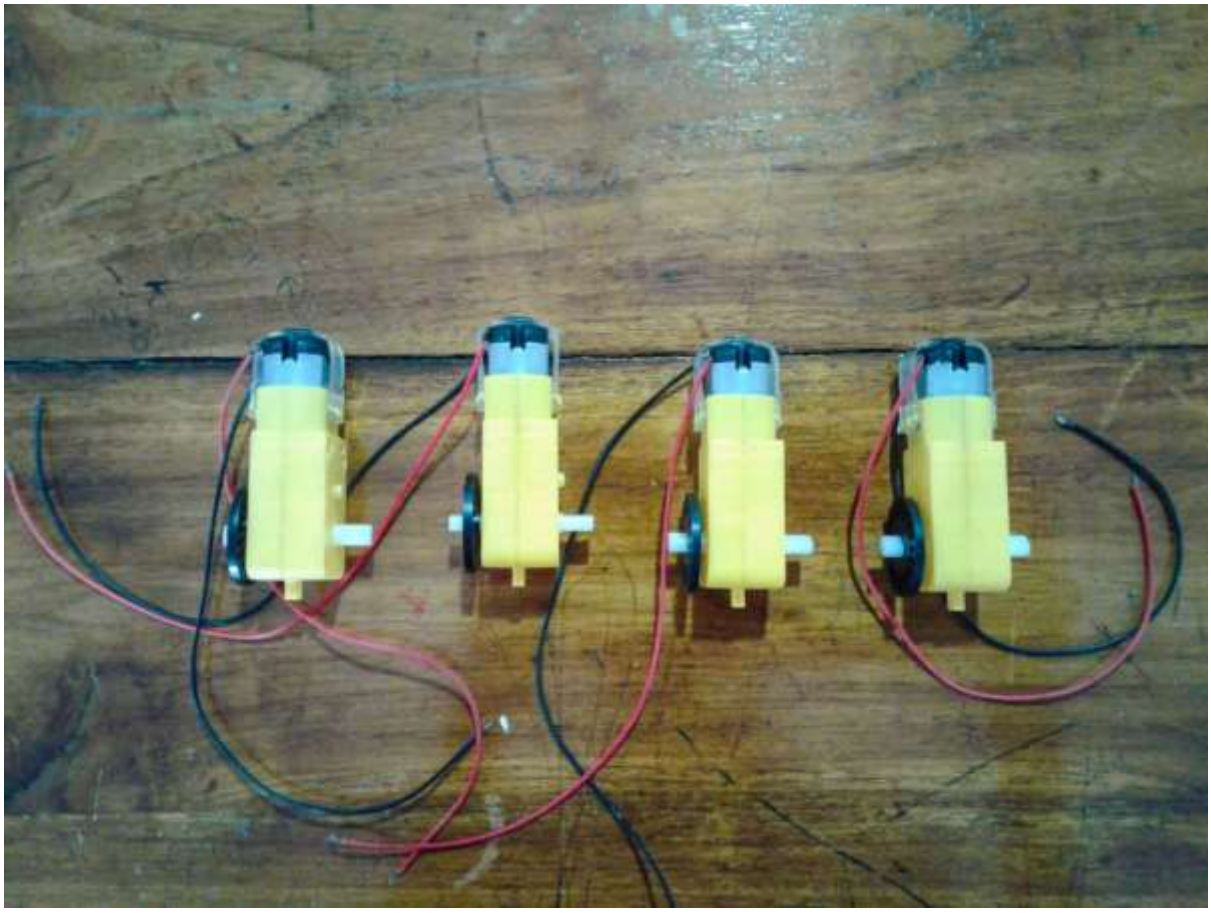


Figure 6 Four Motors

Figure 7 Bolt & Nuts

Speed Encoder

Figure 8 Speed Encoder

All Parts in one

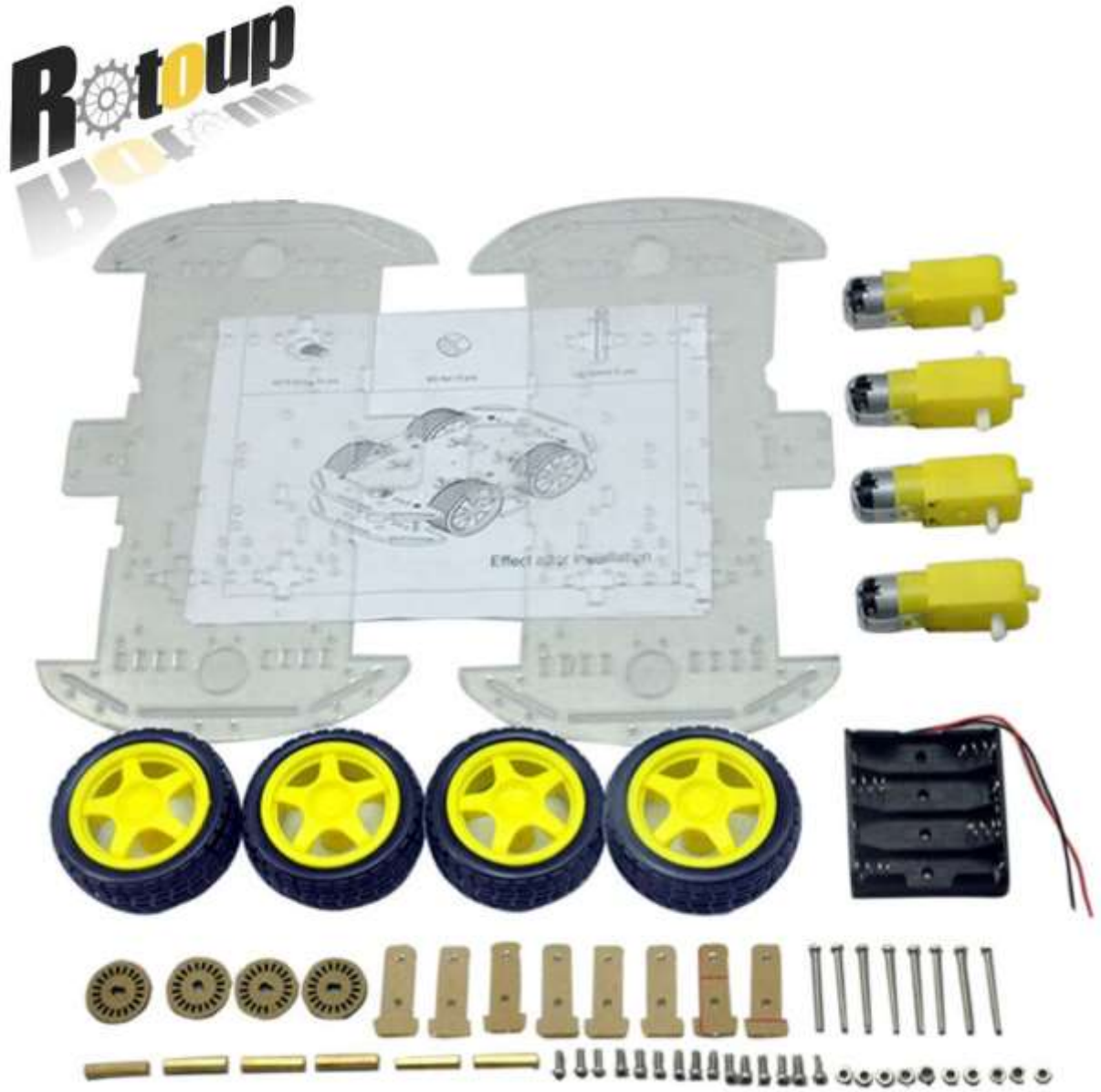


Figure 9 All parts in one

Final Structure in package

Figure 10 Final Robot Structure

Motor Shied Drive

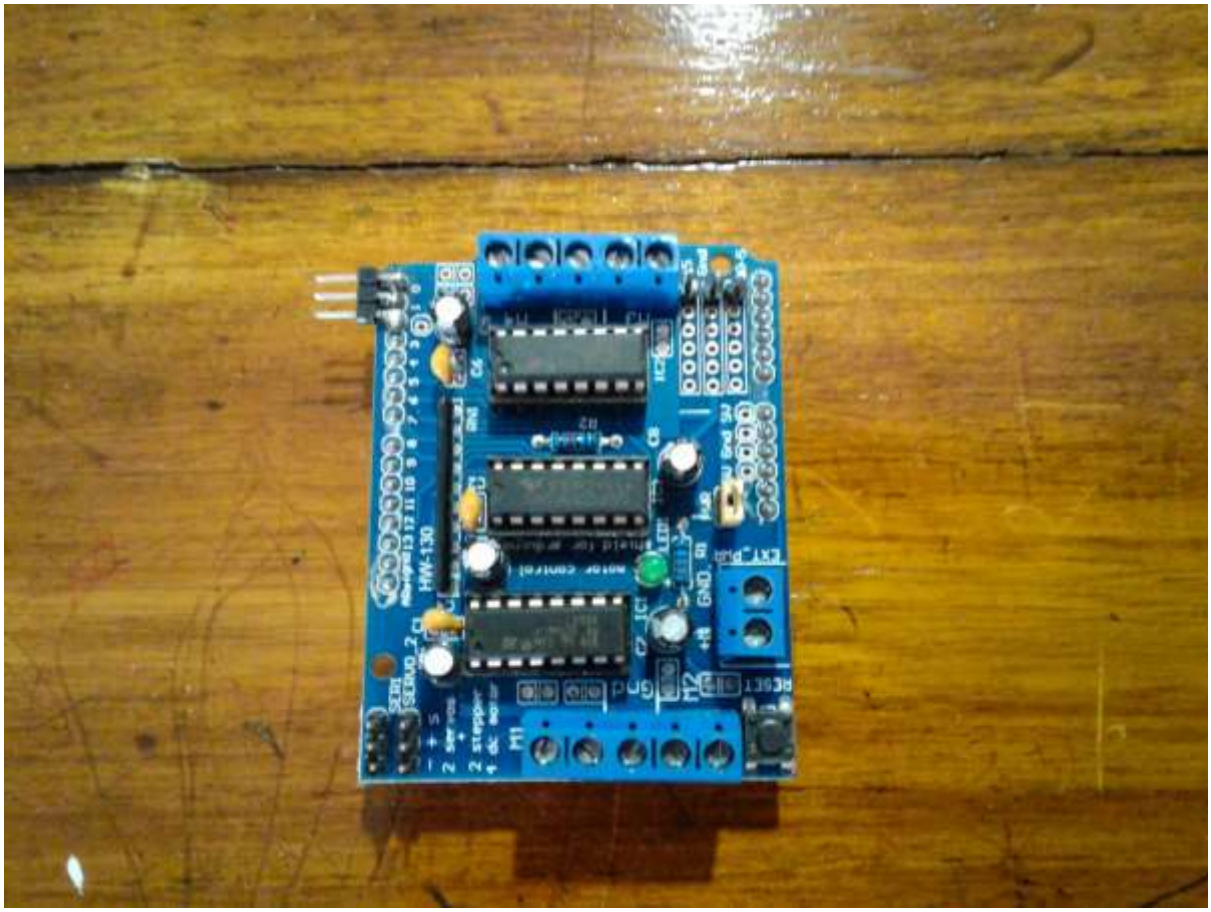


Figure 11 Motor Shied Drive

Battery

Figure 12 Battery

Battery Charger

Figure 13 Battery Charger

Battery Holder

Figure 14 Battery Holder

Switch

Figure 15 Switch

After connecting the switch and battery holder

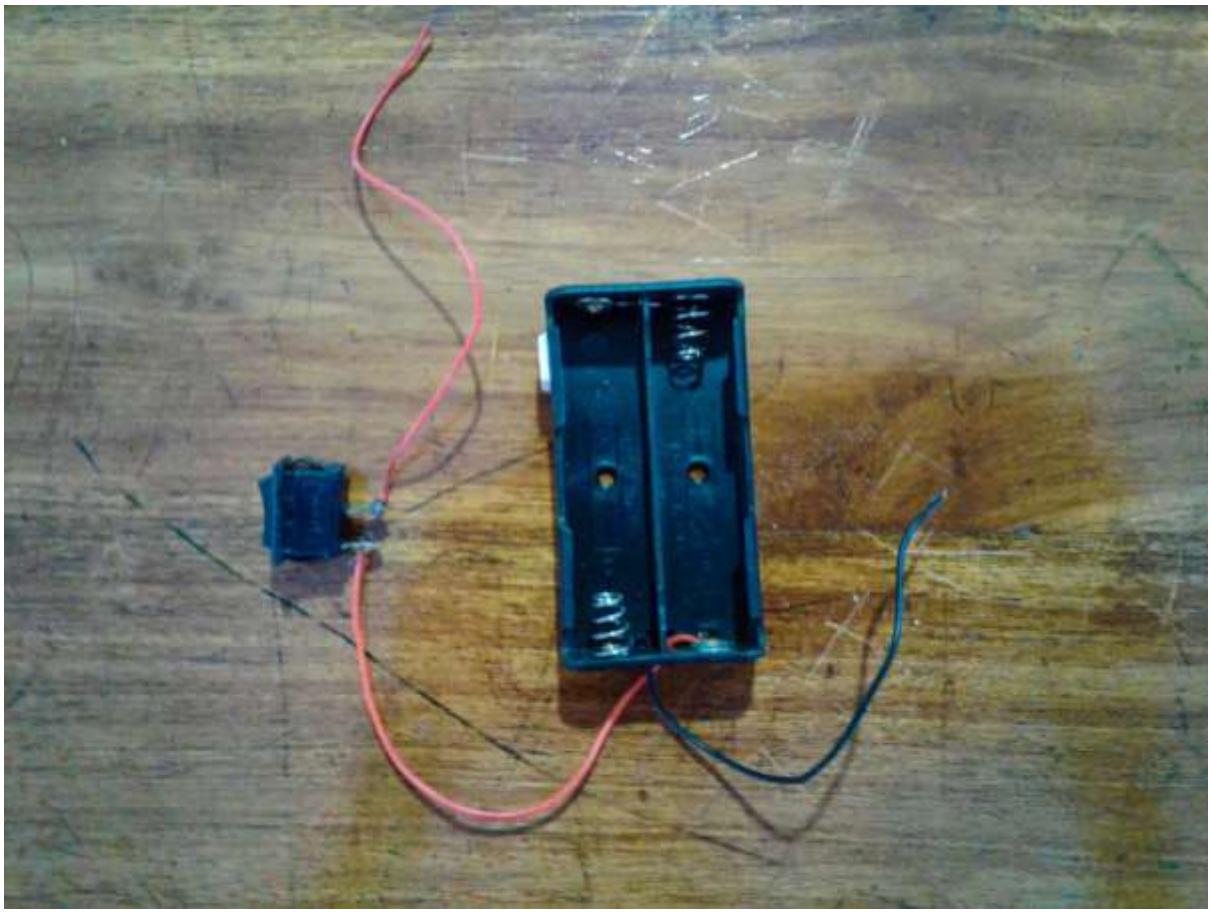


Figure 16 After connecting the switch and holder

IR Sensors

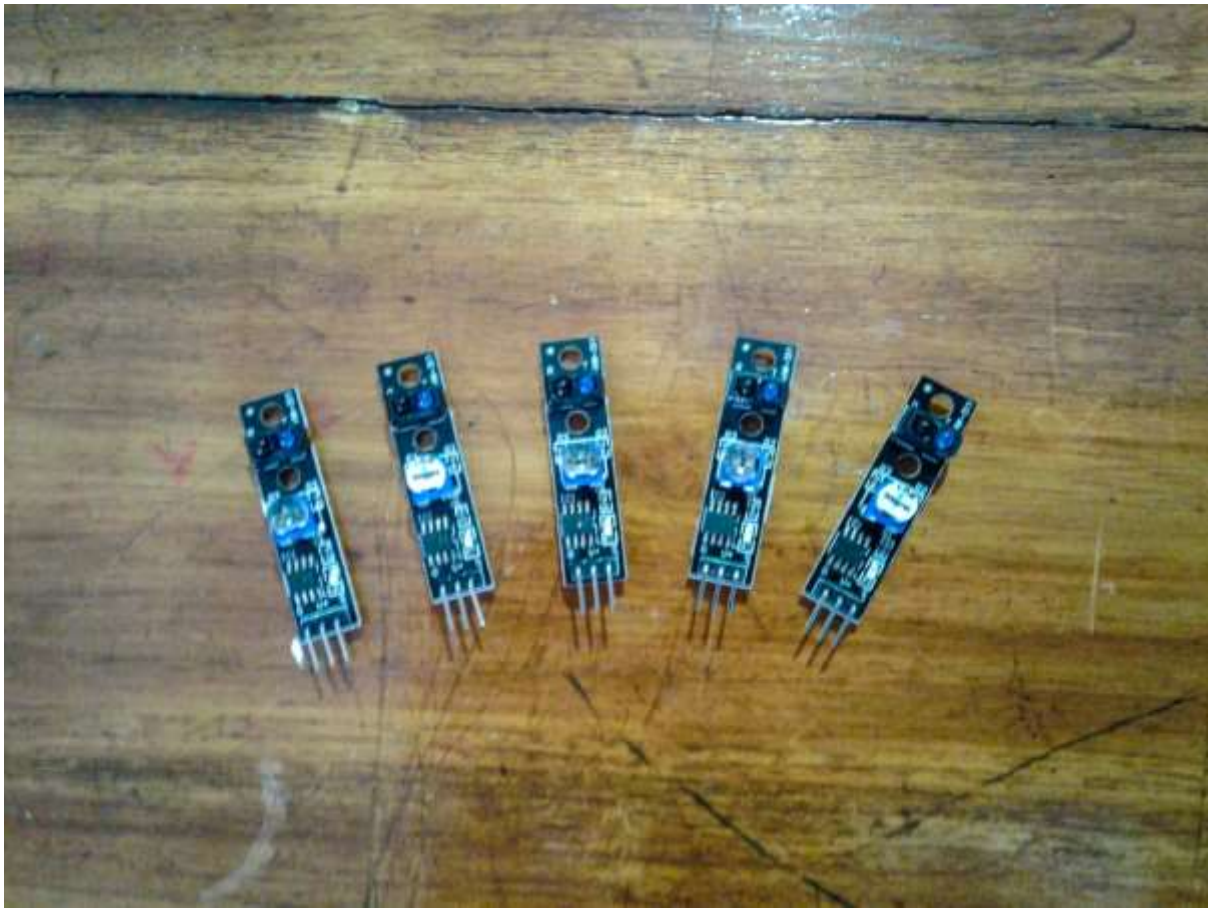


Figure 17 IR Sensors

Jumper Wires

Figure 18 Jumper Wires

Final Output

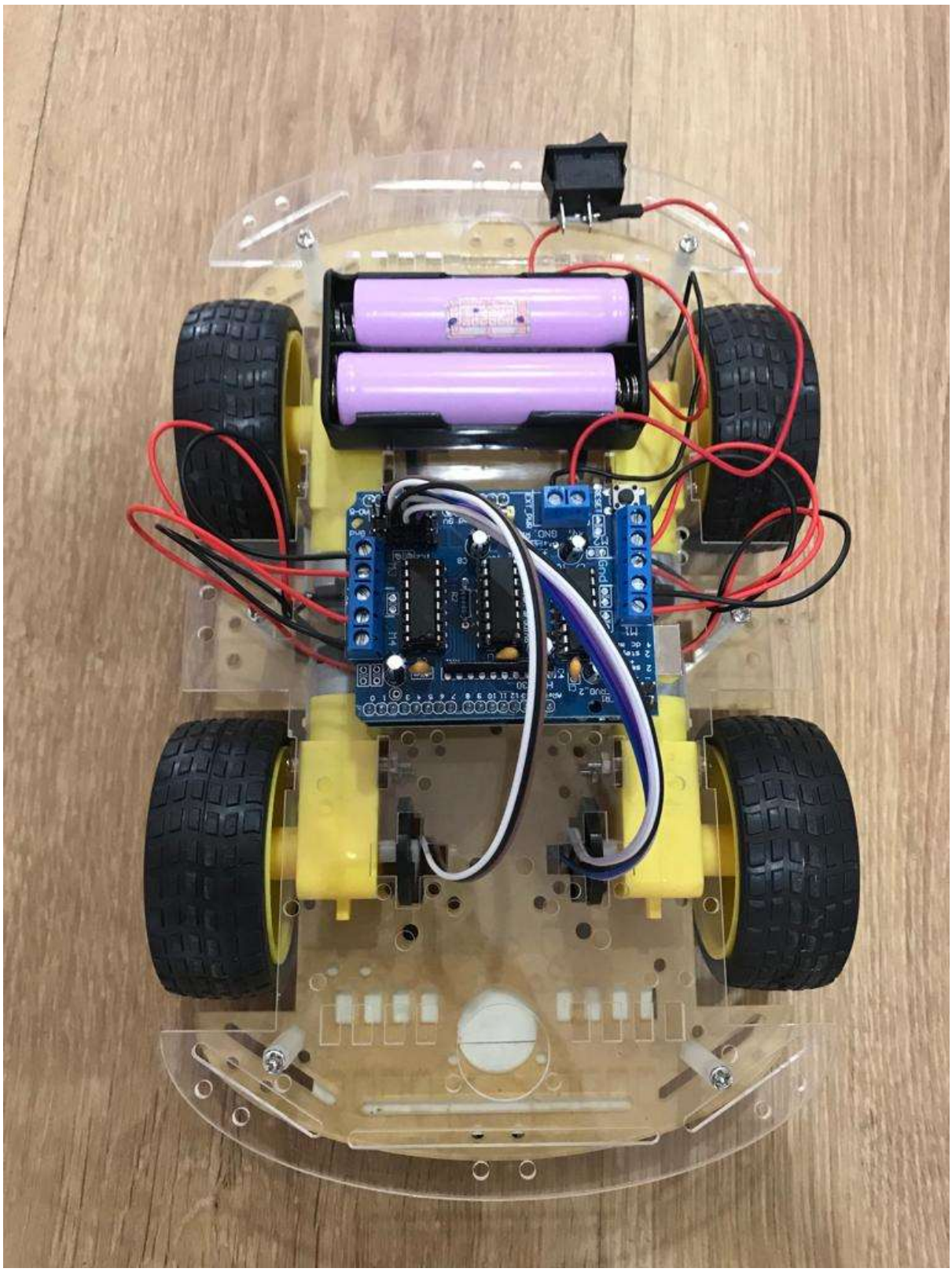


Figure 19 Final Output

Assembling

- First get a four wheel chassis kit.
- Solder all four motors with a red wire on one side and a black wire on the other side of the motor.
- Install the speed encoder with a nail-like rod on the back of the motor.
- Then place the layer board on top of the encoder so that it comes in. Take a piece of plastic from the inside of the kit, put it in the corner, take a screw and send it inside and tighten it with a nut in the other corner.
- Then set the wheels to the motor.
- Set the motor on all four sides of that layer board and set the wheels.
- Place the 6 pieces of gold color poles inside the kit package on top of the layer board and set with a screw at the bottom.
- Place the other layer board on top of the structure and set it with screws.
- Hold the battery holder with double tape over the top layer.
- Place the two red and black wires on the battery holder on either side of the switch and solder.
- Hold the Uno board to the top layer with a double tape.
- Hold the motor shield drive so that the pins on the Uno board do not change.
- Before that, solder the head pins to the motor shield drive. (To make it easier to wire and transfer data correctly)
- Then choose the front of the structure and hold the sensors. (Using the jumper wires)
- The structure of the robot has been completed.

Functionality

- The robot goes in a straight line.
- Turn right, left.
- Take the bend.
- Take the L shape.
- Staying the dead end.

Code

```
//including the libraries
#include <AFMotor.h>

//defining pins and variables

#define left A2
#define center A1
#define right A4

//defining motors
AF_DCMotor motor1(1, MOTOR12_1KHZ);
AF_DCMotor motor2(2, MOTOR12_1KHZ);
AF_DCMotor motor3(3, MOTOR34_1KHZ);
AF_DCMotor motor4(4, MOTOR34_1KHZ);

void setup() {
 //declaring pin types

  pinMode(left,INPUT);
  pinMode(right,INPUT);
```

```
  pinMode(center,INPUT);
  //begin serial communication
  Serial.begin(9600);

}

void loop(){
  //printing values of the sensors to the serial monitor
  int left = digitalRead(left);
  int center = digitalRead(center);
  int right = digitalRead(right);

  //line detected by both
  if(left==0 && center==1 && right==0){
    //Forward
    motor1.run(FORWARD);
    motor1.setSpeed(110);
    motor2.run(FORWARD);
    motor2.setSpeed(110);
    motor3.run(FORWARD);
    motor3.setSpeed(110);
    motor4.run(FORWARD);
    motor4.setSpeed(110);
  }
  //line detected by left sensor
  else if(left==1 && center==0 && right==0){
    //turn left
```

```
  motor1.run(BACKWARD);
  motor1.setSpeed(140);
  motor2.run(BACKWARD);
  motor2.setSpeed(140);
  motor3.run(FORWARD);
  motor3.setSpeed(110);
  motor4.run(FORWARD);
  motor4.setSpeed(110);

}
//line detected by right sensor
else if(left==0 && center==0 && right==1){
  //turn right
  motor1.run(FORWARD);
  motor1.setSpeed(110);
  motor2.run(FORWARD);
  motor2.setSpeed(110);
  motor3.run(BACKWARD);
  motor3.setSpeed(140);
  motor4.run(BACKWARD);
  motor4.setSpeed(140);

}

else if(left==1 && center==1 && right==1){
 //Stop
  motor1.run(BRAKE);
```

```
    motor1.setSpeed(0);
    motor2.run(BRAKE);
    motor2.setSpeed(0);
    motor3.run(BRAKE);
    motor3.setSpeed(0);
    motor4.run(BRAKE);
    motor4.setSpeed(0);

  }
}
```

Circuit Diagram

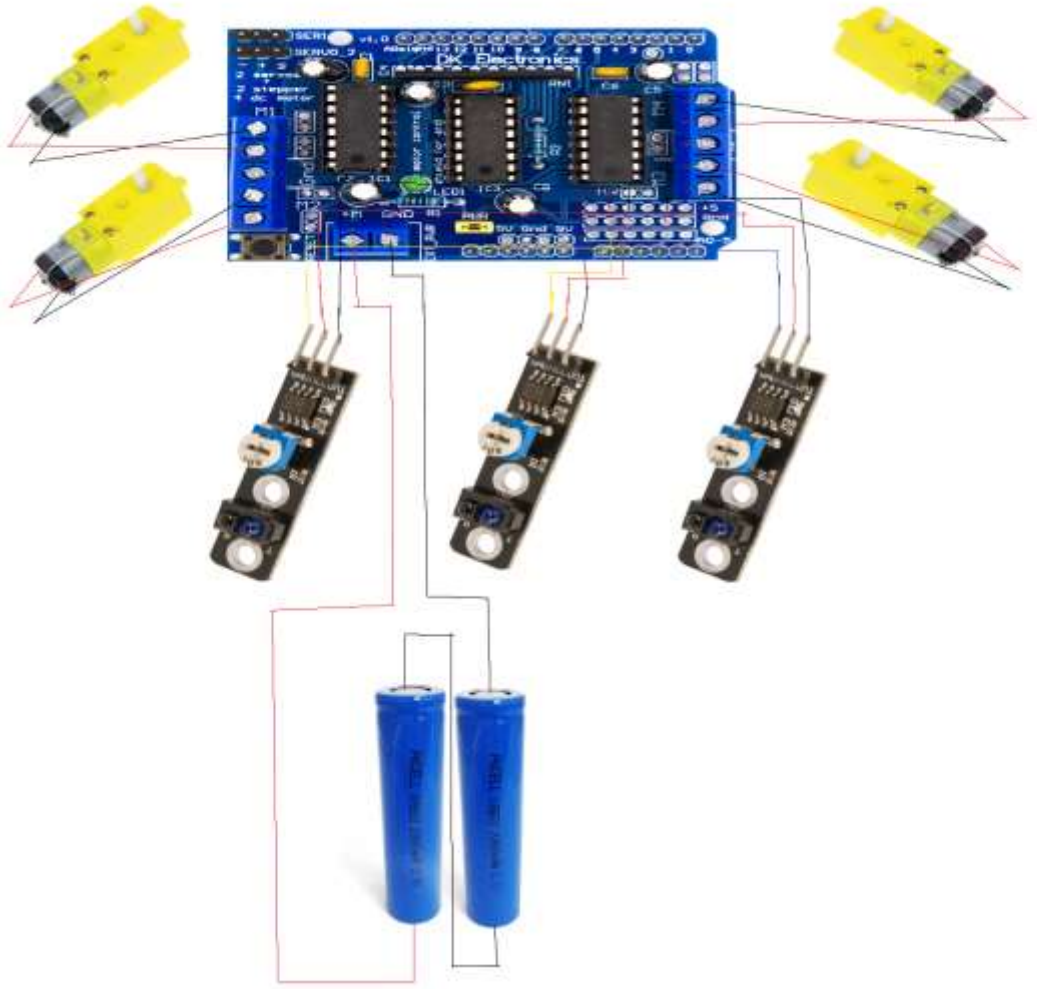


Figure 20 Circuit Diagram

Robot Photo

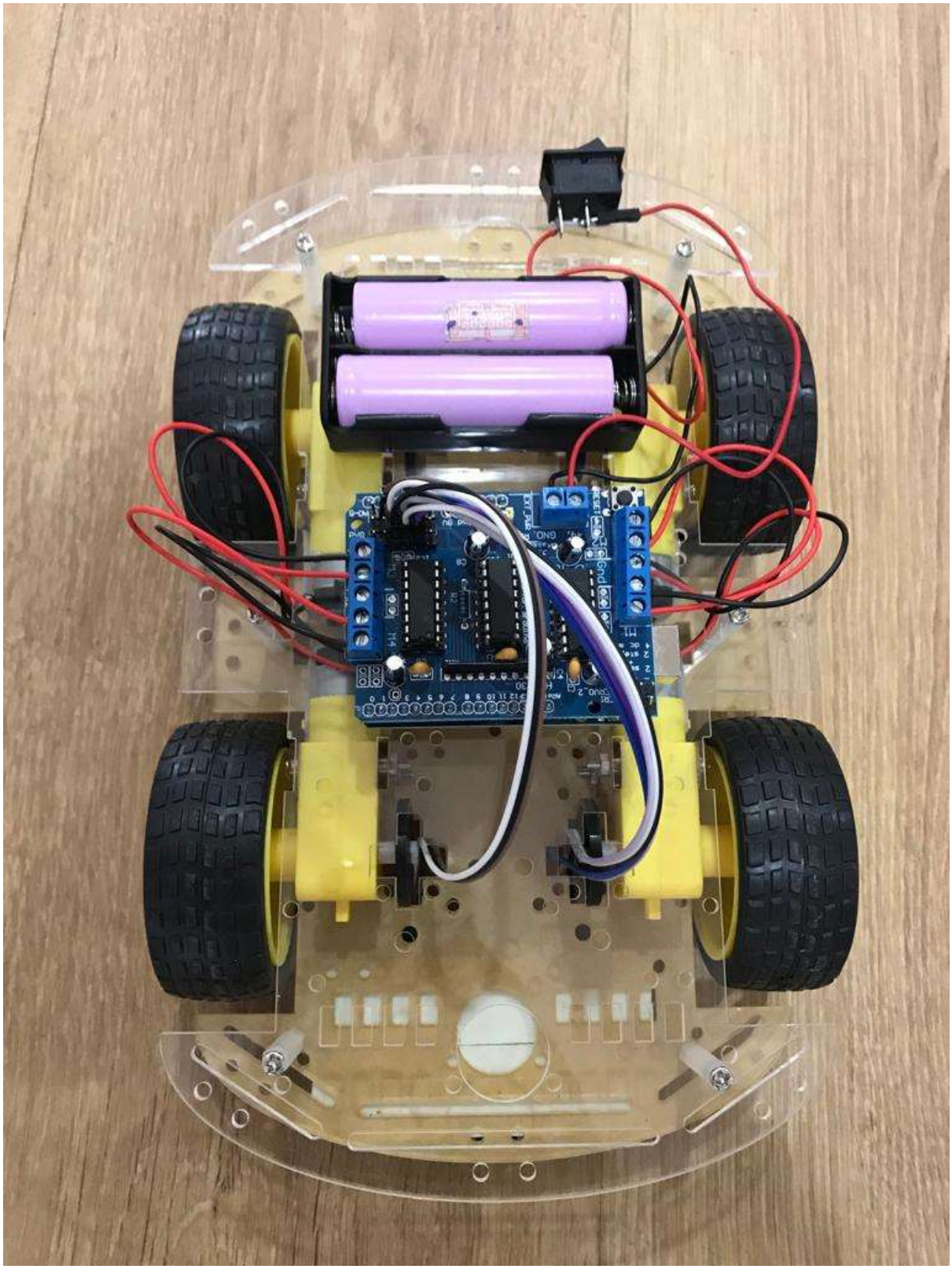


Figure 21 Robot Photo 1

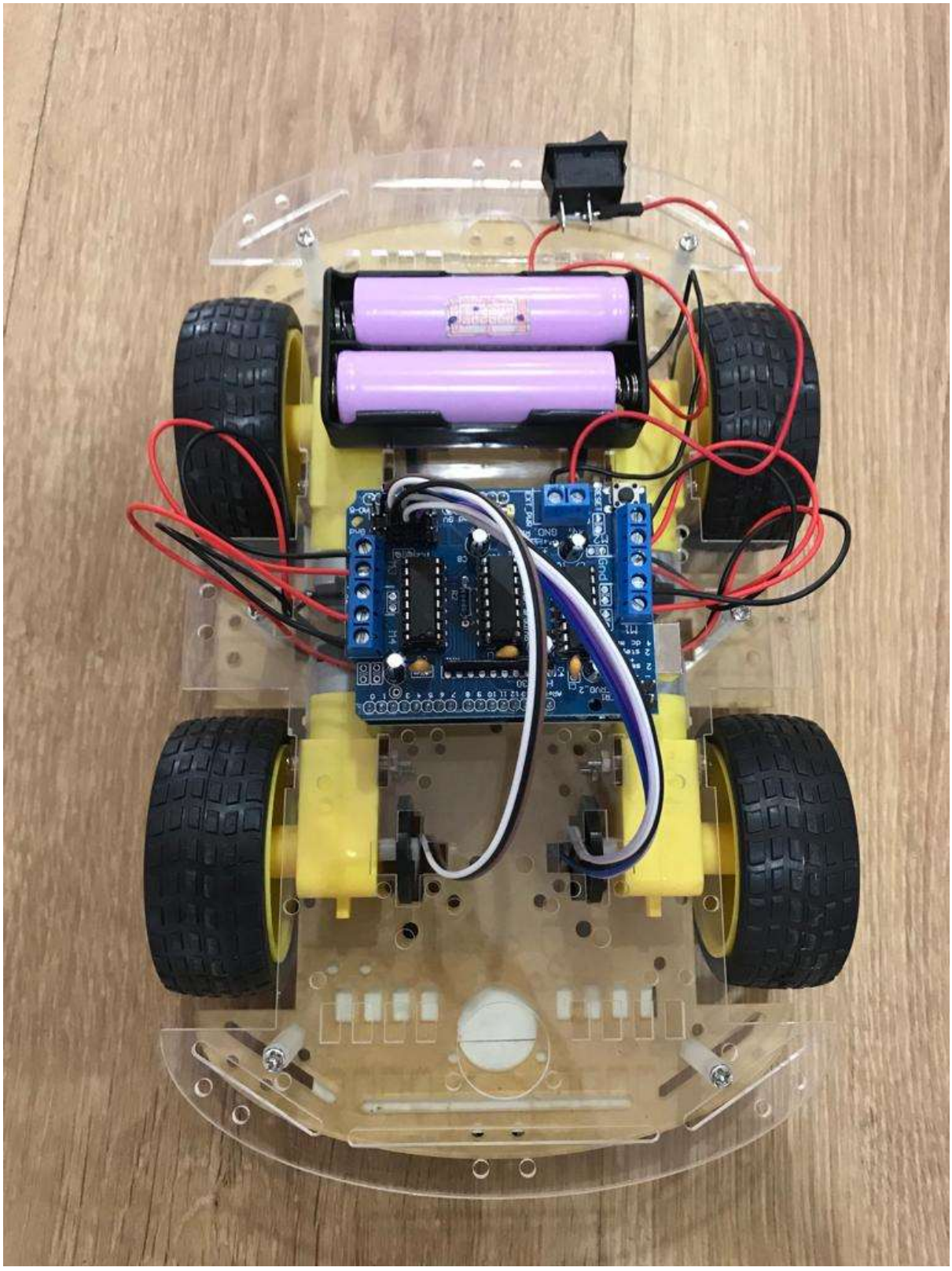


Figure 22 Robot Photo 2

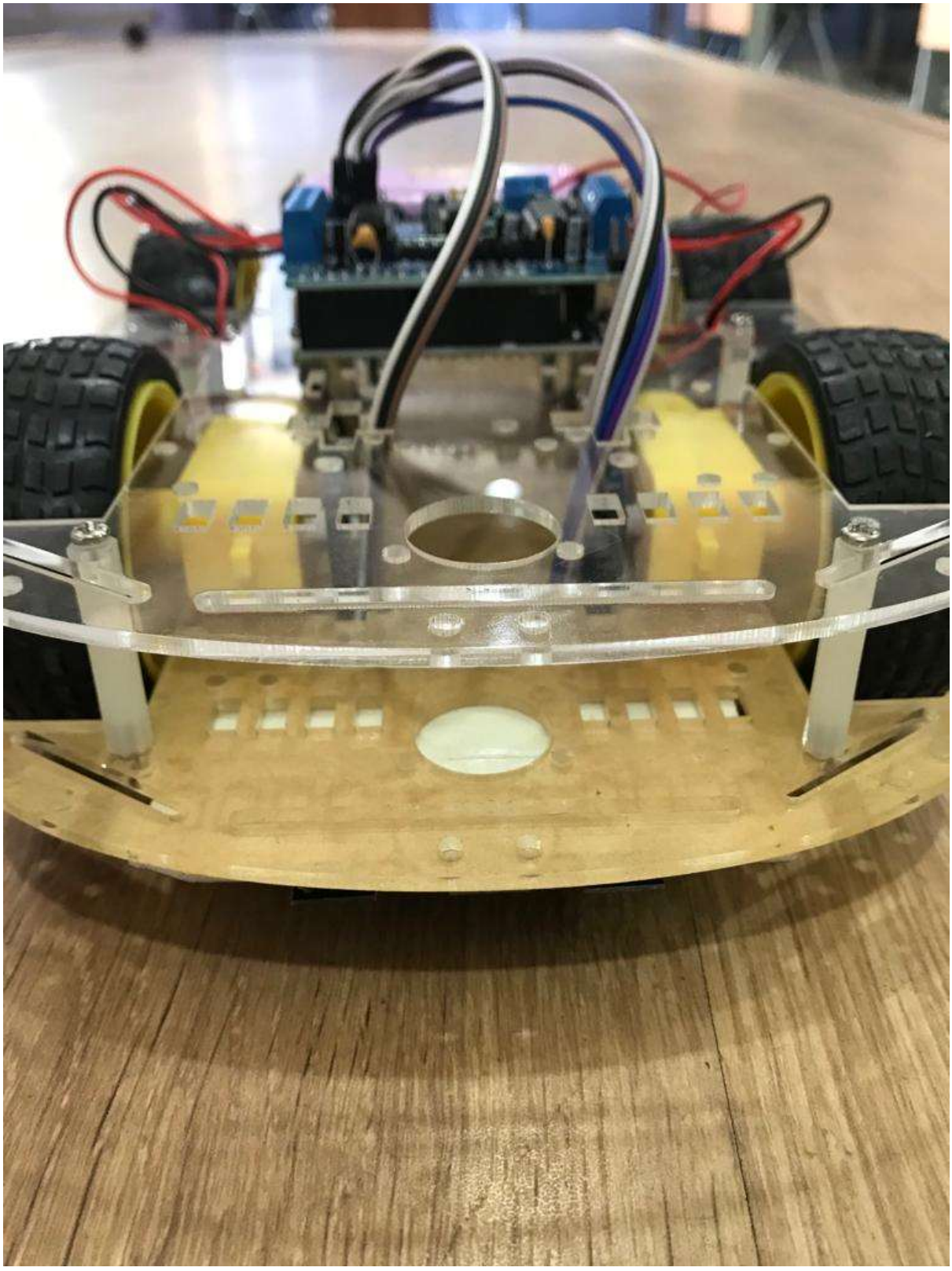


Figure 23 Robot Photo 3

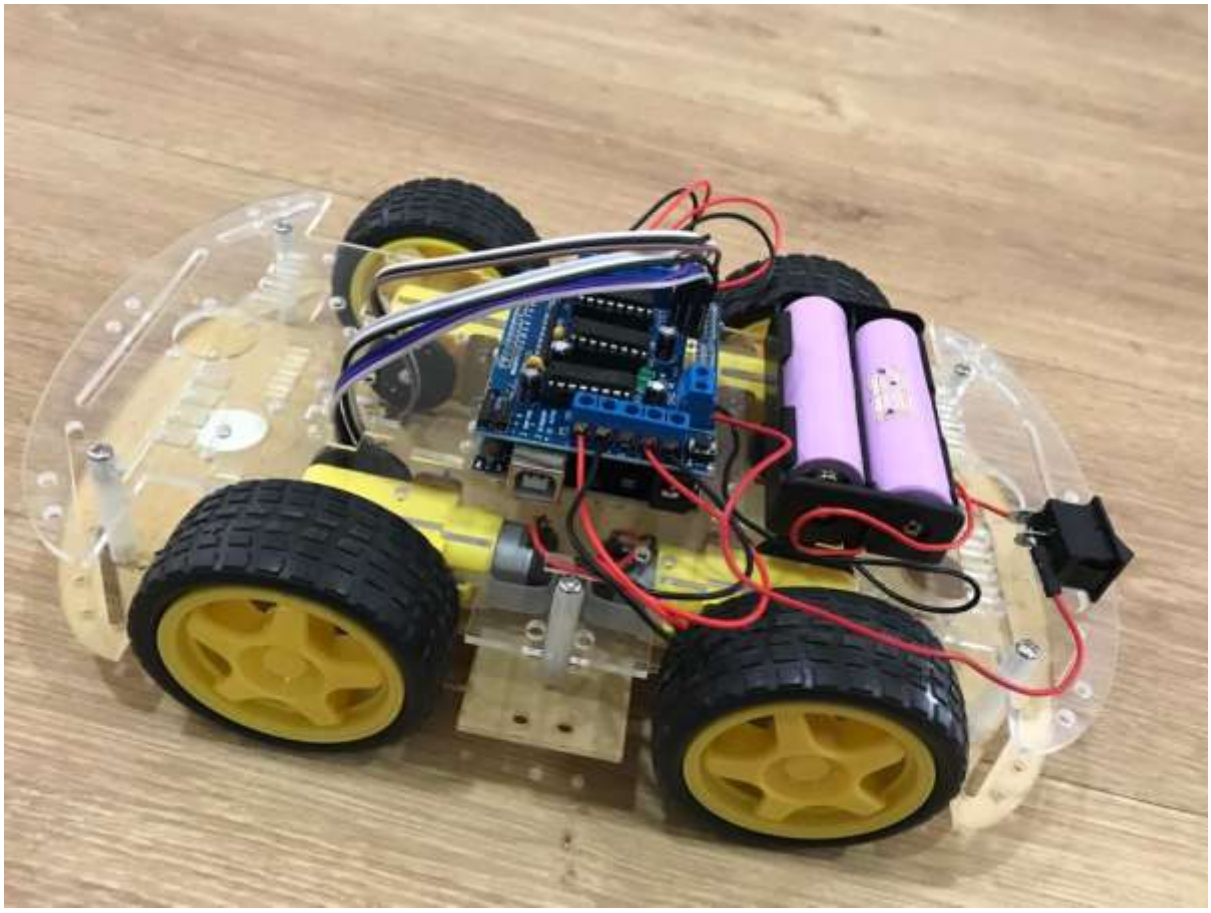


Figure 24 Robot Photo 4

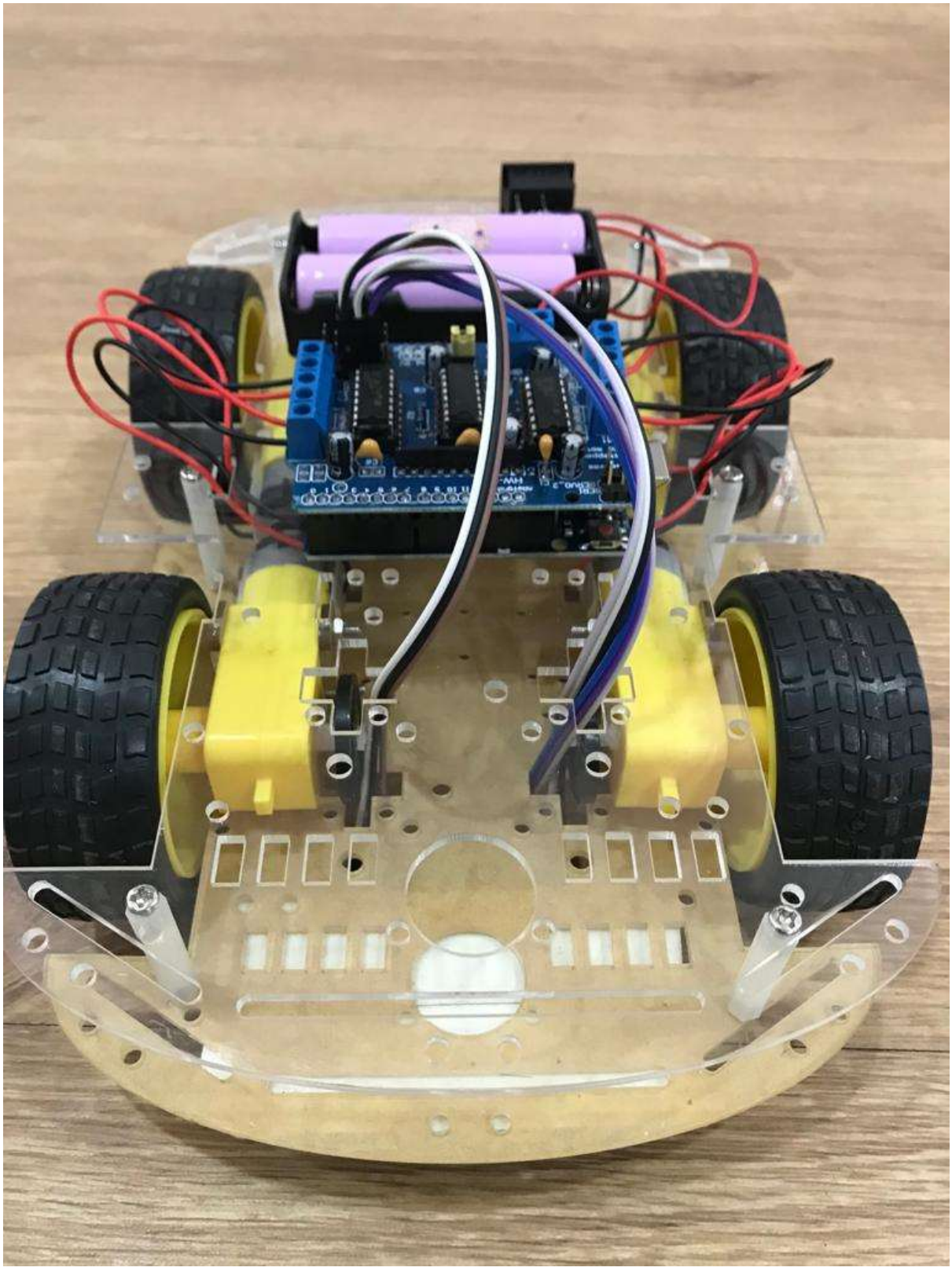


Figure 25Robot Photo 5

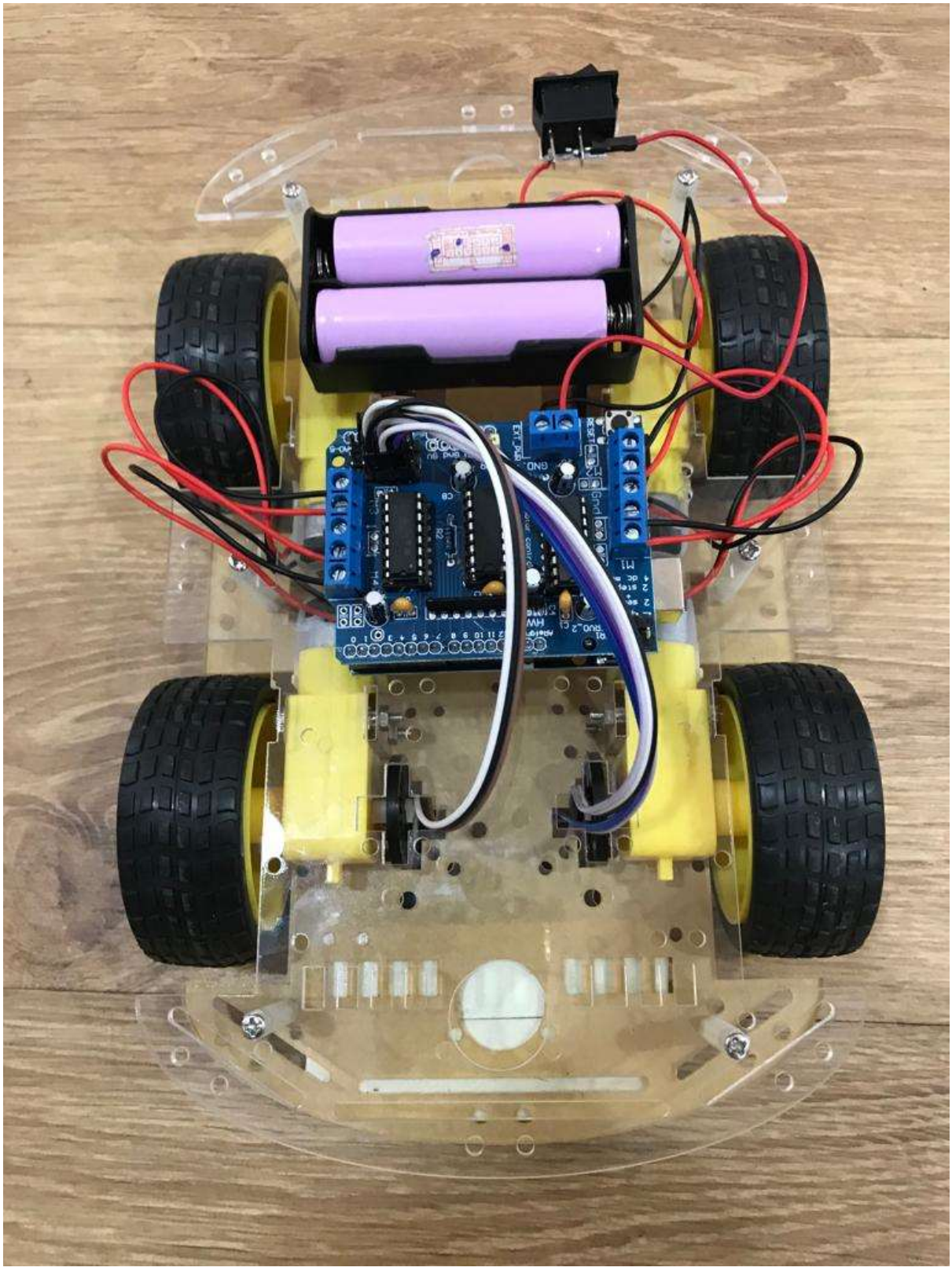


Figure 26 Robot Photo 6

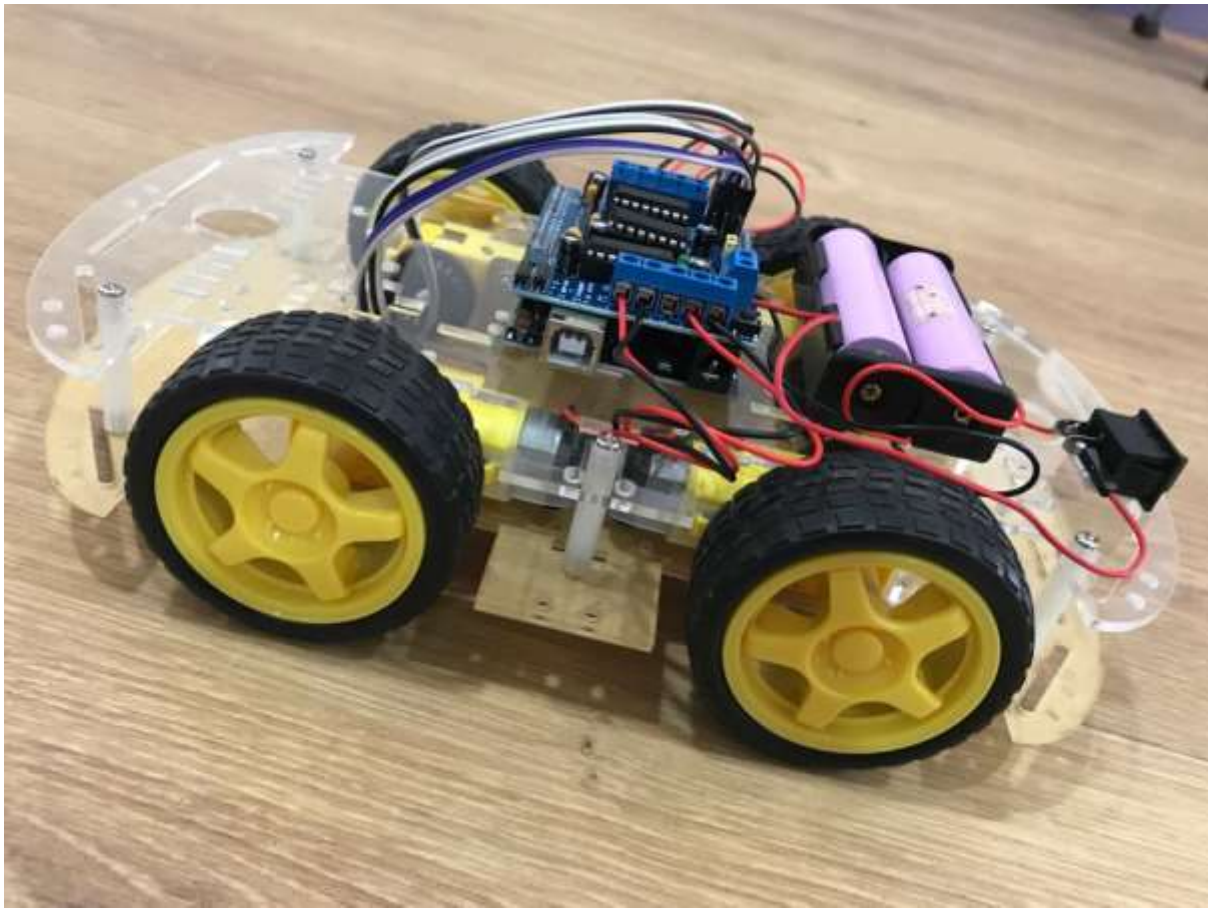


Figure 27 Robot Photo 7

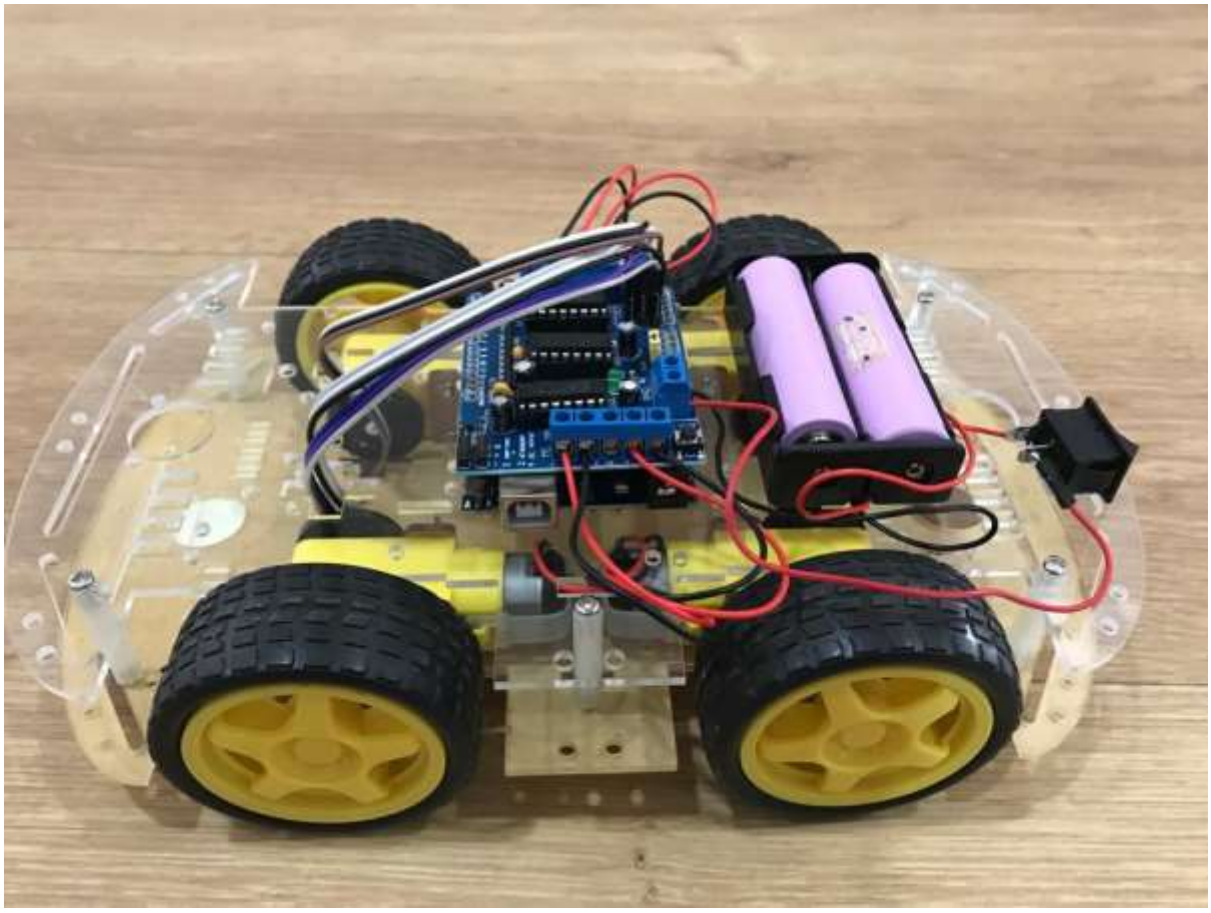


Figure 28 Robot Photo 8

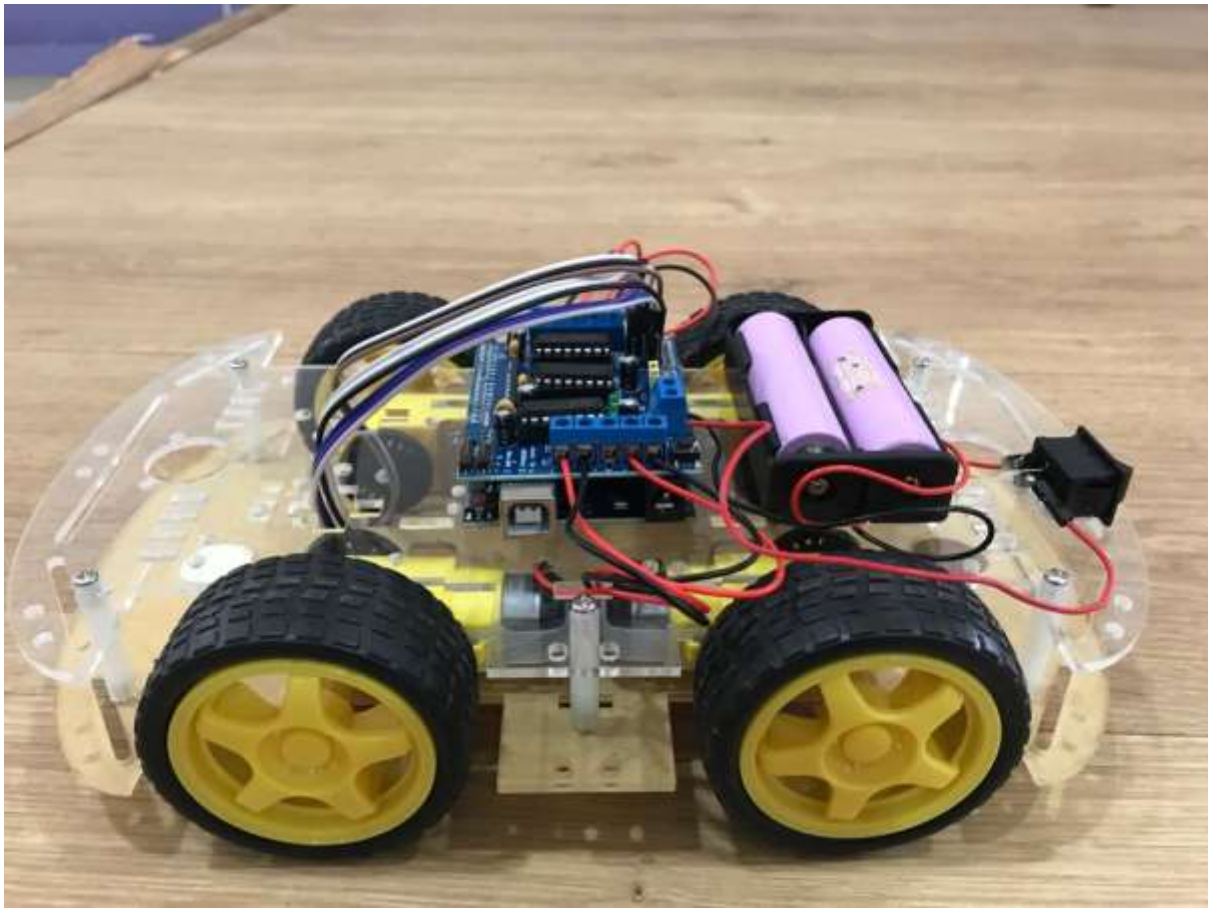


Figure 29 Robot photo 9

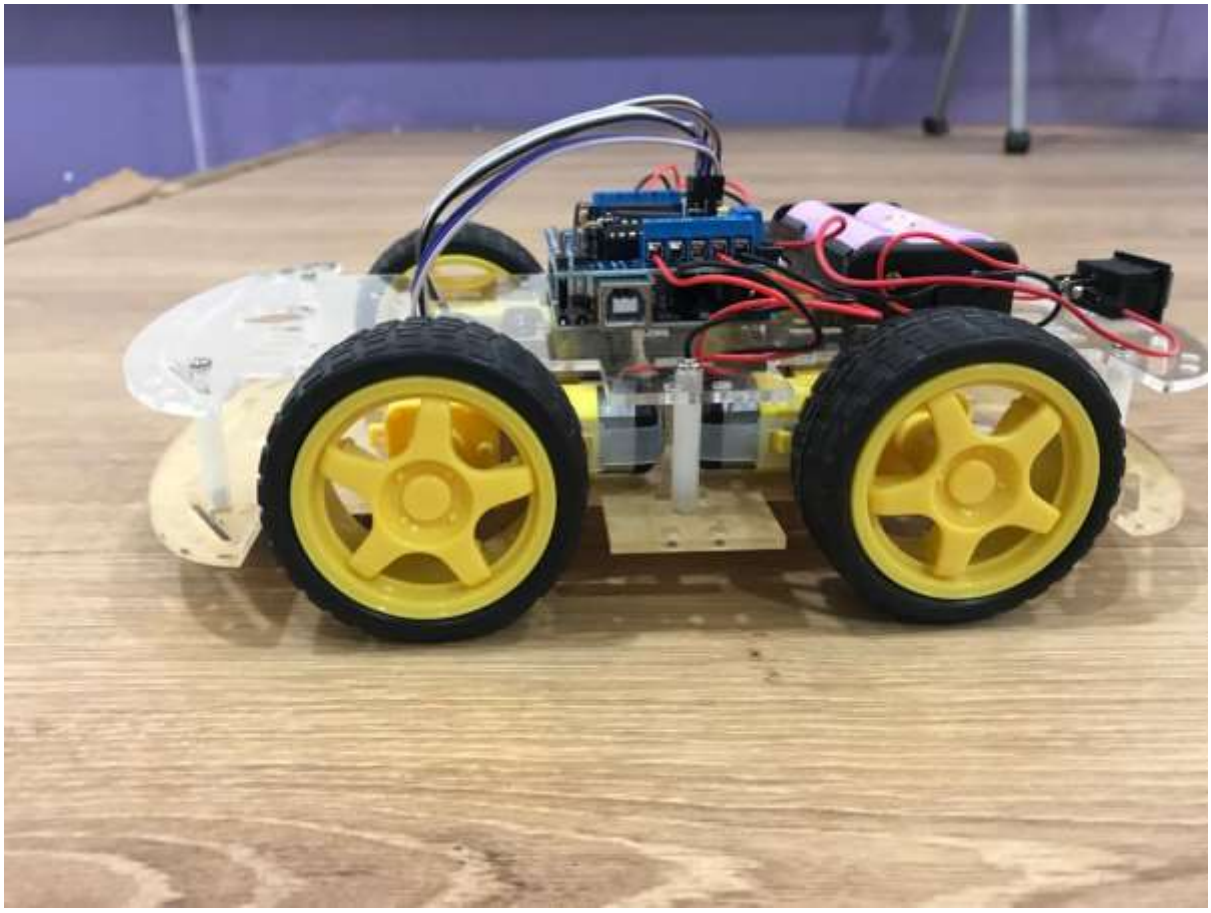


Figure 30 Robot Photo 10

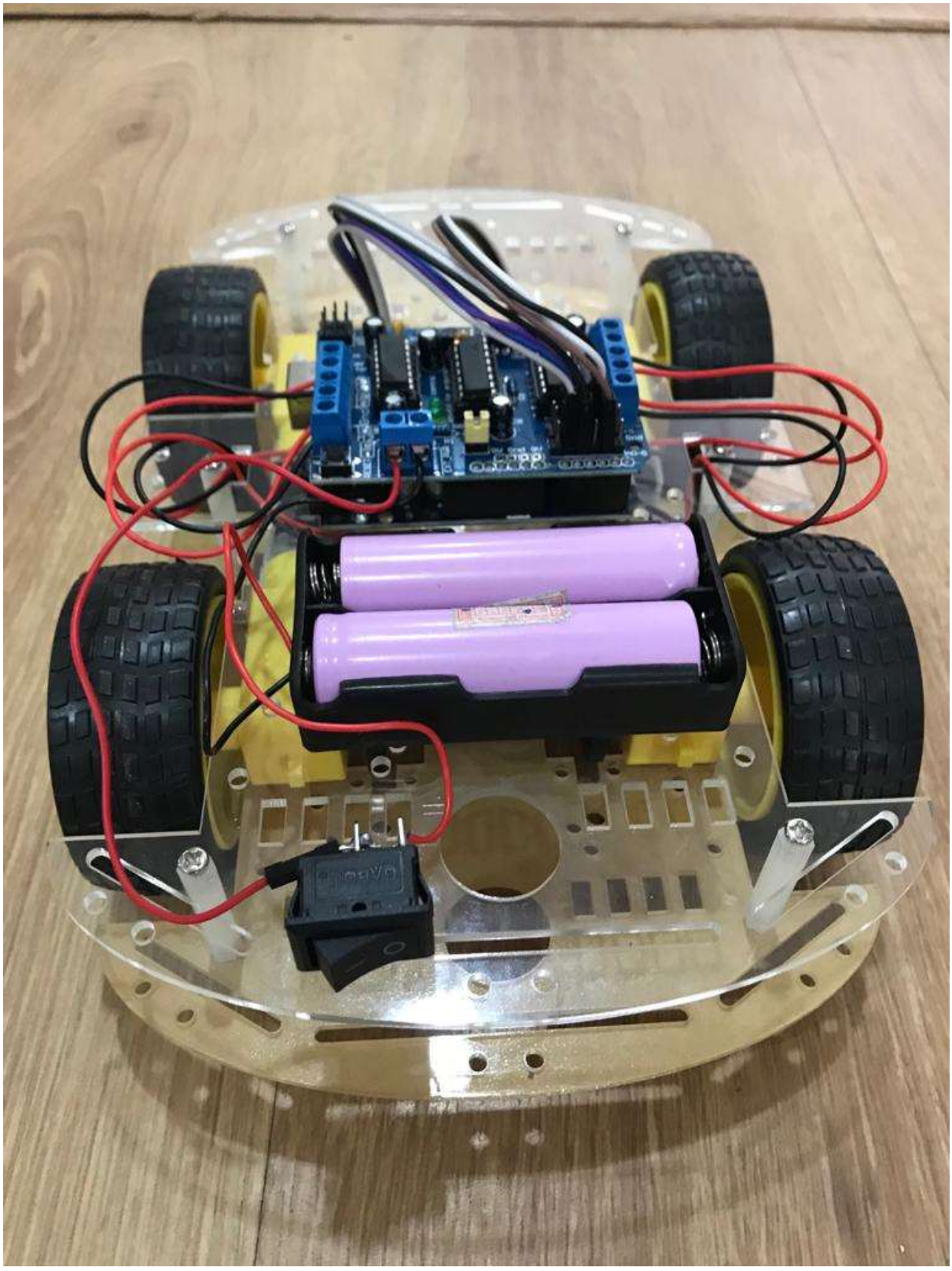


Figure 31 Robot Photo 11

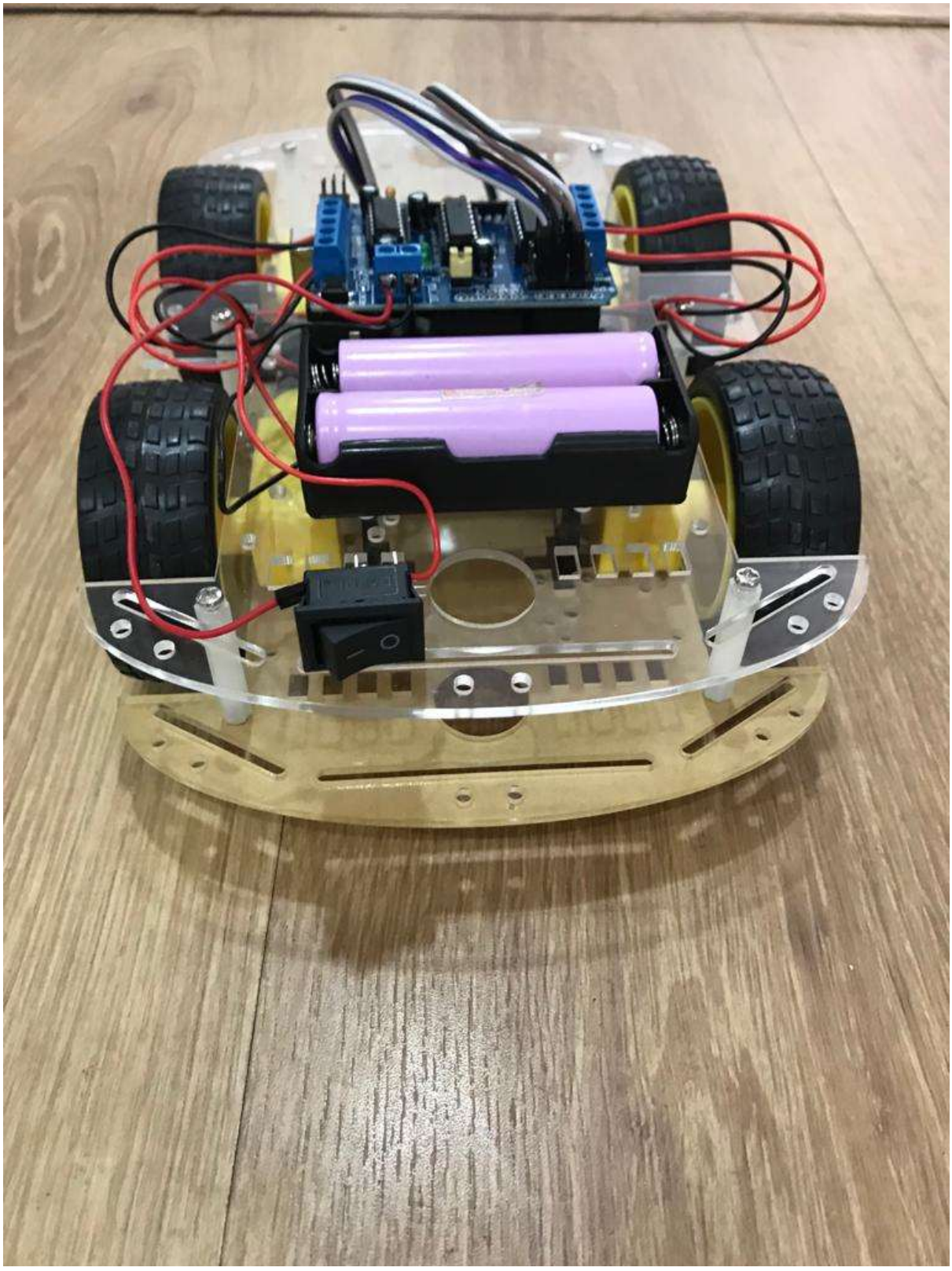


Figure 32 Robot Photo 12

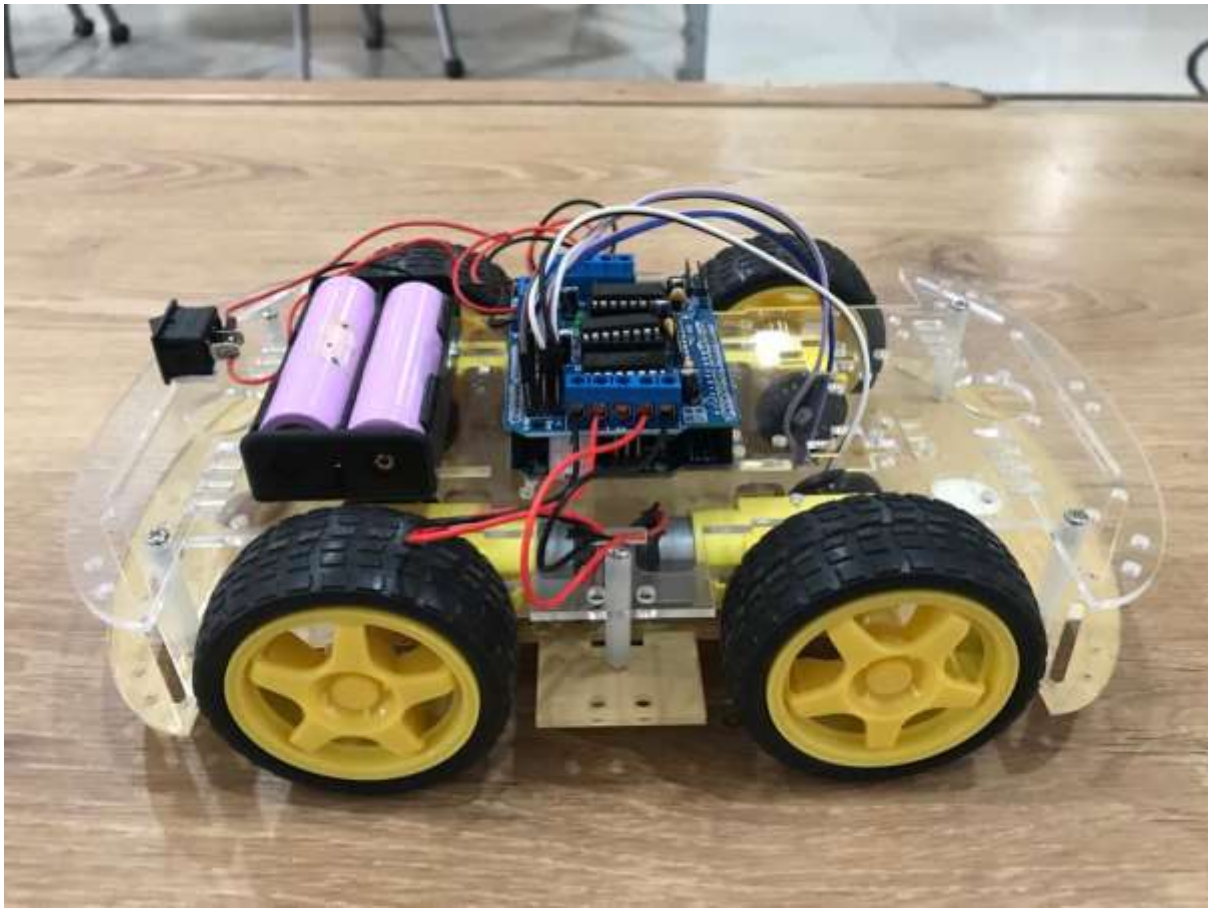


Figure 33 Robot Photo 13

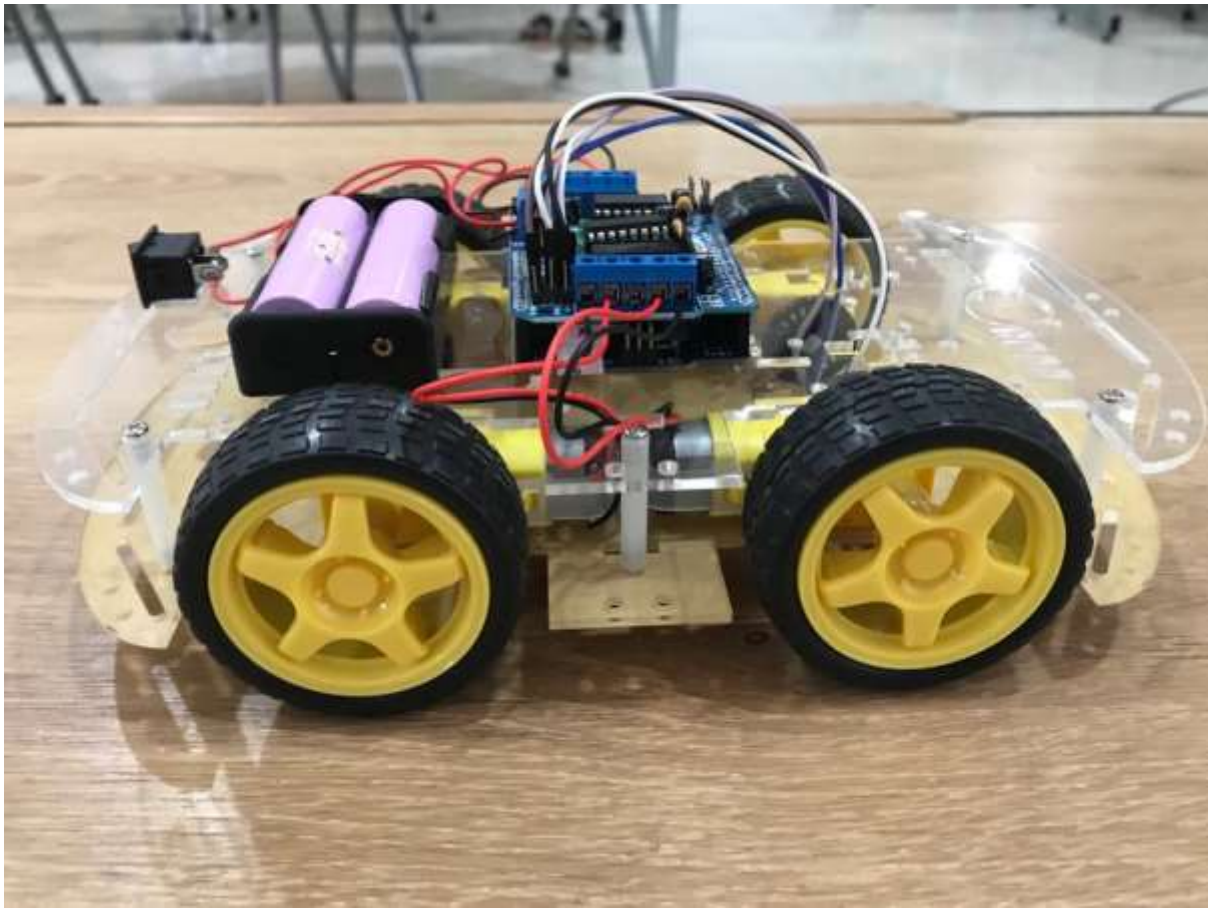


Figure 34 Robot Photo 14

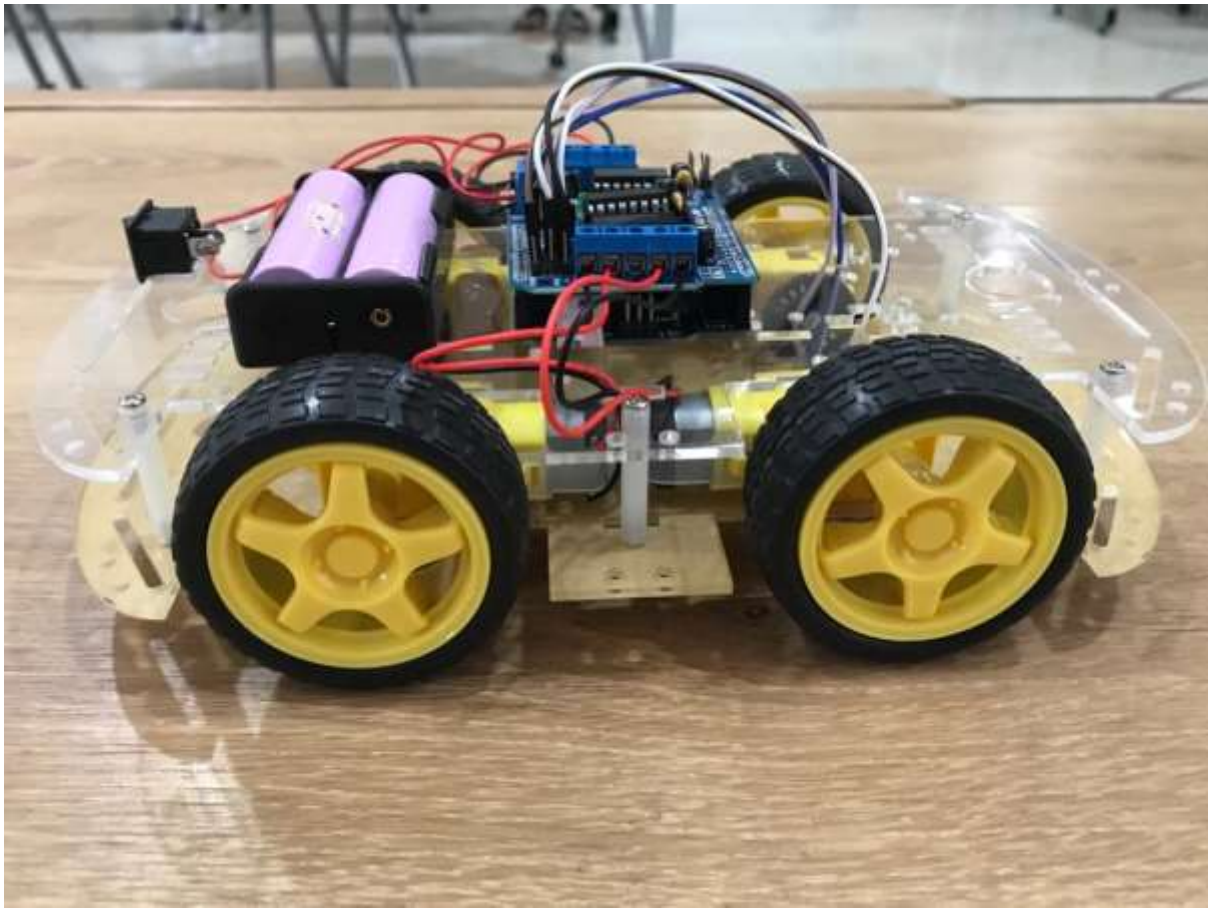


Figure 35 Robot Photo 15

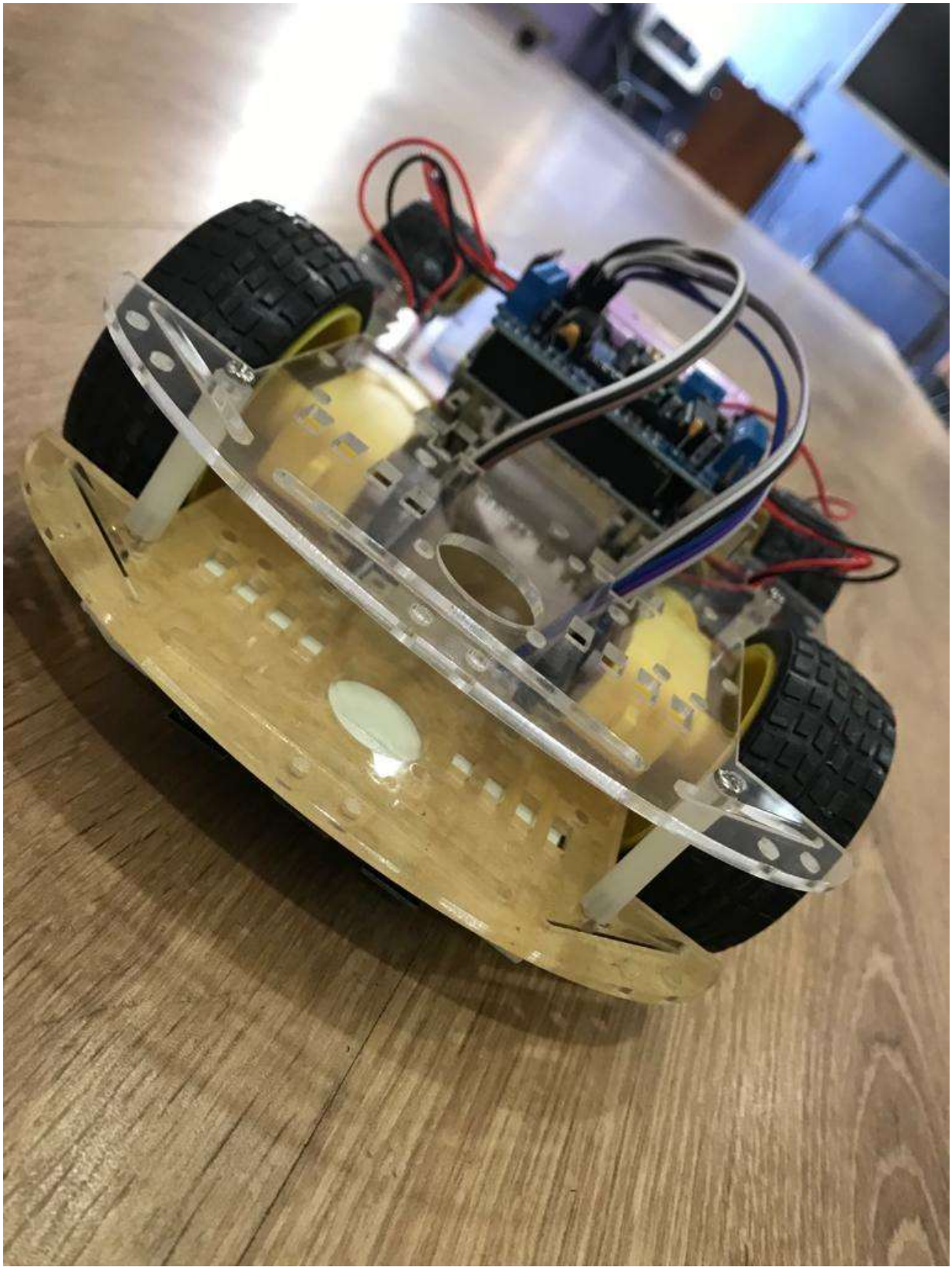


Figure 36 Robot Photo 16

Issues faced and solutions

- Could not get original Uno board.
  Solution:-
  I put the relevant library on it.
- The sensor is connected incorrectly.
  Solution:-
  The sensor that was connected incorrectly was removed and connected.
- The robot goes straight without taking the bend.
  Solution:-
  Corrected it in the code.
- The robot's wheels spin behind.
  Solution:-
  Replaced the wire in the motor.
- The last corner of the jumper wire is worn.
  Solution:-
  Put a new jumper wire.

Video Links

Video 1:- **https://nibm-my.sharepoint.com/:v:/g/personal/mahdse211f-006_student_nibm_lk/ETCMqwqDqTZLgsqImyw8hl8By8HvE81F_Y0wdSYlOKuNmA?e=HyX4Mo**

Video 2:- **https://nibm-my.sharepoint.com/:v:/g/personal/mahdse211f-006_student_nibm_lk/EX2md5VAjrpMqPh_tAYmaRgB_RK4Ea7r4qUAUJkrzA-zJw?e=3BHOCb**