

Zewail city of science and technology Embedded Systems - FALL 2020

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CIE 408 – Project Report

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Problem Definition

Our problem is defined as use the robot (car) to get out of a maze by avoiding obstacles and keep track of previous discovered wrong tracks .in general the problem is to make our car a maze solver

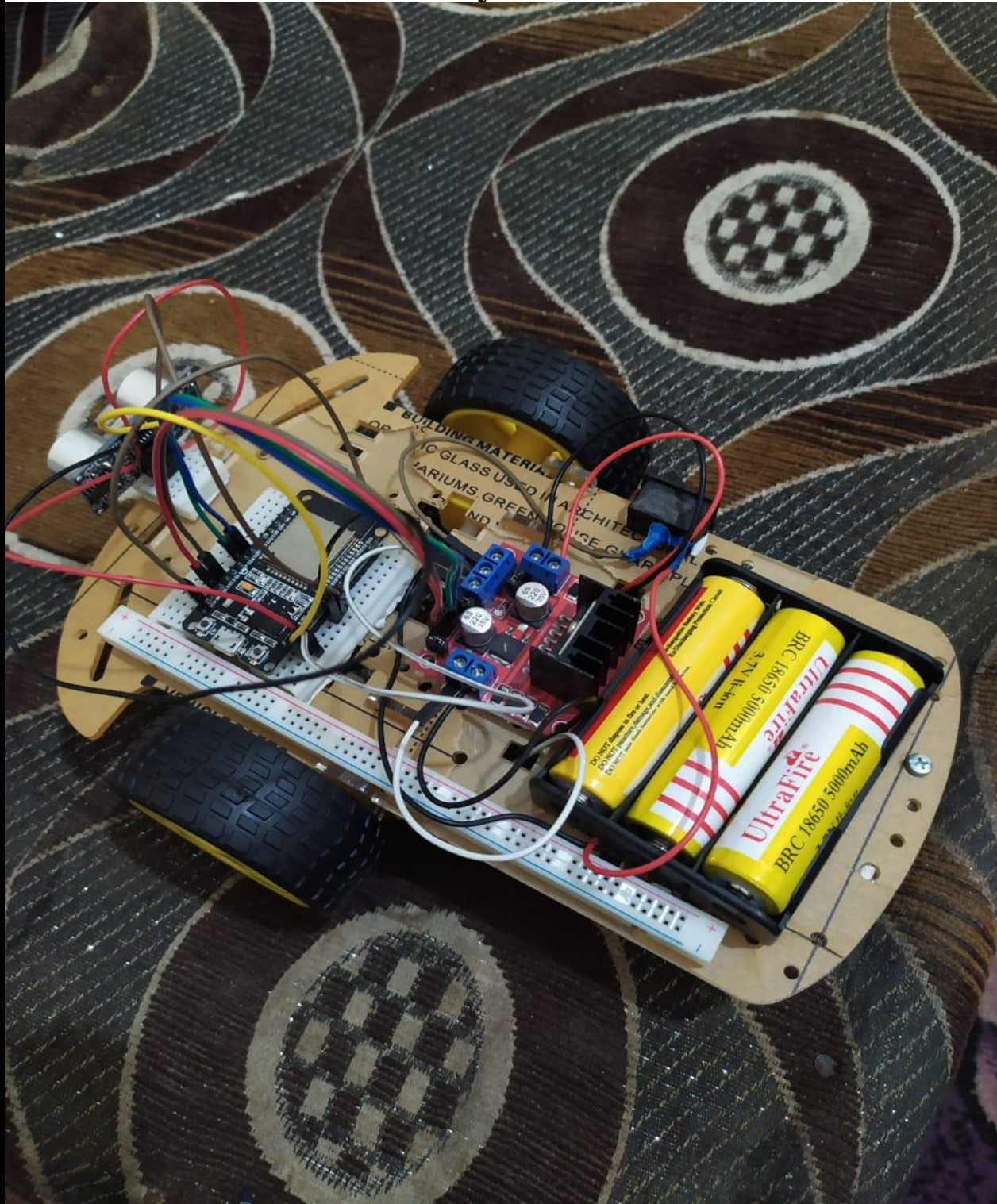
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Hardware structure
&Hardware components

We use ESP32 instead of arduino because it is faster than arduino. We communicate with the car via bluetooth.

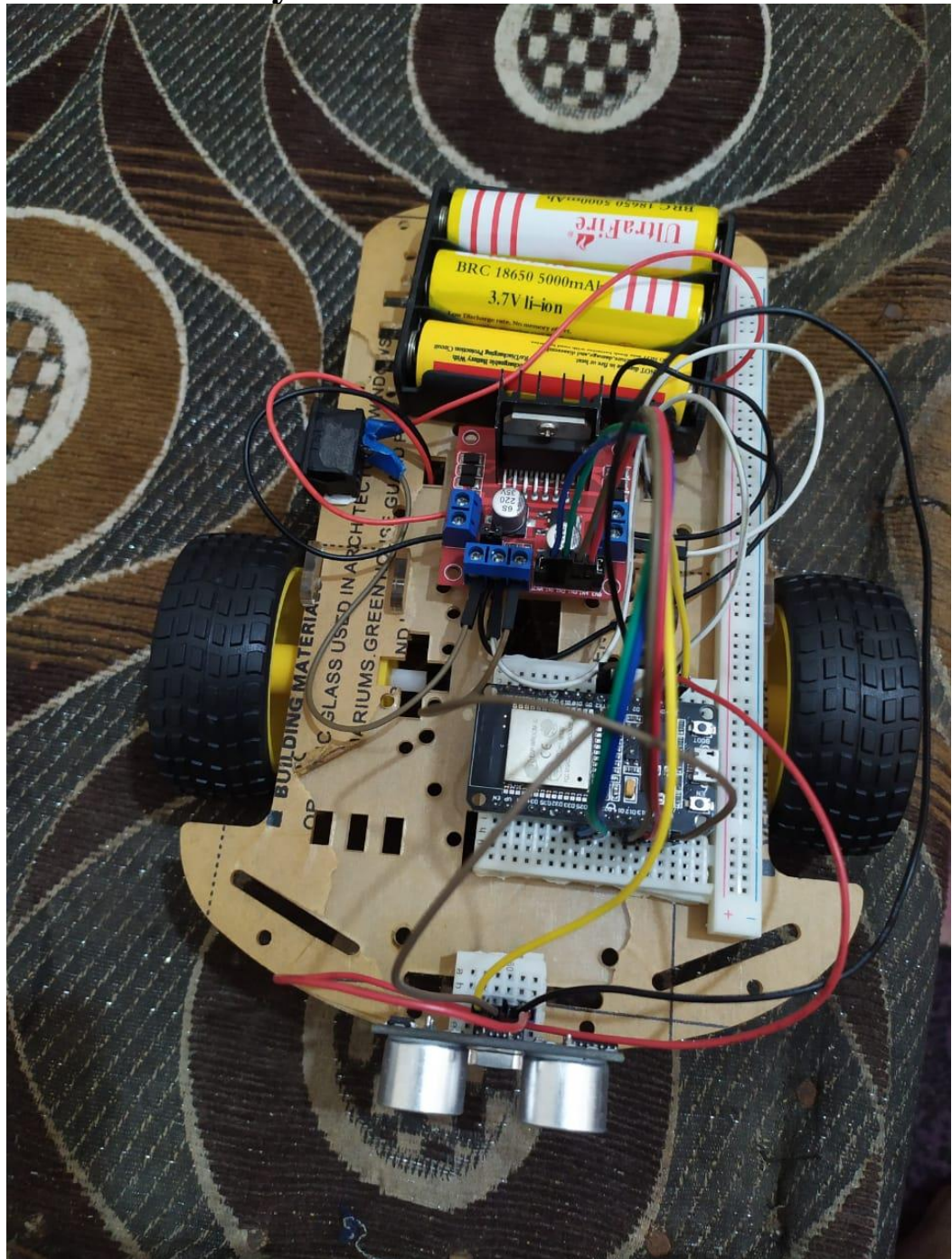
The car contains three batteries , each one is 3.7 Volts, ESP32 microcontroller , ultrasonic sensors and a motor driver that act as a bridge between the tires motors and microcontroller , as the motors operating volt is very high and the Volts from the microcontroller will not be able to operate these motors, so the motor driver will give these motor an excess operating volts

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Figure(1)

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Figure(2)

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Software Part

Car control via Bluetooth

```
car_ESp32
1  #include "BluetoothSerial.h"
2  #if !defined(CONFIG_BT_ENABLED) || !defined(CONFIG_BLUEDROID_ENABLED)
3  #error Bluetooth is not enabled! Please run `make menuconfig` to and enable it
4  #endif
5
6  BluetoothSerial SerialBT;
7
8  void setup() {
9
10     pinMode(13,OUTPUT);
11     pinMode(12,OUTPUT);
12     pinMode(25,OUTPUT);
13     pinMode(26,OUTPUT);
14     //Serial.begin(115200);
15     SerialBT.begin("ESP32test"); //Bluetooth device name
16     //Serial.println("The device started, now you can pair it with bluetooth!");
17 }
18
```

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car_ESp32

```
18
19 void loop() {
20     // if (Serial.available()) {
21         // SerialBT.write(Serial.read());
22     //}
23     char x;
24     while(SerialBT.available()) {
25         x=SerialBT.read();
26         if (x=='F'){
27             digitalWrite(13,0);
28             digitalWrite(12,1);
29             //
30             digitalWrite(26,1);
31             digitalWrite(25,0);
32         }
33         else if (x=='G'){
34             digitalWrite(13,1);
35             digitalWrite(12,0);
36             //
37             digitalWrite(26,0);
38             digitalWrite(25,1);
39         }
40         else if (x=='R'){
41             digitalWrite(13,0);
42             digitalWrite(12,1);
43             //
44             digitalWrite(26,0);
45             digitalWrite(25,0);
```


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```
car_Esp32
38     digitalWrite(25,1);
39 }
40 else if (x=='R'){
41     digitalWrite(13,0);
42     digitalWrite(12,1);
43     //
44     digitalWrite(26,0);
45     digitalWrite(25,0);
46 }
47 else if (x=='L'){
48     digitalWrite(13,0);
49     digitalWrite(12,0);
50     //
51     digitalWrite(26,1);
52     digitalWrite(25,0);
53 }
54 else if (x=='S'){
55     digitalWrite(13,0);
56     digitalWrite(12,0);
57     //
58     digitalWrite(26,0);
59     digitalWrite(25,0);
60 }
61
62
63 }
64
65 }
```

Maze Solver implementation

Also the code of maze solver is attached with project files

Files attached

- 1.Car .cpp & Car .h
- 2.ultrasonic .cpp & ultrasonic .h
- 3.MazeSolver .ino

Obstacle we faced here in this phase

Our problem here that we faced that prevent us from implementing this phase by hardware that this phase requires 3 ultrasonic sensors to be implemented but unfortunately we have only one ultrasonic sensor and due to Quarantine restriction and campus lockdown we could not come to the lab and take another two ultrasonic sensor

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Hardware and software

The link for the code and video test

([Project - Google Drive](#))

The link for the video only

([Project - Google Drive](#))

Future Work

We will work on ROS, and submit it on github on 2 days maximum.