Inspiring Excellence

Lab report 4 of CSE461

Submitted By:

Group 4

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1.1 Name of the experiment : DC motor interfacing with Raspberry Pi.

1.2 Objective: In this experiment, we will control the motor to rotate in a direction for some time. This will help you understand how to control the motor using GPIO pins on the Raspberry Pi.

1.3 Equipment:

- Raspberry Pi 4
- Connecting wires (male to female(1x), female to female (2x))
- Motor driver
- External power supply
- DC motor

1.4 Experimental Setup: To complete this experiment we have connected the GPIO17 and GPIO22 with the INA and INB port of the motor driver. Then with the VCC and the ground of the motor driver we connected the external power supply and to get the ground we also connected the ground of the raspberry-pi with it. After all of these with the outA and youtube of the Motor driver the DC motor was connected.

After running the code the DC motor rotated in a direction for some time.

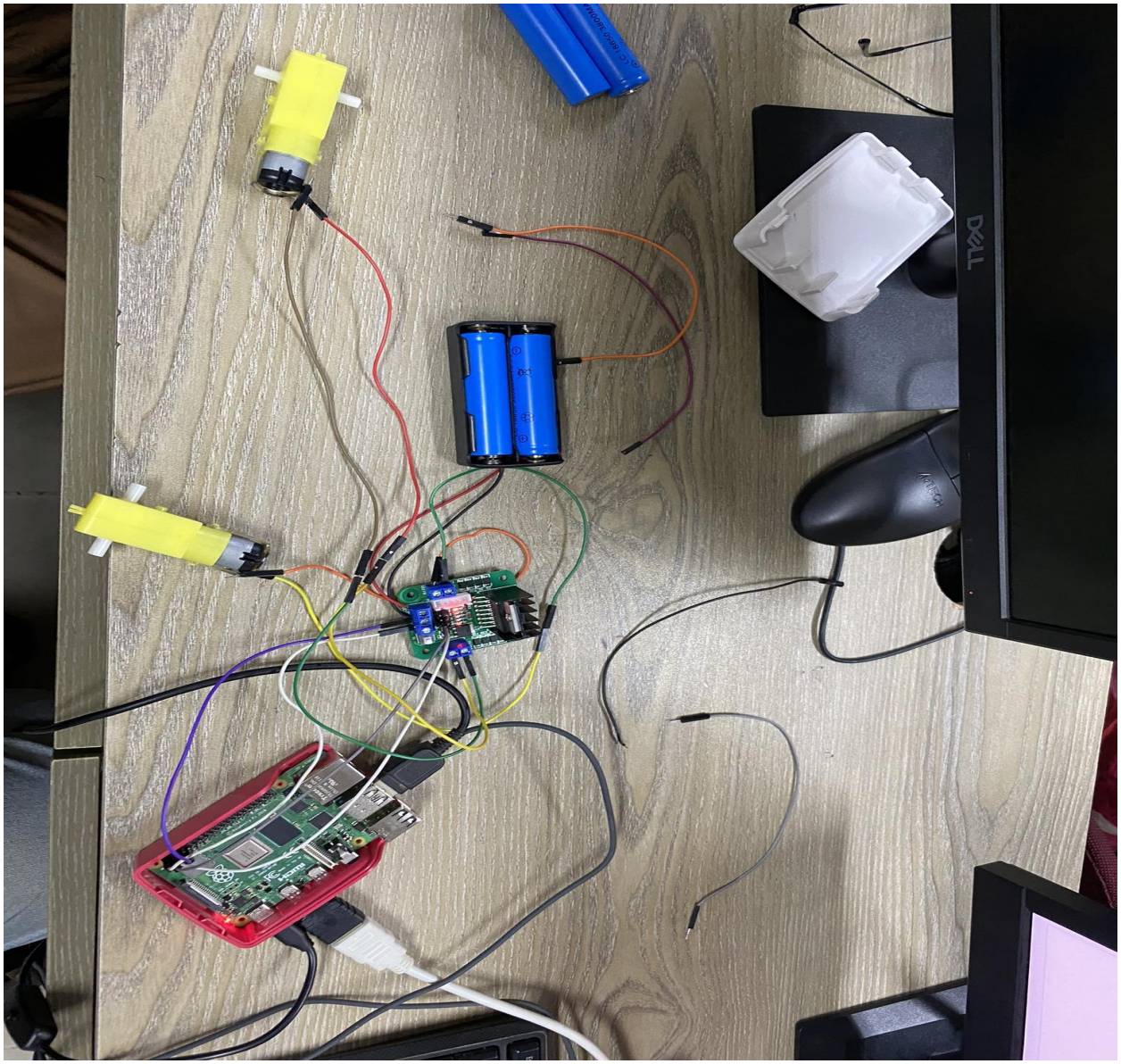

Fig 1: DC Motor Configuration

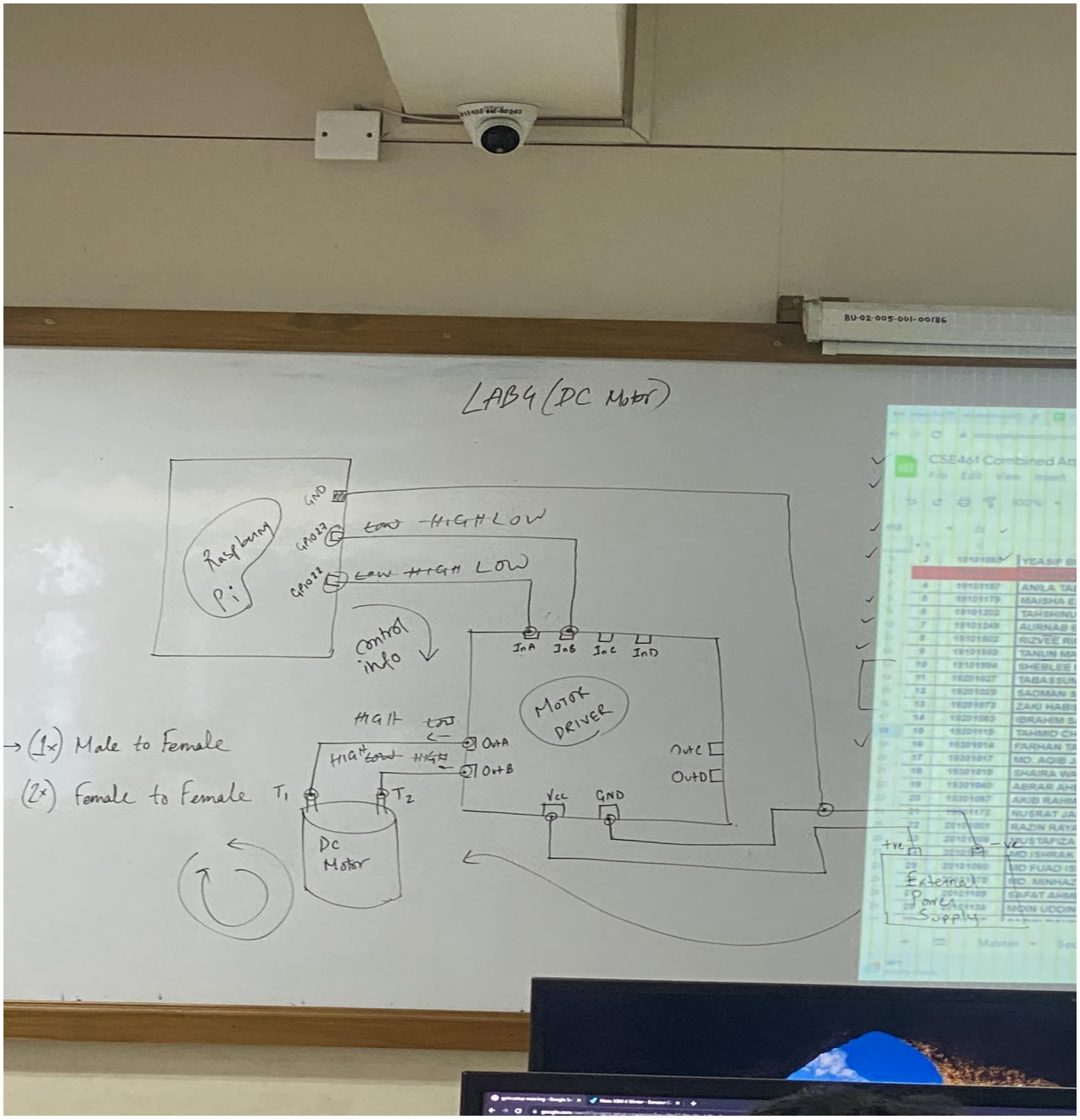

Fig 2: Circuit Diagram of DC Motor Setup

Code:

```
import RPi.GPIO as GPIO
from time import sleep


in1 = 27
in2 = 22


GPIO.setmode(GPIO.BCM)
GPIO.setup(in1,GPIO.OUT)
GPIO.setup(in2,GPIO.OUT)
GPIO.output(in1,GPIO.LOW)
GPIO.output(in2,GPIO.LOW)


while true:
    GPIO.output(in1,GPIO.HIGH)
    GPIO.output(in2,GPIO.LOW)
```

Result: For these experiment,the DC motor will continuously rotate in one direction as the while True: loop runs indefinitely. The motor will keep turning in one direction until the program is interrupted or stopped manually.

It's worth noting that the code doesn't include any delays (sleep()) after setting the GPIO outputs, which means the motor will run at maximum speed continuously. Depending on the motor and power supply used, this may lead to the motor running too fast and potentially causing damage.

2.1 Name of the experiment : DC motor interfacing with Raspberry Pi.

2.2 Objective: In this experiment, we will control the motor to rotate in both directions (1 sec forward direction and 1 sec backward direction) for a specified time and then stop. This will help you understand how to control the motor using GPIO pins on the Raspberry Pi.

2.3 Equipment:

- Raspberry Pi 4
- Connecting wires (male to female(1x), female to female (2x))
- Motor driver
- External power supply
- DC motor

2.4 Experimental Setup: To complete this experiment we have connected the GPIO17 and GPIO22 with the INA and INB port of the motor driver. Then with the VCC and the ground of the motor driver we connected the external power supply and to get the ground we also connected the ground of the raspberry-pi with it. After all of these with the outA and outB of the Motor driver the DC motor was connected.

After running the code based on the conditions the DC motor rotated in a direction for some time. And when we change the High Voltage to Low and the Low voltage to High the DC motor rotates in another direction for some time. Additionally when both voltages give high or low at the same time, rotation stops.

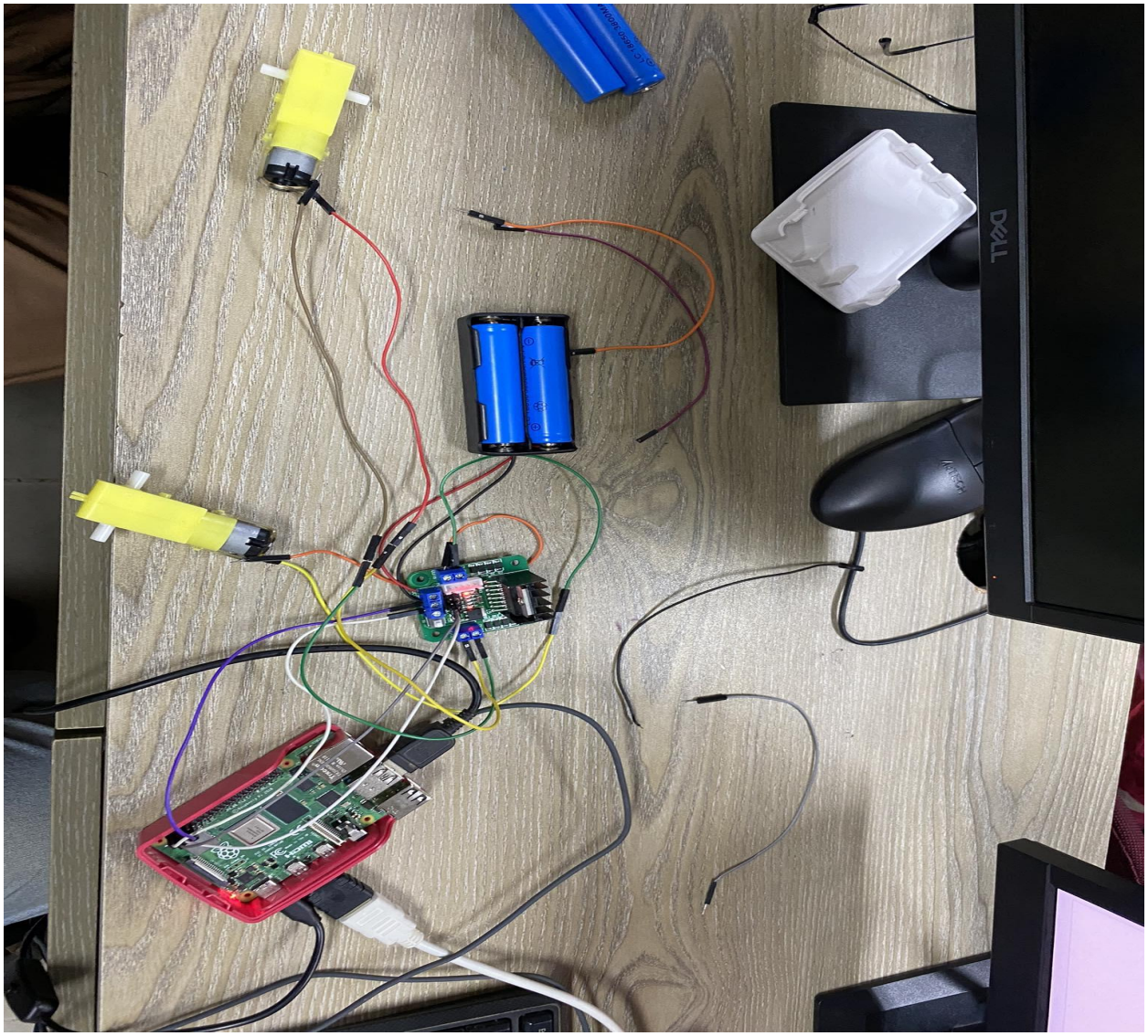

Fig 3: DC Motor Configuration

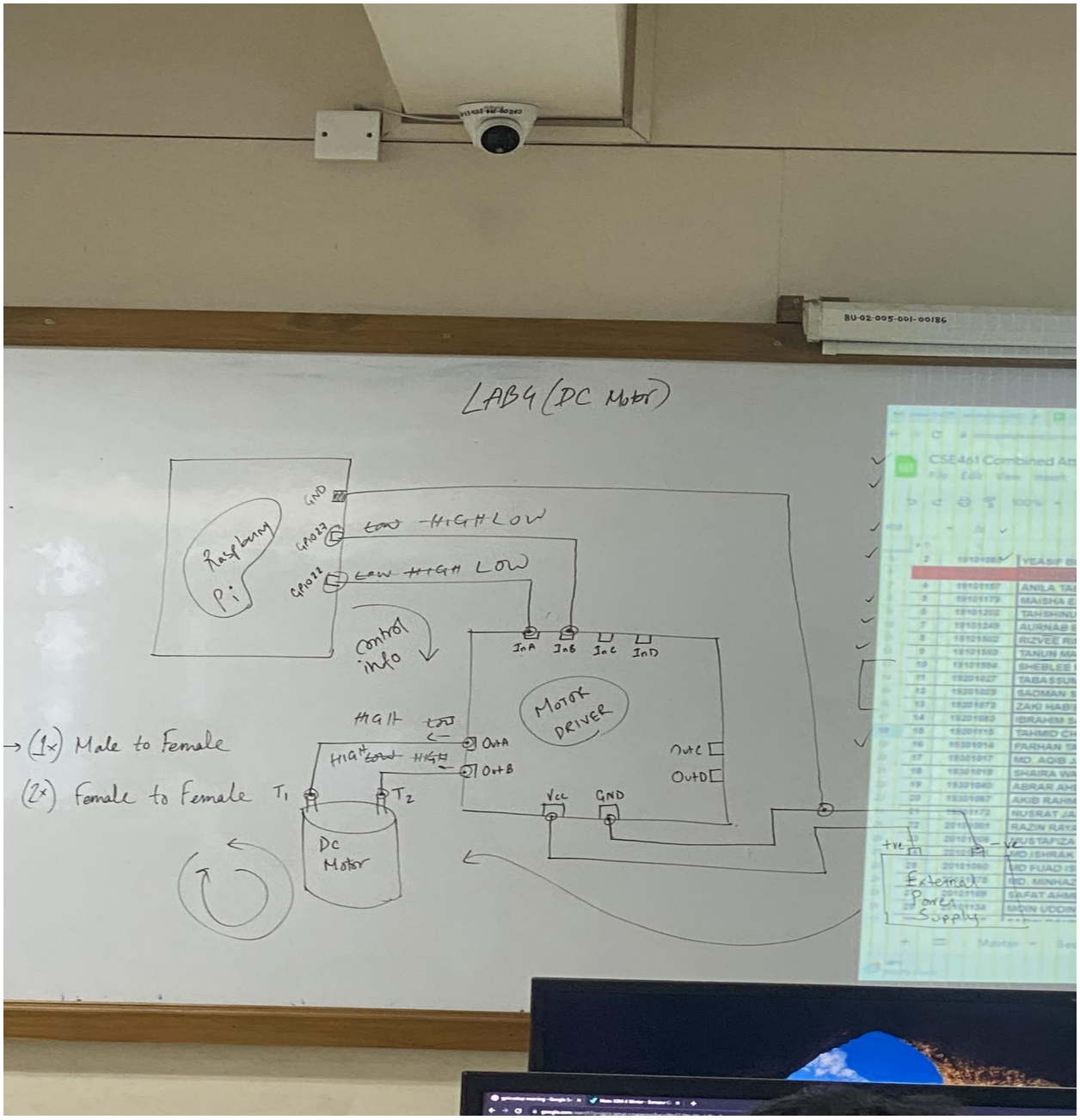

Fig 2: Circuit Diagram of DC Motor Setup

Code:

```
import RPi.GPIO as GPIO
from time import sleep

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in2 = 22

GPIO.setmode(GPIO.BCM)
GPIO.setup(in1,GPIO.OUT)
GPIO.setup(in2,GPIO.OUT)
GPIO.output(in1,GPIO.LOW)
GPIO.output(in2,GPIO.LOW)

while true:
    GPIO.output(in1,GPIO.HIGH)
    GPIO.output(in2,GPIO.LOW)
    sleep(3)
    GPIO.output(in1,GPIO.LOW)
    GPIO.output(in2,GPIO.HIGH)
    sleep(3)
    GPIO.output(in1,GPIO.HIGH)
    GPIO.output(in2,GPIO.HIGH)
    Sleep(3)
    GPIO.output(in1,GPIO.LOW)
    GPIO.output(in2,GPIO.LOW)
    Sleep(3)
```

Result: When GPIO pins gave high and low the DC motor rotated clockwise and stopped after some time. On the other hand when GPIO pins gave low and high the DC motors rotated anticlockwise and stopped after some time. In similar inputs for example if both of the GPIO pins hive high or low voltages then the DC motor did not rotate.

Discussion : To connect a DC motor to a Raspberry Pi we chose a motor driver. Next we connected it to the GPIO pins. Ensured that the motor had its own power supply. We then wrote code in a programming language such as Python. Tested the motors performance while prioritizing safety measures.