LAB –11 Programming on Resistive Sensors

Aim:

To connect a variable resistor to a Raspberry Pi and measure the position of its rotation using python.

Task:

To develop a method to measure resistance using resistors and capacitors using Raspberry Pi.

Pin & Circuit Diagram:

Figure 1: Pin diagram of Raspberry Pi

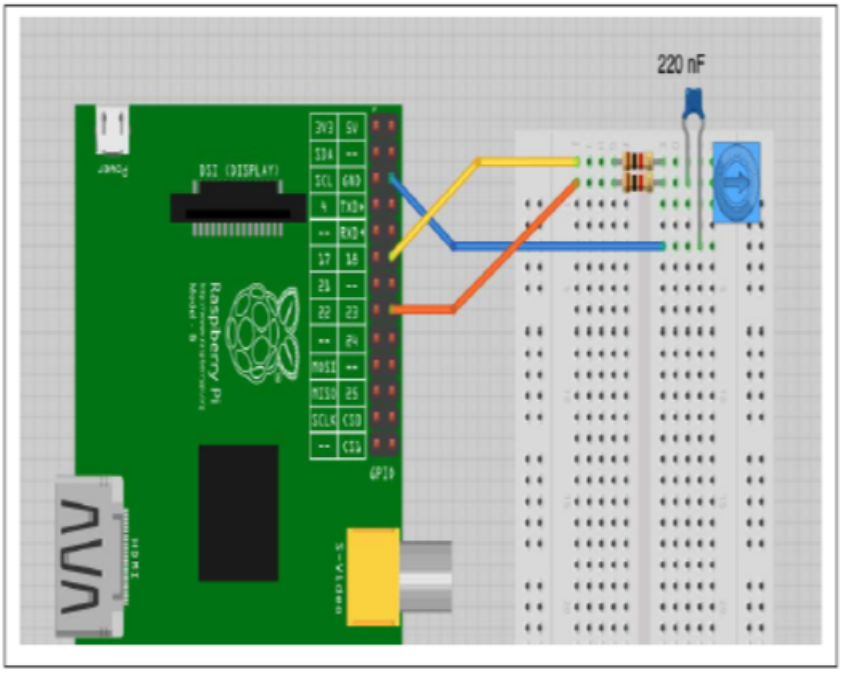


Figure 2: Measuring resistance on a Raspberry Pi

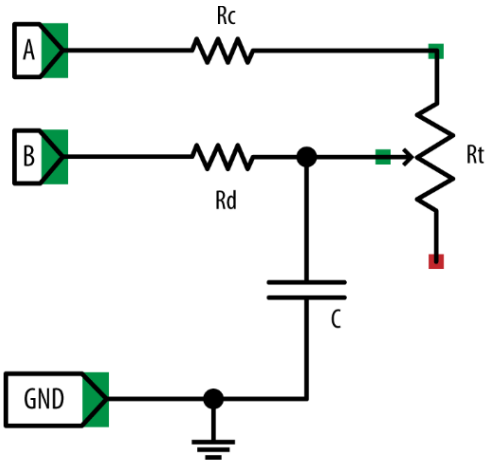


Figure 3: Measuring resistance using step response

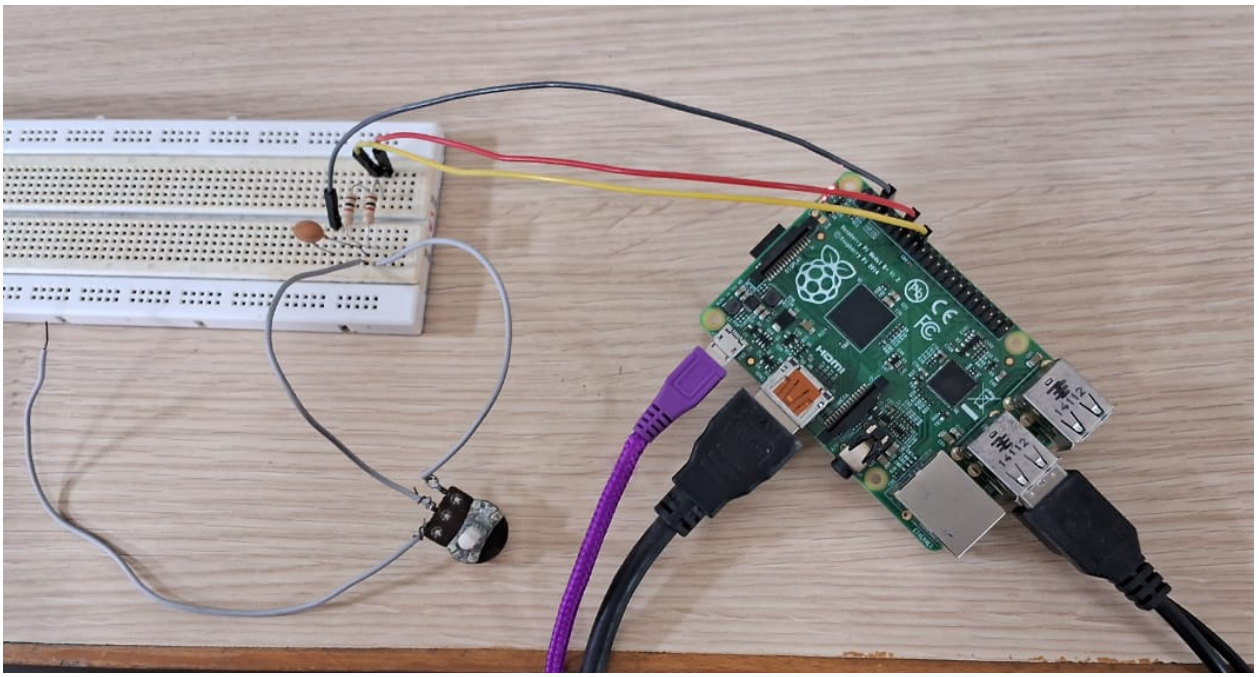
Algorithm:

1. Import the necessary libraries: **RPi.GPIO** and **time**.
2. Set the GPIO mode to BCM.Define the GPIO pins for the analog sensor as **a_pin** and **b_pin**.
3. Inside the **discharge** function:
   i)Set **a_pin** as an input and set **b_pin** as an output and set it to False.
4. Inside the **charge_time** function:
   i)Set **b_pin** as an input and **a_pin** as an output.
   ii)Initialize a count to 0.
   iii)Set **a_pin** to True,while **b_pin** is not yet set, increment the count.
5. Inside the **analog_read** function:
   i)Discharge the sensor.
   ii)Return the charge time obtained from the **charge_time** function.
6.Print the value obtained from **analog_read**.

Program:

```
import RPi.GPIO as GPIO
import time
GPIO.setmode(GPIO.BCM)
a_pin = 18
b_pin = 23
def discharge():
    GPIO.setup(a_pin, GPIO.IN)
    GPIO.setup(b_pin, GPIO.OUT)
    GPIO.output(b_pin, False)
    time.sleep(0.005)
def charge_time():
    GPIO.setup(b_pin, GPIO.IN)
    GPIO.setup(a_pin, GPIO.OUT)
    count = 0
    GPIO.output(a_pin, True)
    while not GPIO.input(b_pin):
        count = count + 1
    return count
def analog_read():
    discharge()
    return charge_time()
while True:
    print(analog_read())
    time.sleep(1)
```

Output:



Pre Lab Questions:

1. How does a Potentiometer work?
2. What are the types of Potentiometers? Explain any two in detail.

Post Lab Questions:

1. How does a trimpot work as a variable resistor?

2. Explain how the step response technique can be used to measure the resistance of the variable resistor.

Result:

Thus,the Python program successfully interfaces with the Raspberry Pi's GPIO pins to connect a variable resistor (potentiometer).