Experiment No._04

Title: Sensor control through web interface

Batch: B2 **Roll No.:** 16010421094 **Experiment No.:**04

Aim: Sensor control through web interface

Resources needed: Internet, Raspberry Pi module, Sensors and Actuators

Theory:

Pre Lab/ Prior Concepts:

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enable these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure.

Role of Sensor in IoT:

Sensors are now found in a wide variety of applications, such as smart mobile devices, automotive systems, industrial control, healthcare, oil exploration and climate monitoring. Sensors are used almost everywhere, and now sensor technology is beginning to closely mimic the ultimate sensing machine the human being. The technology that allows this to happen is sensor fusion, which leverages a microcontroller to fuse the individual data collected from multiple sensors to get a more accurate and reliable view of the data than one would get by using the data from each discrete sensor on its own. Sensor fusion creates a situation in which the whole is much greater than the sum of its parts.

Role of Actuator in IoT:

An actuator is a component of a machine that is responsible for moving and controlling a mechanism or system, for example by opening a valve. In simple terms, it is a "mover".

An actuator requires a control device (controlled by control signal) and a source of energy. The control signal is relatively low energy and may be electric voltage or current, pneumatic, or hydraulic fluid pressure, or even human power. Its main energy source may be an electric current, hydraulic pressure, or pneumatic pressure. The control device is usually a valve. When it receives a control signal, an actuator responds by converting the source's energy into mechanical motion. In the electric, hydraulic, and pneumatic sense, it is a form of automation or automatic control.

The displacement achieved is commonly linear or rotational, as exemplified by linear motors and rotary motors, respectively. Rotary motion is more natural for small machines making large displacements. By means of a leadscrew, rotary motion can be adapted to function as a linear actuator (a linear motion, but not a linear motor).

Activity:

1. 1. Use any Web Interface to control sensors in IoT.

2. Control sensor / actuator with Web Interface, list out step performed, code, output and components used.

Results: (Program printout with output / Document printout as per the format)

Code:

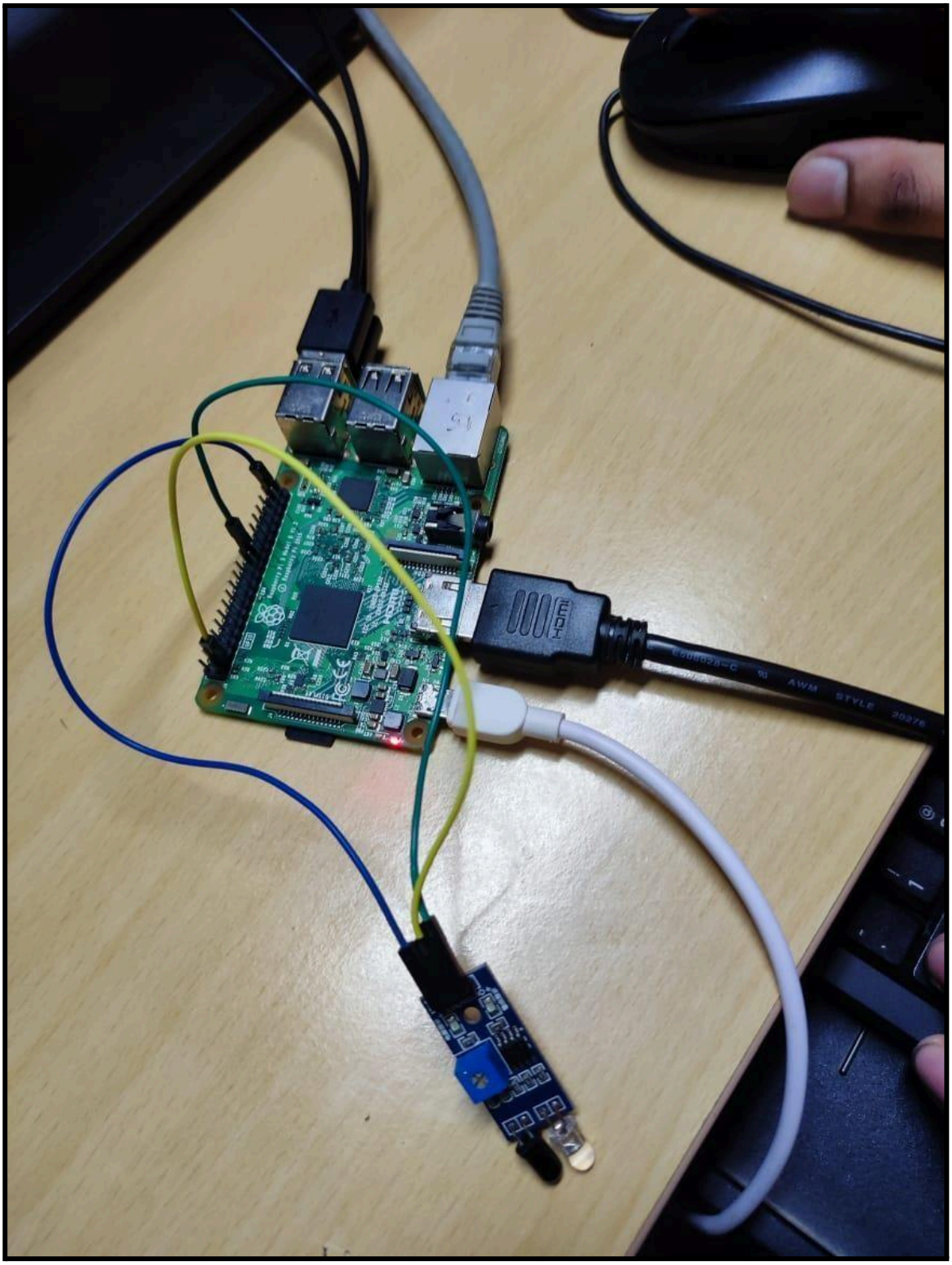
Main.py

```
from flask import Flask, render_template, Blueprint
import RPi.GPIO as GPIO
import time


sensorPin = 23
GPIO.setmode(GPIO.BCM)
GPIO.setup(sensorPin, GPIO.IN)
print("IR Sensor Ready.     ")
print(" ")

def readIRSensor():

val = "Object not detected"
try:
if GPIO.input(sensorPin) == GPIO.LOW:
        print("Object Detected")
val = "Object not detected"
except KeyboardInterrupt:
GPIO.cleanup()

return val

app = Flask(_name_)
app.config['EXPLAIN_TEMPLATE_LOADING'] = True
@app.route('/')
def index():
return render_template('Templates/index.html')

@app.route('/readSensor')
def readSensor():
return readIRSensor()

if__name___== '_main_': app.run(debug=True,
host='0.0.0.0', port=2450)
```

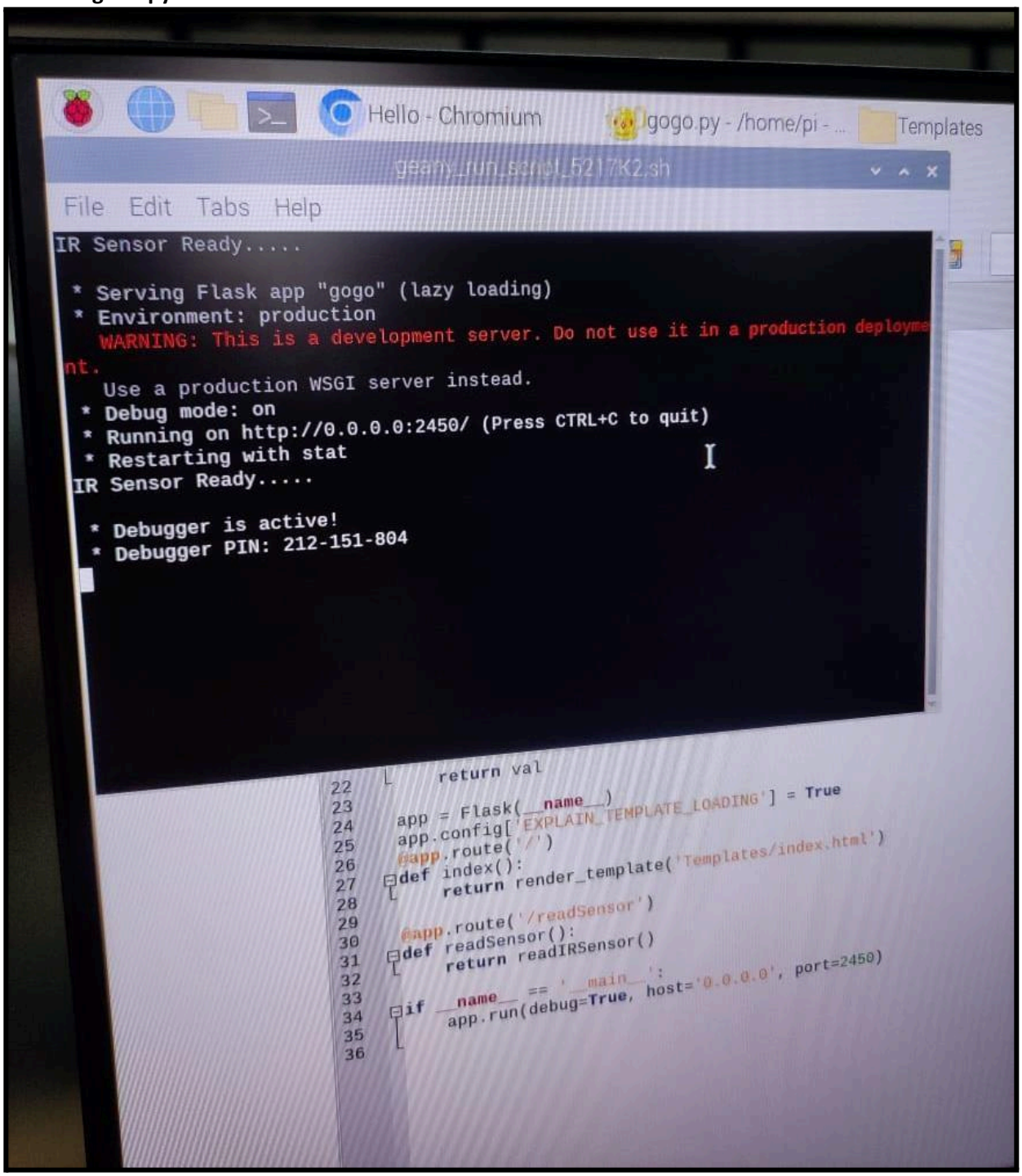
Templates/index.html

```
<html>
<head>
<title>Hello</title>
<style>
body {
        background-color: black;
        color: white;
        display: flex;
        justify-content: center;
        align-items: center;
        text-align: center;
}
</style>

</head>
<body>
<h1 id="root">More content will appear here</h1>
<script>
setInterval (async function() {

        try {
        const response = await

        fetch("/readSensor");

        const data = await response.text();
        document.getElementById("root").innerHTML = data;
        }
        catch (e) {
        document.getElementById("root").innerHTML = e;

        }

}, 1000);
</script>
</body>
</html>
```

The setup:
We have used an IR Sensor and Raspberry Pi for our setup.

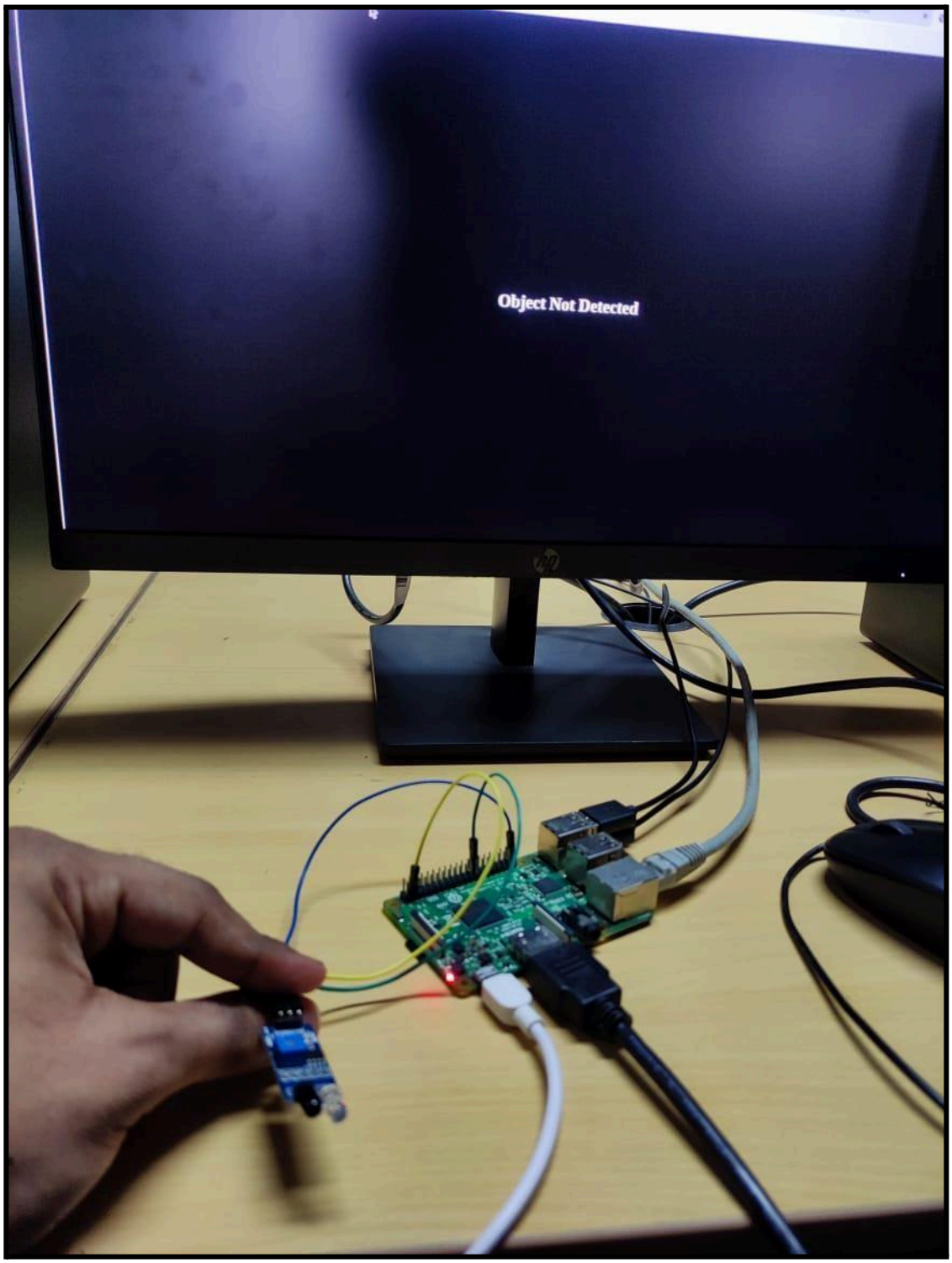


Executing the python file:

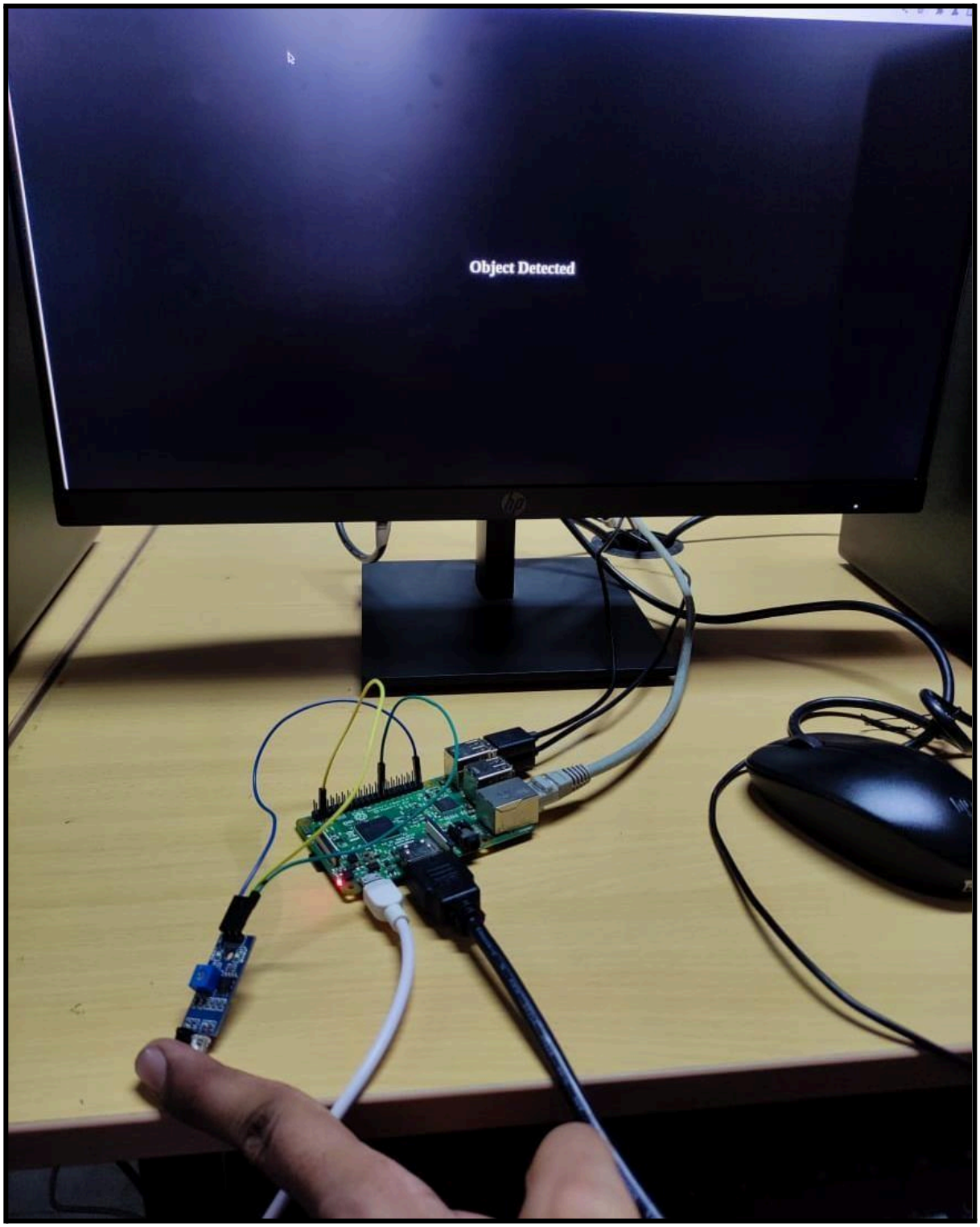


Output on localhost:

When no object is being detected-



When an object is being detected-



Outcomes:

CO2: Comprehend IoT architecture, enabling technologies and protocols.

Conclusion:

Thus in this experiment we successfully controlled the IR sensor through a web interface.

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of faculty in-charge with date

References:

https://en.wikipedia.org/wiki/Internet_of_things

Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

2. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1stEdition, VPT, 2014.

3. Dr. Ovidiu Vermesan, Dr. Peter Friess, “Internet of Things - From Research and Innovation to Market Deployment”, River Publisher, 2014