



Inspiring Excellence

CSE461 LAB

Introduction to Robotics

LAB 1

Topic: Introduction to the Raspberry Pi GPIO pins, and creating Blinking LED Effects

Submitted By:

Group 8

Tahsin Ashrafee Susmit (20301088)

Isratul Hasan (20301072)

Suraiya Binte Akbar (20301007)

Lamia Khan Shoily (20301085)

Samia Abdullah (20101595)

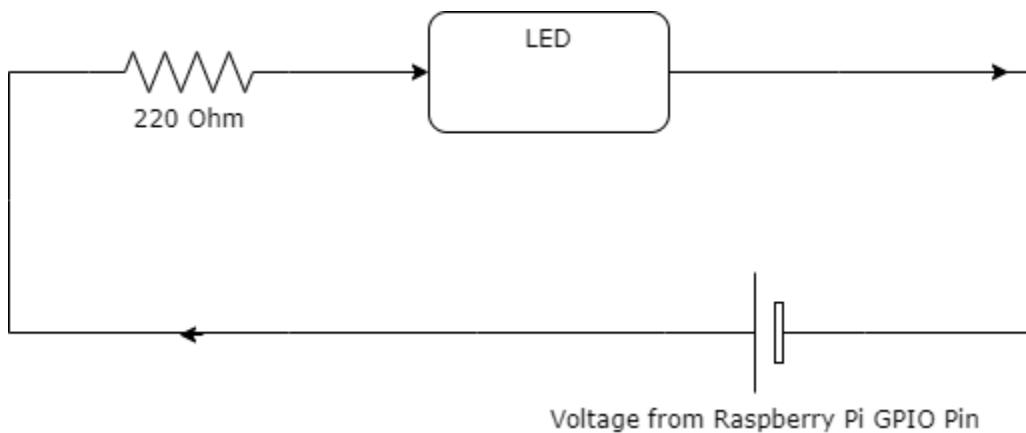
Description:

The Raspberry Pi stands out as an affordable and user-friendly single-board computer. In this lab, we've gained a preliminary understanding of the Raspberry Pi's GPIO pins, exploring their functionalities, operations, and significance. There are a total of 40 GPIO pins capable of serving as either input or output pins, the Raspberry Pi facilitates interaction with various external components. There are 5V pins, 3.3V pins, ground pins, and reserved pins. It is about understanding how these pins work and what each one does. After getting an idea about GPIO pins, we start by learning how to connect something as simple as a LED to the GPIO pins. And then, to control the LED lights and create a blinking effect, we utilize Python code. This provides us with the opportunity to witness theory in action, to know how GPIO pins can be used to control user-controlled circuits.

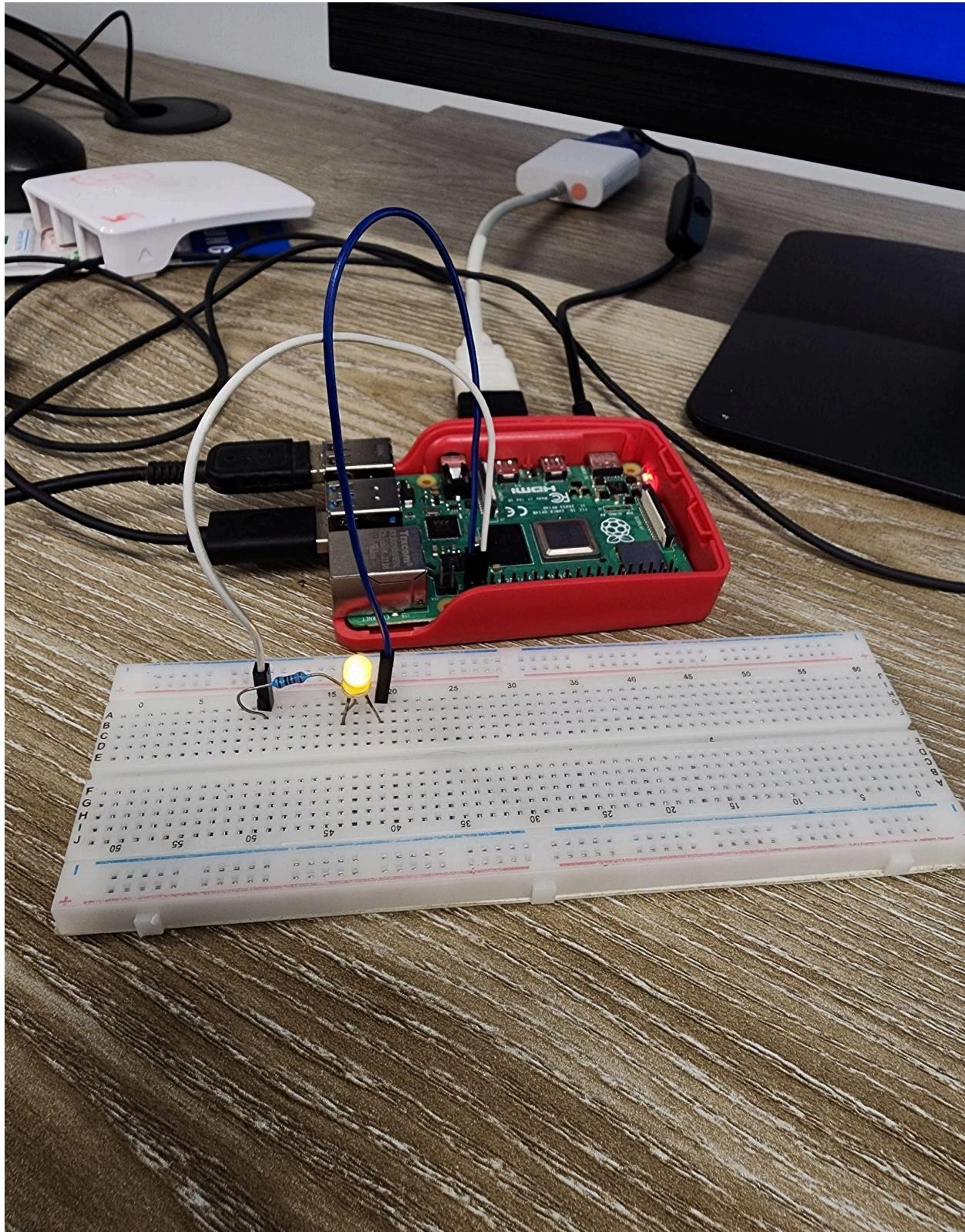
Components:

1. Raspberry Pi 4
2. MicroSD Card
3. Mouse
4. Keyboard
5. Monitor
6. LED
7. Breadboard
8. Connecting wires (Male to Female)
9. A 220-ohm resistor

Circuit diagram:



Circuit setup:



Code:

```
from gpiozero import LED
import time
led = LED(26)
while True:
    led.on()
    time.sleep(3)
    led.off()
    time.sleep(4)
```

Discussion:

In the experiment, we've constructed a simple circuit with LEDs, resistors, and the Raspberry Pi to create a blinking LED effect. This circuit is connected to the GPIO pins, allowing us to control the LEDs illumination through code execution. By utilizing Python code written in the Thonny Python IDE on the Raspberry Pi's operating system, we've achieved the ability to toggle the LED on and off at predefined intervals. The code at first imports the necessary libraries and initializes the LED connected to pin 26. Through a loop, the LED is turned on for 3 seconds and then turned off for 4 seconds, creating a cyclic pattern of illumination or blinking effect. Through this task, we gained valuable insights into simultaneously utilizing both the Raspberry Pi and breadboard, while also understanding the functionality of different pin numbers. Additionally, we had the opportunity to get familiar with the gpiozero and time library along with coding practices essential for Raspberry Pi projects.

Question/Answer:

1. Why is there a 220 Ohms resistor in series with the LED?

Ans:

A 220-ohm resistor is placed in series with the LED because it serves as a crucial component in the circuit. Its role is to limit the current flow, thereby safeguarding both the LED and the GPIO pin. Thus, this ensures to drop some voltage so that the LED does not get damaged.

2. What would happen if the series 220 Ohms resistor was replaced with a 1KOhms resistor? What visual change would you see?

Ans:

If we swap out the 220-ohm resistor in series with an LED for a 1K Ohm resistor, the LED light will appear dimmer. This is because a larger voltage drop will occur across the 1K Ohm resistor, resulting in a reduced voltage drop across the LED. So, with increased resistance, the brightness will be lower.