



CSE 461 : Introduction to Robotics

Lab Report

Lab No: 01

Lab Task: Using push buttons to control LEDs.

Group Information

Lab Section: 09

Group Number: 03

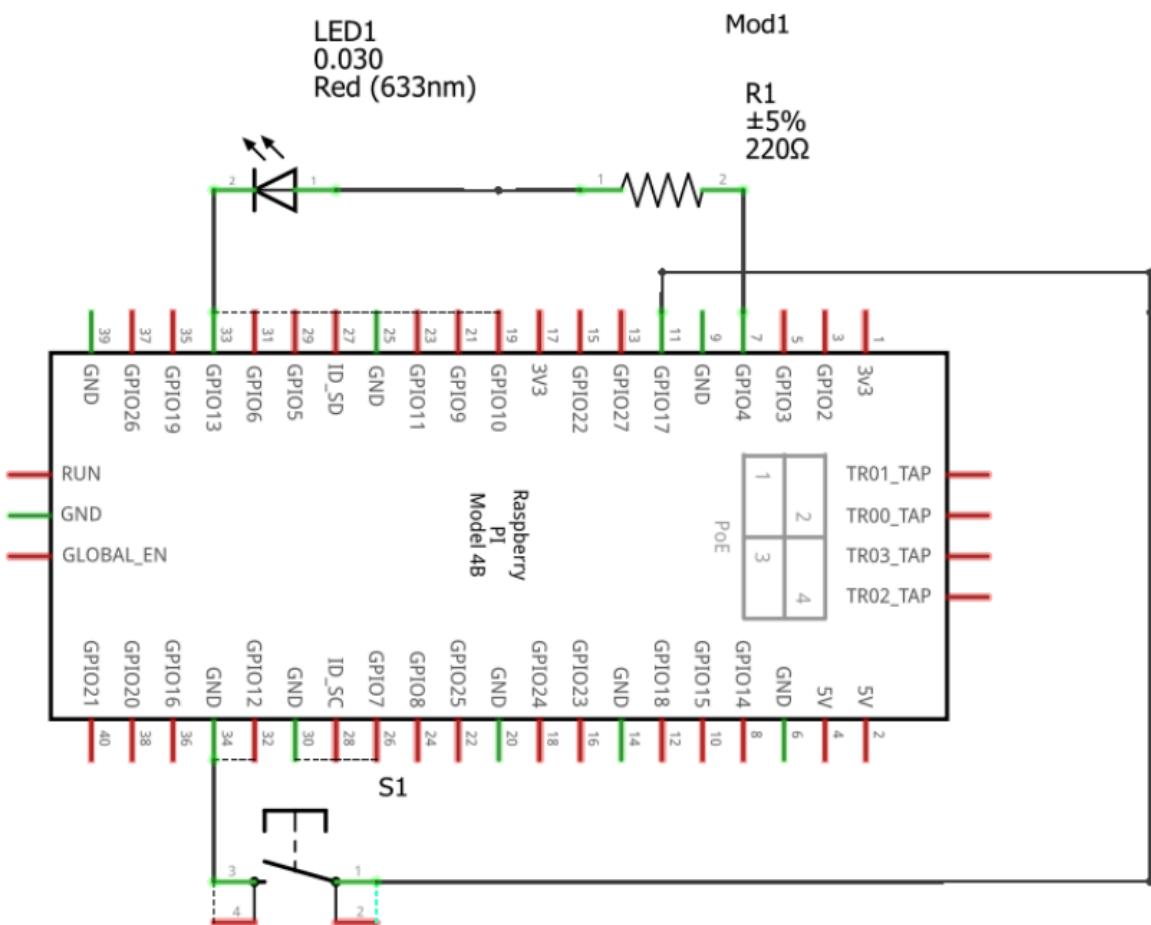
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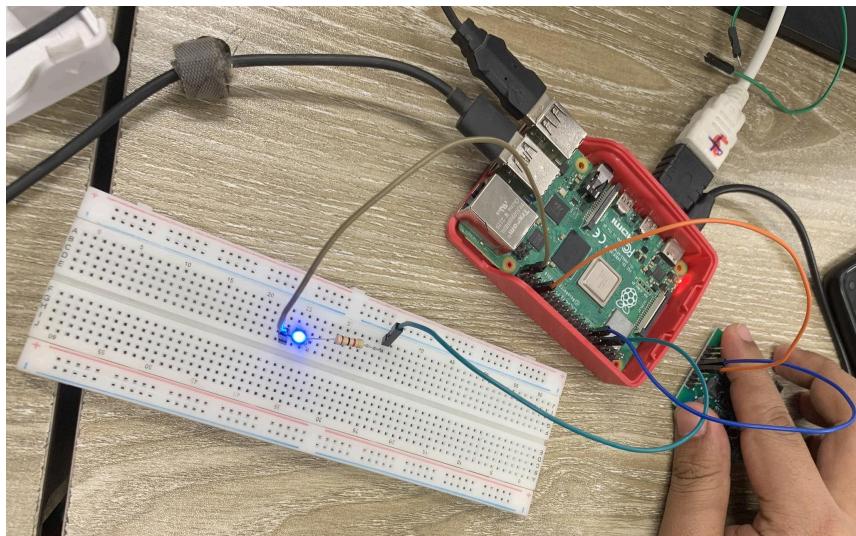
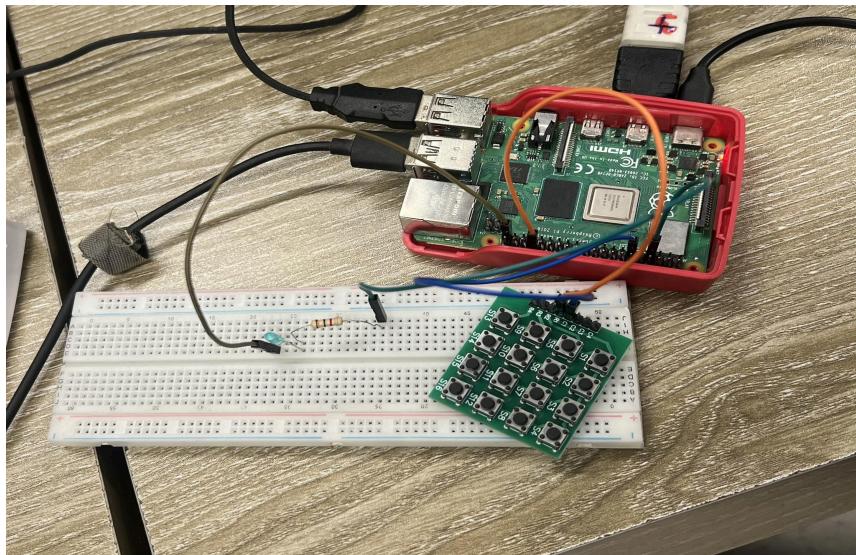
Task Description: Firstly, we have set up the raspberry pi by innserting the os loaded micro sd card, connecting to monitor, keyboard ,mouse and power source. After that, to set up the hardware according to the provided circuit diagram, we'll begin by linking the Raspberry Pi 4 and an LED on the breadboard. Next, we'll connect the cathode terminal of the LED and one leg terminal of the push-button to the breadboard's series short terminal, and then connect this short terminal to the ground pin of the Raspberry Pi. The anode terminal of the LED will be linked to GPIO pin 4 of the Raspberry Pi. Finally, we'll connect the remaining leg terminal of the push-button to GPIO pin 17 of the Raspberry Pi 4. And lastly, we write some Python code for controlling LED with the button on Raspberry Pi 4

Components Used: Raspberry Pi, Jumper Wires, Push Buttons, Bread Board, LED Light, A resistor of 220 ohms, SD Card, Mouse, Keyboard, VGA Cable.

Circuit Diagram:



Circuit Setup:



Code:

```
from gpiozero import LED
from gpiozero import Button

led = LED(4)
button = Button(17)

while True:
    button.wait_for_press()
    led.on()
    button.wait_for_release()
    led.off()
```

Discussion / Q&A:

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

Ans: The 220 Ohm resistor is in series with the LED because it will supply not more than enough electricity to the LED. If we remove the resistor, the LED can be burned.

2) Why is the push button connected from a GPIO pin on the RPI to the GND pin of the RPI instead of being connected directly to the LED and the resistor combination?

Ans : Connecting the push button from a GPIO pin on the Raspberry Pi to the GND pin of the Raspberry Pi instead of directly to the LED and the resistor combination allows for a simpler and more efficient circuit design. This setup utilizes the GPIO pin as an input to detect when the button is pressed, triggering an action (such as turning the LED on or off) in software rather than directly controlling the LED's power supply. This method is commonly used in digital circuits to simplify input/output handling and enable more flexible software control over hardware components. Additionally, it helps prevent potential issues such as short circuits or excessive current flow that could occur if the button were directly connected in series with the LED and resistor.

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

Ans : Replacing the 220 Ohms resistor with a 1K Ohms resistor in the LED circuit will result in a dimmer LED. High resistance will reduce the current flowing through the LED, reducing its brightness. So, visually, the LED will appear dimmer than when it was connected to the 220 Ohms resistor.