Embedded System Lab1

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Lab1_task1:

Components used:

1. Raspberry Pi 5 & power supply
2. 330-ohm Resistor
3. Breadboard & Wire
4. LED
5. Push Button

Process:

LED-GPIO(27)

Button-GPIO(18)

Code:

```
from gpiozero import LED, Button
from time import sleep
from threading import Thread

led = LED(27)
button = Button(18)  # use GPIO27 (physical pin 13) ? or change to your button
pin

blinking = False  # loop status flag

def toggle_loop():
   global blinking
   blinking = not blinking
   print("Blinking started" if blinking else "Blinking stopped")

# Assign button press to toggle function
button.when_pressed = toggle_loop

def led_blink_loop():
   global blinking
   while True:
       if blinking:
           led.on()
```

```
            print("LED ON")
            sleep(1)
            if not blinking:
                led.off()
                continue  # check if blinking was turned off
            led.off()
            print("LED OFF")
            sleep(3)
        else:
            sleep(0.1)  # wait a bit to reduce CPU usage

# Start the blinking loop in a separate thread so button can still respond
t = Thread(target=led_blink_loop)
t.daemon = True
t.start()

# Keep the program running
print("Press the button to toggle LED blinking...")
while True:
    sleep(0.1)
```

Video: https://www.youtube.com/watch?v=dBPx9v4DySQ

Review of Experience:

We set the task as while we press the button the LEDs would start flashing, and it will stop flashing if we press the button again, etc.

Lab1_task2:

Components used:

1. Raspberry Pi 5 & power supply
2. HC-SR501 ultrasonic sensor
3. 330-ohm Resistor*2
4. Breadboard & Wire
5. LED*2

Process:

LED1-GPIO(27)

LED2-GPIO(22)

HC-SR501 Signal-GPIO(17)

Code:

```
import RPi.GPIO as GPIO
import time

# GPIO pin definitions
PIR_PIN = 17
LED1_PIN = 27
LED2_PIN = 22

GPIO.setmode(GPIO.BCM)
GPIO.setup(PIR_PIN, GPIO.IN)
GPIO.setup(LED1_PIN, GPIO.OUT)
GPIO.setup(LED2_PIN, GPIO.OUT)
print("Waiting for motion...")
while True:
   print("Motion detected!")
   # Start alternating LEDs only while motion is active
   while GPIO.input(PIR_PIN):
       GPIO.output(LED1_PIN, GPIO.HIGH)
       GPIO.output(LED2_PIN, GPIO.LOW)
       time.sleep(1)
       GPIO.output(LED1_PIN, GPIO.LOW)
       GPIO.output(LED2_PIN, GPIO.HIGH)
       time.sleep(1)

   GPIO.output(LED1_PIN, GPIO.LOW)
```

```
    GPIO.output(LED2_PIN, GPIO.LOW)
```

Video: https://www.youtube.com/watch?v=a2J9uU9HZnI

Review of Experience:

Our LED flashing has a bug that would stop for about a second in each loop to check if the sensor detected anything.