GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY
Faculty of Engineering
Department of Electrical, Electronics and Telecommunication Engineering

ET4242 – Internet of Things

Practical 01 –Smart Traffic Light Controller using Raspberry Pi

---

Aim: To Design a smart Traffic Light System based on user inputs.

Objective: To get familiar with RPi Platform and OS
To familiar with fundamentals of data reading, process and Tx/Rx in the platform

Outcome: After completing this experiment you would be able to,

a) Hands-on experience in Pin layout of RPi
b) Understand the Structure of programming RPi
c) Understand the Communication structure of RPi and Tkinter communication.
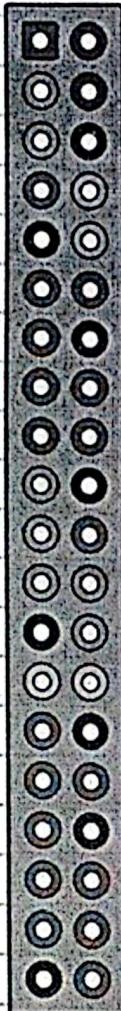
Apparatus:

Equipment Required:
- Breadboard
- DC Power Supply (Micro USB Port (5V @ 2A) - Raspberry Pi)
- Router with an internet connection
- Personal Computer / Smartphone/Desktop Monitor

Components Required:
- Raspberry Pi
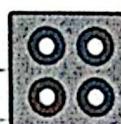- LEDs
- Resistors
- Jumper Cables

Raspberry Pi 4 B J8 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1, I^2C)		DC Power 5v	04
05	GPIO03 (SCL1, I^2C)		Ground	06
07	GPIO04 (GPCLK0)		(TXD0, UART) GPIO14	08
09	Ground		(RXD0, UART) GPIO15	10
11	GPIO17		(PWM0) GPIO18	12
13	GPIO27		Ground	14
15	GPIO22		GPIO23	16
17	3.3v DC Power		GPIO24	18
19	GPIO10 (SPI0_MOSI)		Ground	20
21	GPIO09 (SPI0_MISO)		GPIO25	22
23	GPIO11 (SPI0_CLK)		(SPI0_CE0_N) GPIO08	24
25	Ground		(SPI0_CE1_N) GPIO07	26
27	GPIO00 (SDA0, I^2C)		(SCL0, I^2C) GPIO01	28
29	GPIO05		Ground	30
31	GPIO06		(PWM0) GPIO12	32
33	GPIO13 (PWM1)		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Raspberry Pi 4 B J14 PoE Header

01	TR01		TR00	02
03	TR03		TR02	04

Pinout Grouping Legend

Inter-Integrated Circuit Serial Bus ◎ ◎   Serial Peripheral Interface Bus

Ungrouped/Un-Allocated GPIO ◉ ◉   Universal Asynchronous Receiver-Transmitter

Reserved for EEPROM ◎

Rev. 2
19/06/2019 CGS

www.element14.com/RaspberryPi

Practice Problem 1 - Lighting an LED.

```
Import RPi.GPIO as gpio
Import time
gpio.setwarnings(False)
gpio.setmode(gpio.BCM)
gpio.setup(18,gpio.OUT)

gpio.output(18,True)
time.sleep(2)
gpio.output(18,False)
```

Observe the output.

Practice Problem 2 – Traffic Light System with Red, Amber/Yellow and Green.

Procedure:
1) Flashing red for two seconds.
2) Then, flashing red and amber/yellow together for one second.
3) Switching off the red and amber/yellow and flashing green.
4) Repeat the procedure.

Practice Problem 3 – Check button to control LED on Raspberry Pi.

Creating a Check Button using Tkinter:

```
From tkinter import *

root = Tk()
root.title('Check Button')

check_var = BooleanVar()

def Update():
    print('Command')

check1 = Checkbutton(root, text = 'D1',command = update,
variable = check_var, onvalue=True, offvalue=false.pack
```

Procedure:
5) Create three check buttons.
6) Flash three LED based on ticking and unticking of the check buttons.