

Experiment – 8***Aim of the Experiment:***

Optimizing MicroPython for different Display Control: Interfacing different display unit with Raspberry Pi.

Objective:

- 1) Introduction to **Different display unit such as OLED Screen, Liquid Crystal display, Seven Segment Display, RGB Led Strip** etc. and its behaviour and applications.
- 2) Implementation of Programming an OLED Screen to display text on Micro-python with Raspberry Pi.
- 3) Implementation of Programming a Liquid Crystal Display (LCD) Screen to display text on Micro-python with Raspberry Pi.
- 4) Implementation of **Room Temperature Meter with a Liquid Crystal Display (LCD)** using Raspberry Pi.
- 5) Implementation of Programming a Common Cathode (CC) based Seven Segment Display Screen to display numeric on Micro-python with Raspberry Pi.
- 6) Implementation of **Displays number 0-9 with or without the decimal point** using Common Cathode (CC) based Seven Segment Display and Raspberry Pi.
- 7) Implementation of **favourite colours and display them on the RGB LED Strip** using Raspberry Pi.
- 8) Implementation of a **Randomly generated colourful flowing light** using RGB LED Strip module and Raspberry Pi.

Components/Equipment/items Required:

Sl No.	Name of the Component/Equipment	Specification	Quantity
1	Raspberry Pi Pico	RP2040 microcontroller chip, 125MHz	1
2	Raspberry Pi Pico cable	USB Type A to Micro-B	1
3	Resistors (carbon type)	¼ watt (10kΩ)	1
4	Resistors (carbon type)	¼ watt (1kΩ)	1
5	Trimmer Pot	10k	1
6	OLED Module	SSD1360, 0.96 inch	1
7	Thermister	103	1

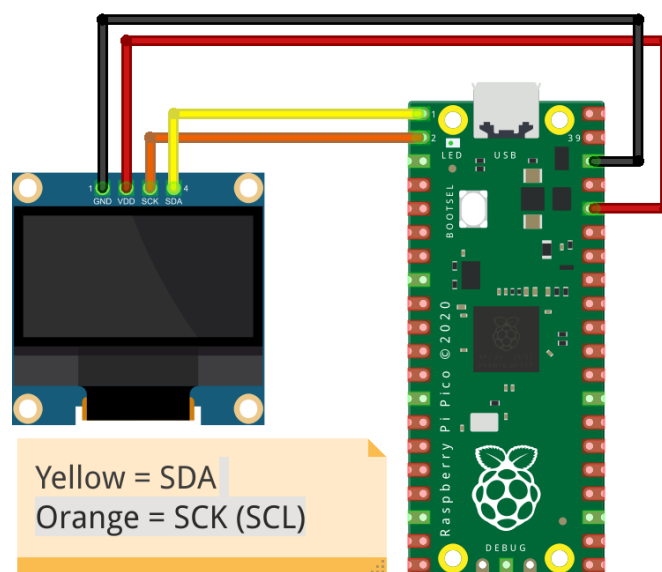
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8	LCD module	16 x 02	1
9	I2C Module	-----	1
10	Seven Segment Display	Common Cathode	1
11	RGB LED Strip	WS 2812	1
12	Breadboard	840 Tie points	1
13	Jumper Wire	-----	As per requirement

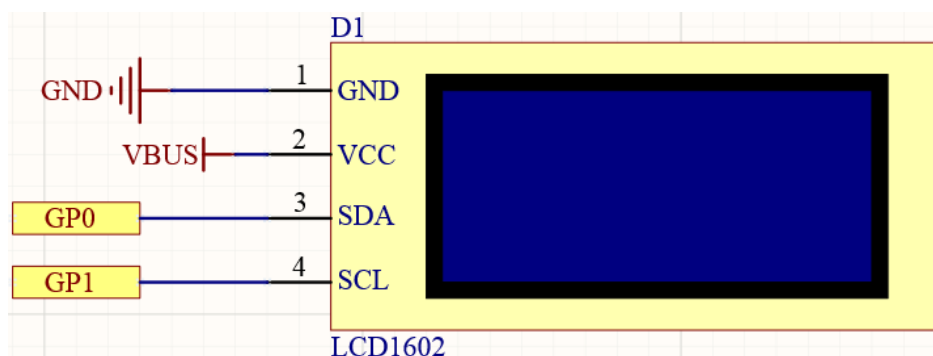
Circuit/Schematic Diagram:

Objective 2



(Figure 1: Circuit diagram for implementation of Programming an OLED Screen to display text on Micro-python with Raspberry Pi.)

Objective 3

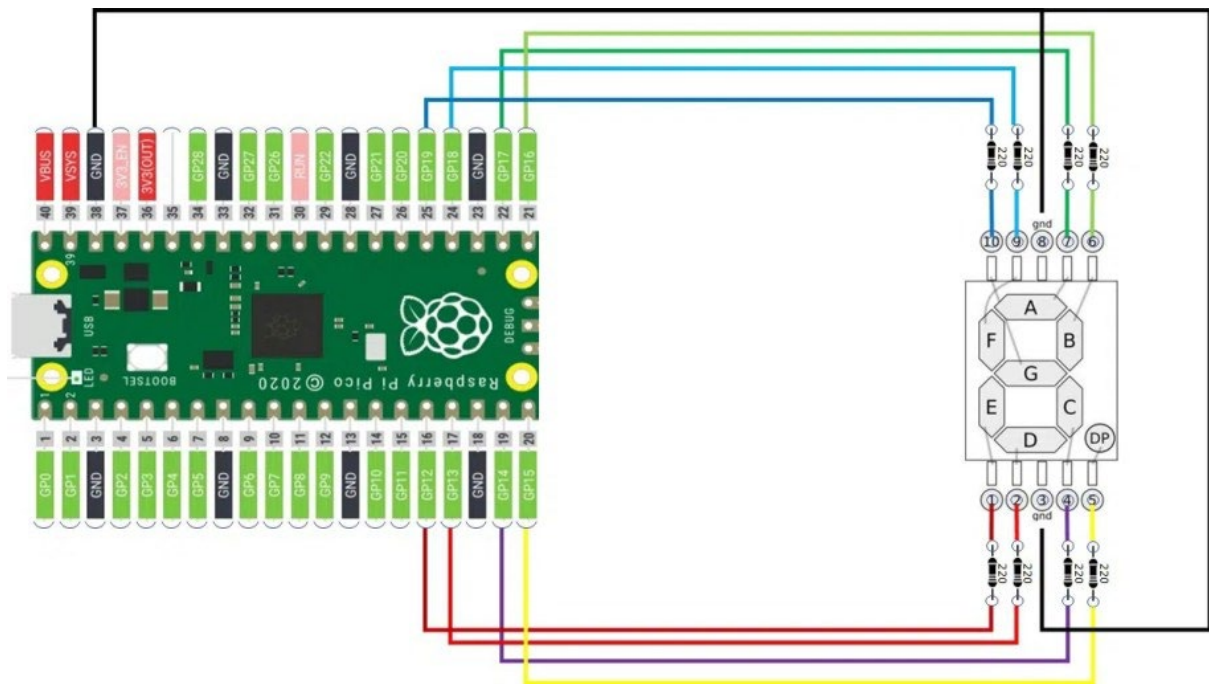


(Figure 2: Circuit diagram for implementation of Programming a Liquid Crystal Display (LCD) Screen to display text on Micro-python with Raspberry Pi.)

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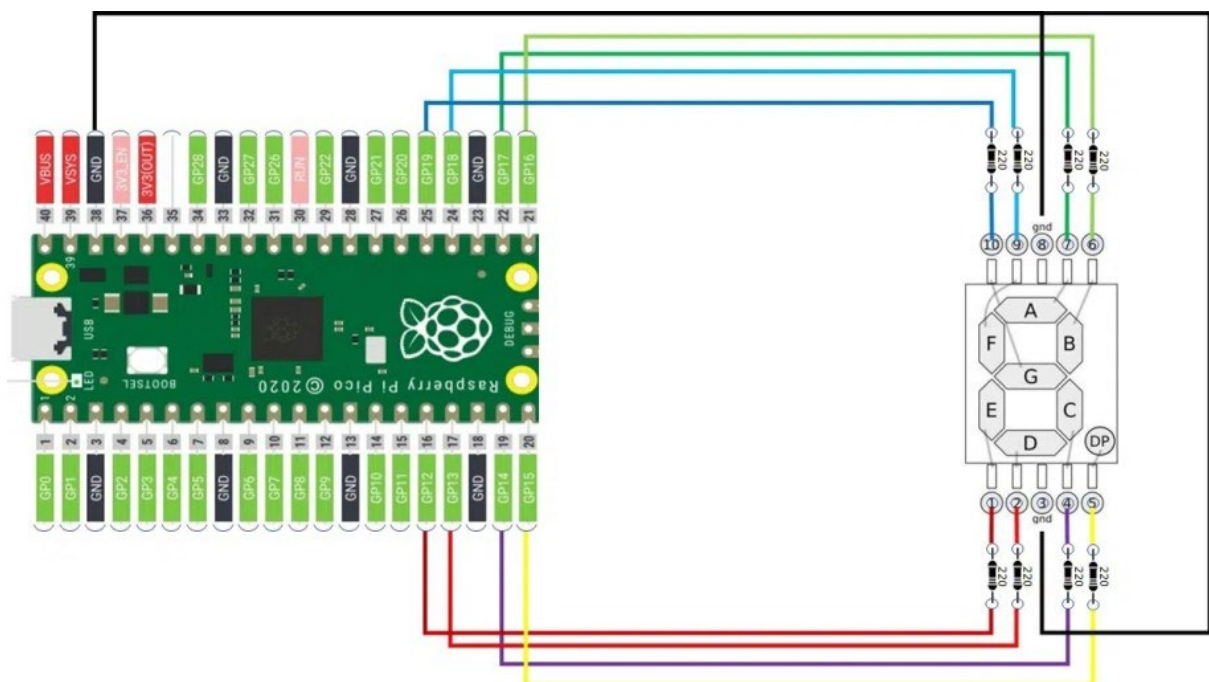
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Objective 5



(Figure 3: Circuit diagram for implementation of Programming a Common Cathode (CC) based Seven Segment Display Screen to display numeric on Micro-python with Raspberry Pi.)

Objective 6

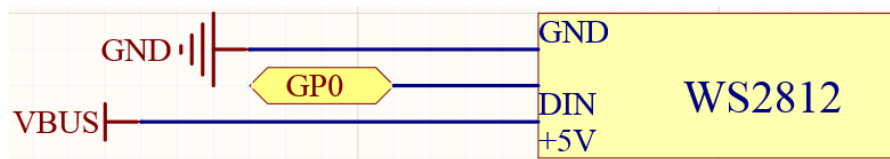


(Figure 4: Circuit diagram for implementation of Displays number 0-9 with or without the decimal point using Common Cathode (CC) based Seven Segment Display and Raspberry Pi.)

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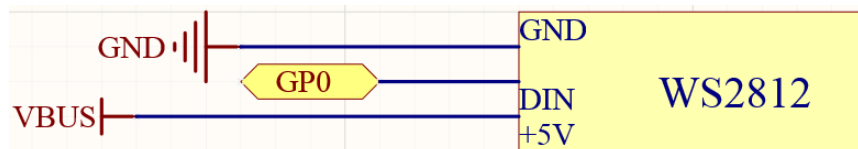
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Objective 7



(Figure 5: Circuit diagram for implementation of favourite colours and display them on the RGB LED Strip using Raspberry Pi.)

Objective 8



(Figure 6: Circuit diagram for implementation of a Randomly generated colourful flowing light using RGB LED Strip module and Raspberry Pi.)

Observation:

Objective 2

(Figure 7: Simulation based electronic circuit for implementation of Programming an OLED Screen to display text on Micro-python with Raspberry Pi.)

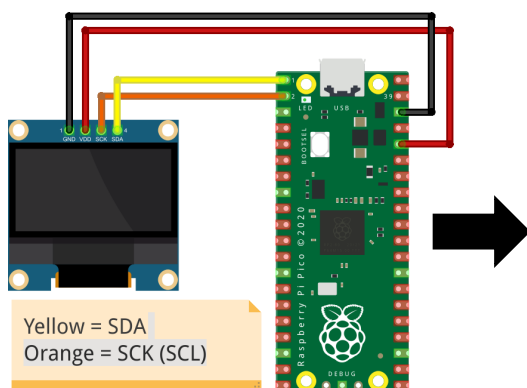


Figure 8: (Breadboard Schematic representation of an electronic circuit for implementation of Programming an OLED Screen to display text on Micro-python with Raspberry Pi.)

Figure 9: (Hardware implementation based electronic circuit for implementation of Programming an OLED Screen to display text on Micro-python with Raspberry Pi.)

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Objective 3

(Figure 10: Simulation based electronic circuit for implementation of Programming a Liquid Crystal Display (LCD) Screen to display text on Micro-python with Raspberry Pi)

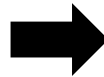
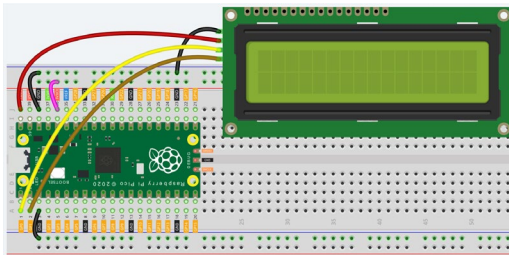


Figure 11: (Breadboard Schematic representation of an electronic circuit for implementation of Programming a Liquid Crystal Display (LCD) Screen to display text on Micro-python with Raspberry Pi.)

Figure 12: (Hardware implementation based electronic circuit for implementation of Programming a Liquid Crystal Display (LCD) Screen to display text on Micro-python with Raspberry Pi)

Objective 4

Figure 13: (Simulation based Implementation of Room Temperature Meter with a Liquid Crystal Display (LCD) using Raspberry Pi.)

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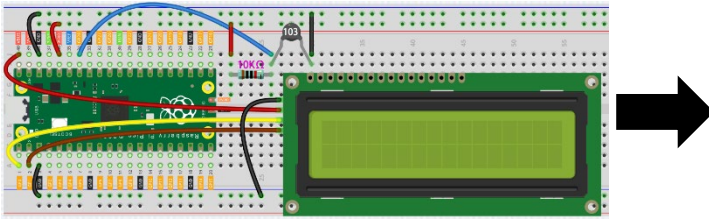


Figure 14: (Breadboard Schematic representation of an electronic circuit for implementation of Room Temperature Meter with a Liquid Crystal Display (LCD) using Raspberry Pi.)

Figure 15: (Hardware implementation based electronic circuit for implementation of Room Temperature Meter with a Liquid Crystal Display (LCD) using Raspberry Pi.)

Objective 5

Figure 16: (Simulation based Programming a Common Cathode (CC) based Seven Segment Display Screen to display numeric on Micro-python with Raspberry Pi.)

Figure 17: (Hardware implementation based electronic circuit for implementation of Programming a Common Cathode (CC) based Seven Segment Display Screen to display numeric on Micro-python with Raspberry Pi.)

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Objective 6

Figure 18: (Simulation based Displays number 0-9 with or without the decimal point using Common Cathode (CC) based Seven Segment Display and Raspberry Pi)

(Figure 19: Hardware implementation based electronic circuit for Displays number 0-9 with or without the decimal point using Common Cathode (CC) based Seven Segment Display and Raspberry Pi)

Objective 7

Figure 20: (Simulation based favourite colours and display them on the RGB LED Strip using Raspberry Pi.)

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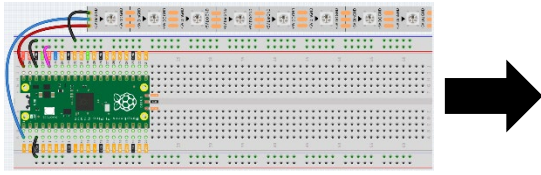


Figure 21: (Breadboard Schematic representation of an electronic circuit for favourite colours and display them on the RGB LED Strip using Raspberry Pi)

(Figure 22: Hardware implementation based electronic circuit for favourite colours and display them on the RGB LED Strip using Raspberry Pi)

Objective 8

Figure 23: (Simulation based a Randomly generated colourful flowing light using RGB LED Strip module and Raspberry Pi)

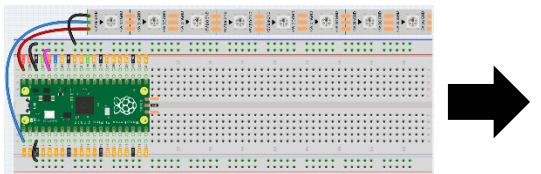


Figure 24: (Breadboard Schematic representation of an electronic circuit for implementation of a Randomly generated colourful flowing light using RGB LED Strip module and Raspberry Pi)

Figure 25: (Hardware implementation based electronic circuit for implementation of a Randomly generated colourful flowing light using RGB LED Strip module and Raspberry Pi)

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Experiment – 8

Codes:

Objective 2

```
print("Hello, Pi Pico!")
print("This is Experiment - 8 and Objective - 2")
print("Name:                ; Registration No.:                ")
print("Objective : 2  Implementation of Programming an OLED Screen to display
text on Micro-python with Raspberry Pi.")
```

Objective 3

```
print("Hello, Pi Pico!")
print("This is Experiment - 8 and Objective - 3")
print("Name:                ; Registration No.:                ")
print("Objective : 3  Implementation of Programming a Liquid Crystal Display
(LCD) Screen to display text on Micro-python with Raspberry Pi.")
```

Objective 4

```
print("Hello, Pi Pico!")
print("This is Experiment - 8 and Objective - 4")
print("Name:                ; Registration No.:                ")
print("Objective : 4  Implementation of Room Temperature Meter with a Liquid
Crystal Display (LCD) using Raspberry Pi.")
```

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Experiment – 8

Objective 5

```
print("Hello, Pi Pico!")
print("This is Experiment - 8 and Objective - 5")
print("Name:                ; Registration No.:                ")
print("Objective : 5   Implementation of Programming a Common Cathode (CC) based
Seven Segment Display Screen to display numeric on Micro-python with Raspberry
Pi.")
```

Objective 6

```
print("Hello, Pi Pico!")
print("This is Experiment - 8 and Objective - 6")
print("Name:                ; Registration No.:                ")
print("Objective : 6   Implementation of Displays number 0-9 with or without
the decimal point using Common Cathode (CC) based Seven Segment Display and
Raspberry Pi.")
```

Objective 7

```
print("Hello, Pi Pico!")
print("This is Experiment - 8 and Objective - 7")
print("Name:                ; Registration No.:                ")
print("Objective : 7   Implementation of favourite colours and display them on
the RGB LED Strip using Raspberry Pi.")
```

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Experiment – 8

Objective 8

```
print("Hello, Pi Pico!")
print("This is Experiment - 8 and Objective - 8")
print("Name:                ; Registration No.:                ")
print("Objective : 8    Implementation of a Randomly generated colourful flowing
light using RGB LED Strip module and Raspberry Pi.")
```

Conclusion:

Precautions:

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Post Experiment Questionnaire:

Answer all the Questions in brief with some appropriate examples.

- 1) How to write a text to OLED display on a specific x and y coordinate in MicroPython for Raspberry Pi Pico?
- 2) How to display an image on OLED display in MicroPython for Raspberry Pi Pico?
- 3) How to draw a line on OLED display in MicroPython for Raspberry Pi Pico?
- 4) Write a MicroPython code to:
 - a) Display "Hello World!" on the OLED Display
 - b) Display an Image on the OLED Display
 - c) Draw a rectangle on the OLED Display
 - d) Scroll text on OLED Display
- 5) A 16x2 LCD is connected to a Raspberry Pi Pico using MicroPython. The LCD's data pins are connected to the Raspberry Pi Pico's GP26 to GP33. The LCD's RS pin is connected to GP25 and the LCD's E pin is connected to GP24. Write the MicroPython code to initialize the LCD and write "Hello World!" on the first line of the LCD.
- 6) A common cathode 7-segment display is connected to a Raspberry Pi Pico using MicroPython. The display's segments A, B, C, D, E, F, G, and DP are connected to the Raspberry Pi Pico's GP26, GP27, GP28, GP29, GP30, GP31, GP32, and GP33 respectively. Write the MicroPython code to initialize the display pins and display the number "5" on the 7-segment display.

Name of the Student

Registration No

Semester

Branch, Section