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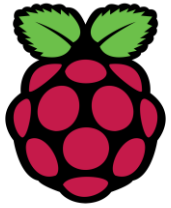
Al Hussein
Technical University
جامعة الحسين التقنية

Remote Lab For Engineering Project
Erasmus+ Program

Raspberry Pi -Take Home Lab

Lab Experiment # 9

Raspberry Pi- LED Matrix Display



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The LED Matrix

- The LED matrix is an arrangement of light-emitting diodes (LEDs) in a grid-like pattern, typically used for displaying text, numbers, or simple graphics.
- LED matrices are commonly used in various applications, including:
  - Digital Clocks.
  - Scoreboards.
  - Signs and billboards.
  - Video Displays.

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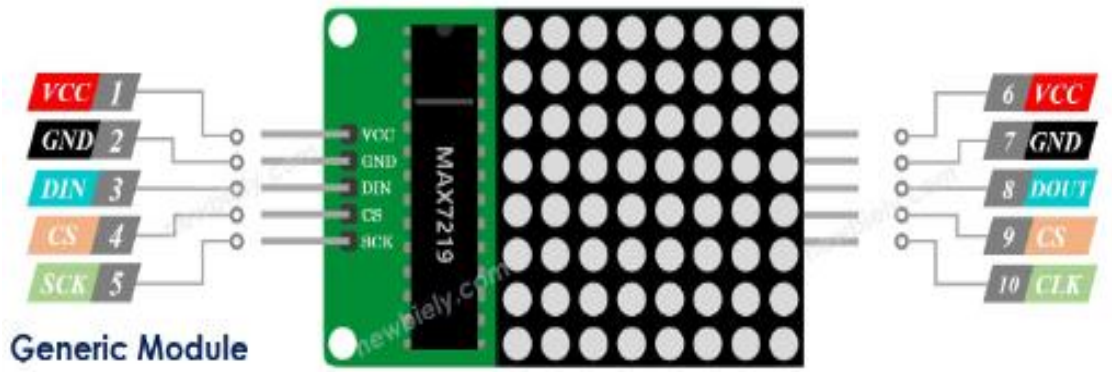
The LED Matrix PINOUT

A LED Matrix is composed of one or multiple blocks. Each block has two sets of pins:

- Input pins group:
  - **VCC:** connected to 5V power supply.
  - **GND:** connected to ground.
  - **DIN:** Data pin, linked to the GPIO10 (MOSI) pin of the Raspberry Pi.
  - **CS:** Chip Select, linked to the GPIO8 (SPI CE0) pin of the Raspberry Pi.
  - **CLK:** Clock pin, linked to the GPIO11 (SPI CLK) pin of the Raspberry Pi.
- Output pins group:
  - **VCC:** connects to **VCC** on the following module.
  - **GND:** connects to **GND** on the following module.
  - **DOUT:** Data Out, links to the DIN pin of the next module.
  - **CS:** connects to CS on the next module.
  - **CLK:** connects to CLK on the next module.



Generic Module

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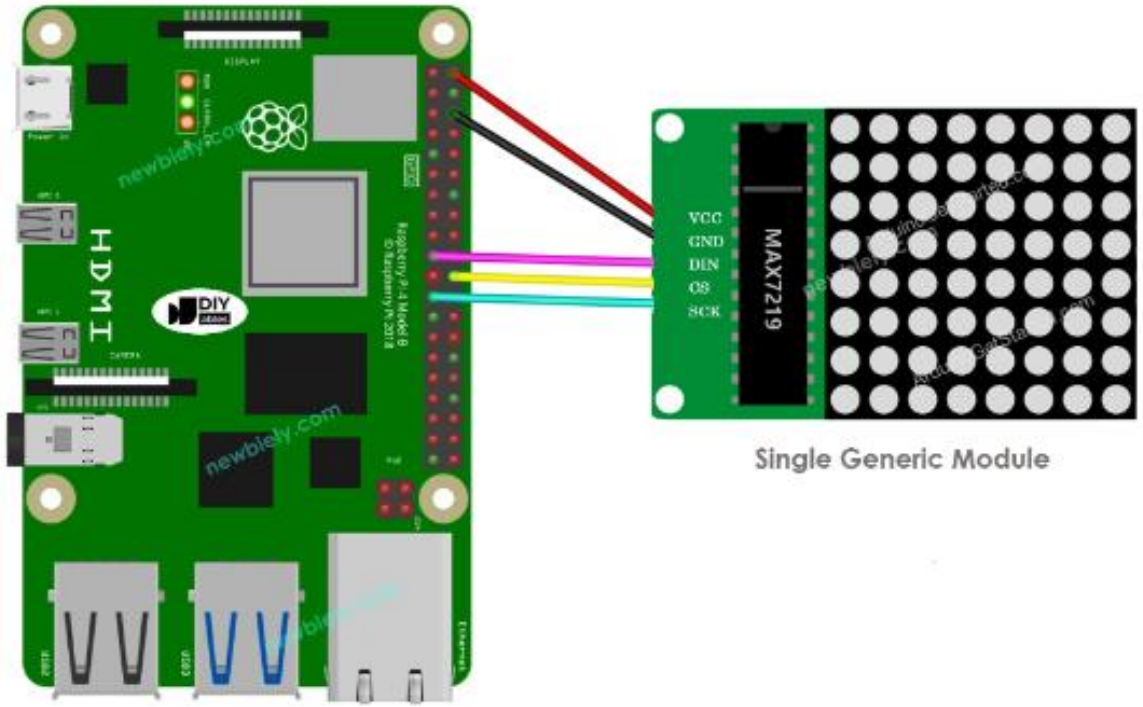
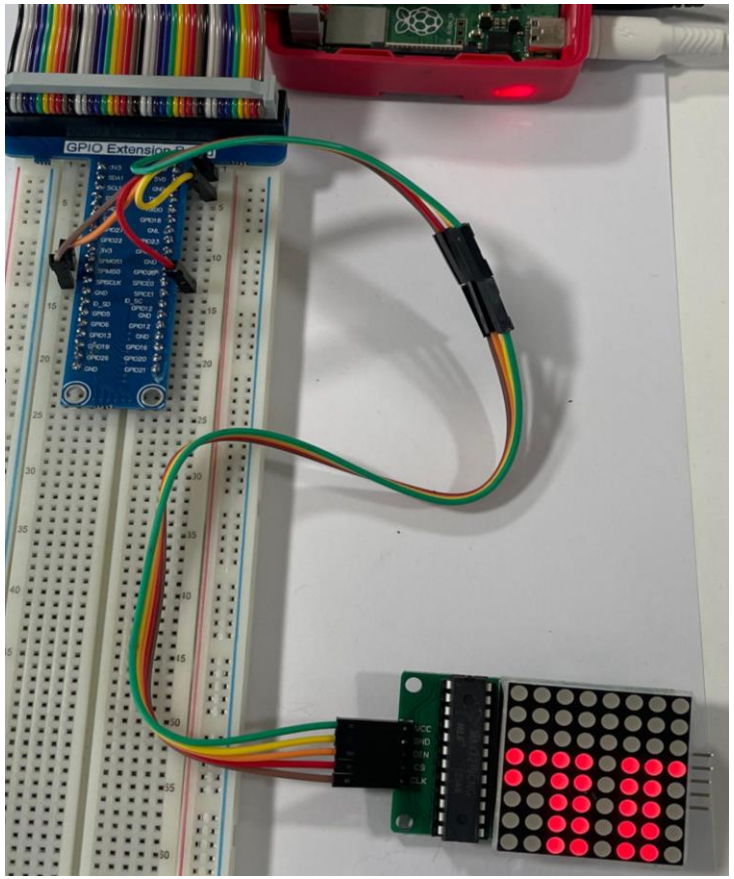
The LED Matrix- Wiring Diagram



Single Generic Module



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The LED Matrix- Code

```python
from luma.led_matrix.device import max7219
from luma.core.interface.serial import spi, noop
from luma.core.render import canvas
from PIL import ImageFont

# Configure the MAX7219 device
serial = spi(port=0, device=0, gpio=noop())
device = max7219(serial, cascaded=1, block_orientation=90)
device.contrast(5)  # Adjust brightness (0-15)

# Display "HTU" on the LED matrix
try:
    print("Displaying 'HTU'")
    with canvas(device) as draw:
        draw.text((0, 0), "HTU", fill="white")  # Display "HTU" at the top-left
except KeyboardInterrupt:
    print("Exiting program.")
```

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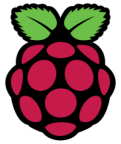
Take-Home Practice



Show numbers from 1 to 100 on the LED matrix.
Hint: Use for loop to achieve the task.