Lab 2 : 8x8 LED Display Experiment

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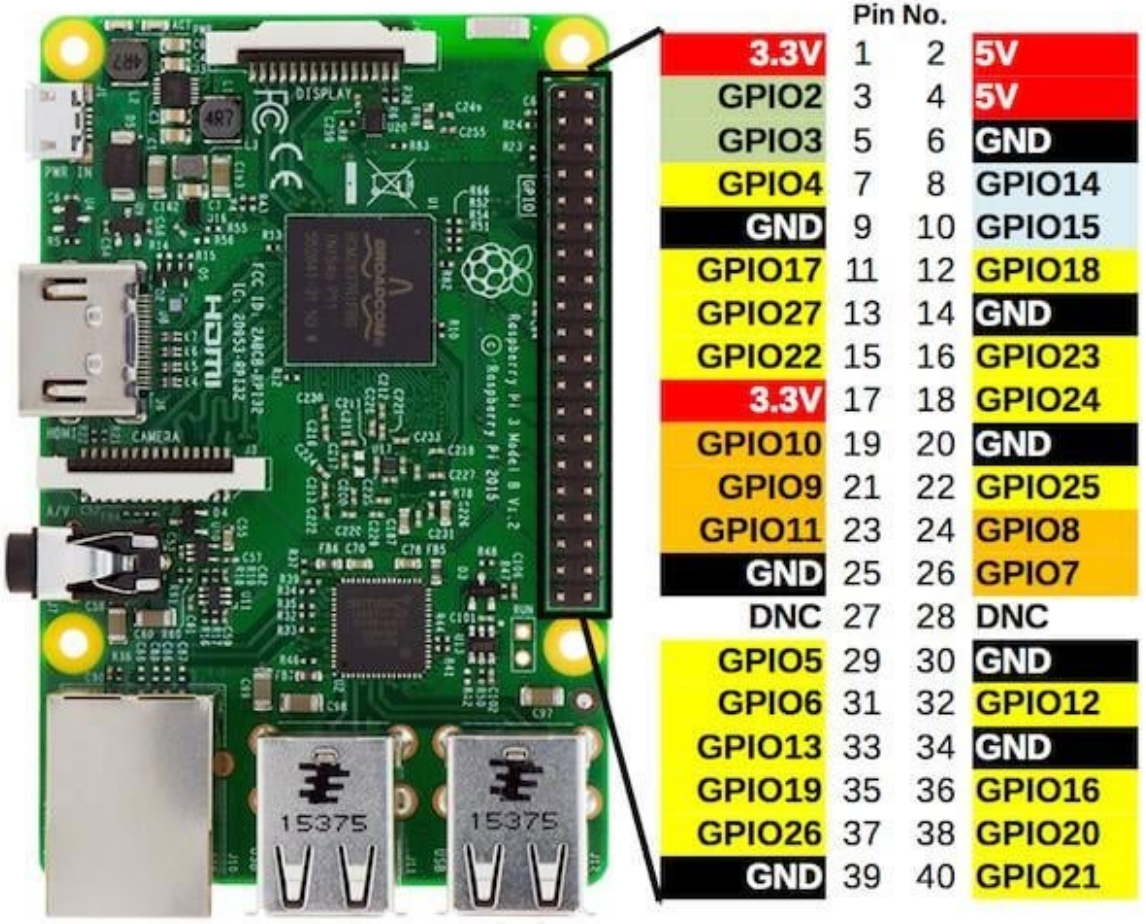
RPi Pin


Pin No.
3.3V 1 2 5V
GPIO2 3 4 5V
GPIO3 5 6 GND
GPIO4 7 8 GPIO14
GND 9 10 GPIO15
GPIO17 11 12 GPIO18
GPIO27 13 14 GND
GPIO22 15 16 GPIO23
3.3V 17 18 GPIO24
GPIO10 19 20 GND
GPIO9 21 22 GPIO25
GPIO11 23 24 GPIO8
GND 25 26 GPIO7
DNC 27 28 DNC
GPIO5 29 30 GND
GPIO6 31 32 GPIO12
GPIO13 33 34 GND
GPIO19 35 36 GPIO16
GPIO26 37 38 GPIO20
GND 39 40 GPIO21

Components Used

1. Rpi 5 & its power supply adapter
2. MAX7219 8x8 LED Display Module
3. Breadboard & Wire

MAX7219 8x8 LED Display Module

- **MAX7219 Red Light Led Matrix MCU Control LED Display Module**

VCC connect to 5V power supply
GND connect to GND
DIN connect to SPI MOSI (Default Pin: GPIO 10,Pin19)
CS connect to SPI CE0 (Default Pin:GPIO 8,Pin24)
CLK connect to SPI SCLK (Default Pin: GPIO 11,Pin23)

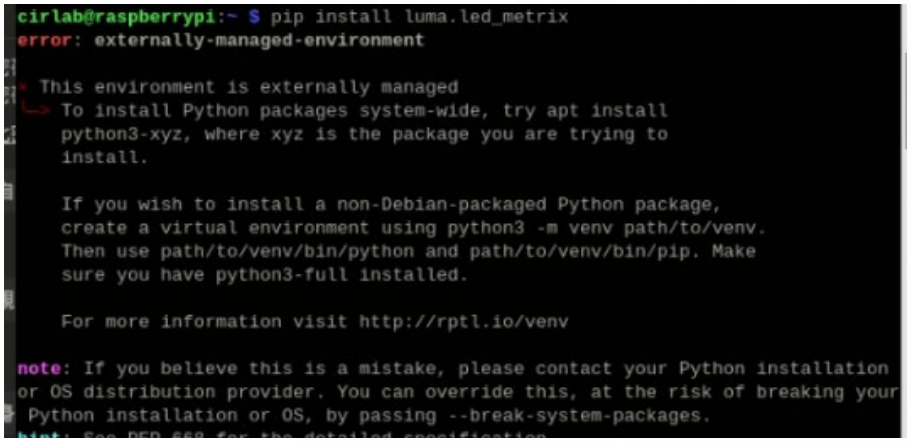
DIN is Serial-Data Input. Data is loaded into the internal 16-bit shift register on CLK’ s rising edge.
MOSI(Master Output, Slave Input):
Host output slave input signal.
CS is Chip-Select Input. Serial data is loaded into the shift register while CS is low. The last 16 bits of serial data are latched on CS’ s rising edge.

Install luma.led_metrix

- Install Luma.LED_Matrix to control LED matrix displays.

```
pip install luma.led_matrix
```

- You might see this error message.



- This error message indicates that you are attempting to install luma.led_metrix in an "externally managed environment," which typically refers to a system-level Python installation managed by the operating system's package manager.

Virtual Environment

- **Use a virtual environment**

1. Create a virtual environment

```
python3 -m venv myenv
```

2. Activate the virtual environment

```
source myenv/bin/activate
```

3. Install the required Python package

```
pip install luma.led_matrix
```

Open SPI Interface

- SPI is the primary communication method between the MAX7219 and the Raspberry Pi. You must ensure that the SPI interface is enabled; otherwise, you will not be able to control the LED matrix display.
- The MAX7219 uses a serial communication protocol, which includes CLK (clock), CS (chip select), and DIN (data input).
- If SPI is not enabled, the Raspberry Pi will not be able to use the SPI interface to transmit data to the MAX7219, resulting in a DeviceNotFoundError or FileNotFoundError when running the Python script.

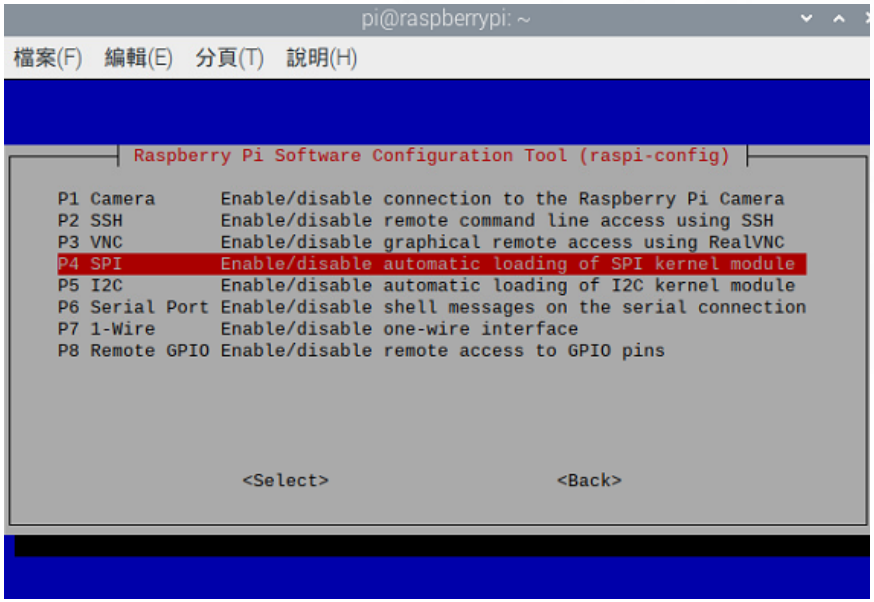
```
>>> %Run aaa.py
  Traceback (most recent call last):
    File "/home/pi/.local/lib/python3.7/site-packages/luma/core/interface/serial.py", line 306, in __init__
      self._spi.open(port, device)
  FileNotFoundError: [Errno 2] No such file or directory

  During handling of the above exception, another exception occurred:

  Traceback (most recent call last):
    File "/home/pi/Desktop/example/aaa.py", line 8, in <module>
      serial = spi(port=0, device=0)
    File "/home/pi/.local/lib/python3.7/site-packages/luma/core/interface/serial.py", line 317, in __init__
      raise luma.core.error.DeviceNotFoundError('SPI device not found')
  luma.core.error.DeviceNotFoundError: SPI device not found
```

Open SPI Interface

1. Run the raspi-config tool

```
sudo raspi-config
```

2. Navigate to 3 Interfacing Options
3. Choose SPI，Choose Yes to open SPI interface

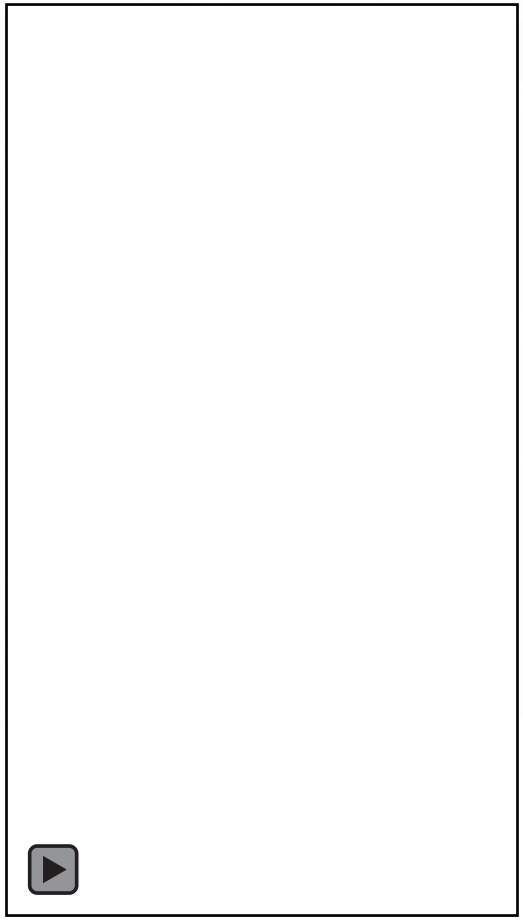


Lab 2

- **show your student ID**

```
from luma.led_matrix.device import max7219
from luma.core.interface.serial import spi, noop
from luma.core.render import canvas
from luma.core.virtual import viewport
from luma.core.legacy import text, show_message
from luma.core.legacy.font import proportional, CP437_FONT, TINY_FONT, SINCLAIR_FONT,
LCD_FONT
Import time
#Create a serial instance and specify SPI bus parameters
serial = spi(port=0, device=0, gpio=noop())
device = max7219(serial, cascaded=1, block_orientation=0)
#cascaded=1 means only one device is connected,  block_orientation=[0, 90, -90], Corrects
block orientation when wired vertically.
#show message
time.sleep(1)
msg = "61275041H"
show_message(device, msg, fill="white", font=proportional(LCD_FONT), scroll_delay=0.1) #white
means LED is illuminated
time.sleep(1)
```

Lab 2 Result



Lab 2

The lab report should include the following:

Video

Code

Problems Encountered

End the report with a section called “Problems Encountered:” where you can describe missing features, problems with your codes, or difficulties encountered with using ssh/scp or other Unix commands. If there were no problems, write “None”.

Deadline : 03/26 **(It is best to complete it in class)**

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