11.Display rainbow

Learning goals: Switch colors of RGB lamps to display rainbows.

Experimental phenomena: After running the program, the RGB matrix will light up the colorful lights, the color is red, orange, yellow, green, cyan, blue, purple, like a rainbow. The color changes with time, and it is a bit like a wave of colored waves.

1.Create python file

nano rainbow.py

We need to input content as shown below:

```
#!/usr/bin/python
import time
from sense_hat import SenseHat
sense = SenseHat()
pixels = [
    [255, 0, 0], [255, 0, 0], [255, 87, 0], [255, 196, 0], [205, 255, 0], [95, 255, 0], [0, 255, 13], [0, 255, 122],
    [255, 0, 0], [255, 96, 0], [255, 205, 0], [196, 255, 0], [87, 255, 0], [0, 255, 22], [0, 255, 131], [0, 255, 240],
    [255, 105, 0], [255, 214, 0], [187, 255, 0], [78, 255, 0], [0, 255, 30], [0, 255, 140], [0, 255, 248], [0, 152, 255],
    [255, 223, 0], [178, 255, 0], [70, 255, 0], [0, 255, 40], [0, 255, 148], [0, 253, 255], [0, 144, 255], [0, 34, 255],
    [170, 255, 0], [61, 255, 0], [0, 255, 48], [0, 255, 157], [0, 243, 255], [0, 134, 255], [0, 26, 255], [83, 0, 255],
    [52, 255, 0], [0, 255, 57], [0, 255, 166], [0, 235, 255], [0, 126, 255], [0, 17, 255], [92, 0, 255], [201, 0, 255],
    [0, 255, 66], [0, 255, 174], [0, 226, 255], [0, 117, 255], [0, 8, 255], [100, 0, 255], [210, 0, 255], [255, 0, 192],
    [0, 255, 183], [0, 217, 255], [0, 109, 255], [0, 0, 255], [110, 0, 255], [218, 0, 255], [255, 0, 183], [255, 0, 74]
]

# Assign a lambda function to the msleep variable
# Redefining a function, x is input, time.sleep(x / 1000.0) is output
msleep = lambda x: time.sleep(x / 1000.0)
# Handling RGB light color switching:
def next_colour(pix):
    r = pix[0]
    g = pix[1]
```

```
        b = pix[2]
        if (r == 255 and g < 255 and b == 0):
            g += 1
        if (g == 255 and r > 0 and b == 0):
            r -= 1
        if (g == 255 and b < 255 and r == 0):
            b += 1
        if (b == 255 and g > 0 and r == 0):
            g -= 1
        if (b == 255 and r < 255 and g == 0):
            r += 1
        if (r == 255 and b > 0 and g == 0):
            b -= 1
        pix[0] = r
        pix[1] = g
        pix[2] = b
while True:
        for pix in pixels:
            next_colour(pix)
        sense.set_pixels(pixels)
        msleep(2)
```

```
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import time
from sense_hat import SenseHat

sense = SenseHat()

pixels = [
    [255, 0, 0], [255, 0, 0], [255, 87, 0], [255, 196, 0], [205, 255, 0], [95, 255, 0], [0, 255, 13], [0, 255, 122],
    [255, 0, 0], [255, 96, 0], [255, 205, 0], [196, 255, 0], [87, 255, 0], [0, 255, 22], [0, 255, 131], [0, 255, 240],
    [255, 105, 0], [255, 214, 0], [187, 255, 0], [78, 255, 0], [0, 255, 30], [0, 255, 140], [0, 255, 248], [0, 152, 255],
    [255, 223, 0], [178, 255, 0], [70, 255, 0], [0, 255, 40], [0, 255, 148], [0, 253, 255], [0, 144, 255], [0, 34, 255],
    [170, 255, 0], [61, 255, 0], [0, 255, 48], [0, 255, 157], [0, 243, 255], [0, 134, 255], [0, 26, 255], [83, 0, 255],
    [52, 255, 0], [0, 255, 57], [0, 255, 166], [0, 235, 255], [0, 126, 255], [0, 17, 255], [92, 0, 255], [201, 0, 255],
    [0, 255, 66], [0, 255, 174], [0, 226, 255], [0, 117, 255], [0, 8, 255], [100, 0, 255], [210, 0, 255], [255, 0, 192],
    [0, 255, 183], [0, 217, 255], [0, 109, 255], [0, 0, 255], [110, 0, 255], [218, 0, 255], [255, 0, 183], [255, 0, 74]
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# Assign a lambda function to the msleep variable
# Redefining a function, x is input, time.sleep(x / 1000.0) is output
msleep = lambda x: time.sleep(x / 1000.0)


# Handling RGB light color switching
def next_colour(pix):
    r = pix[0]
    g = pix[1]
    b = pix[2]

    if (r == 255 and g < 255 and b == 0):
        g += 1
    if (g == 255 and r > 0 and b == 0):
        r -= 1
    if (g == 255 and b < 255 and r == 0):
        b += 1
    if (b == 255 and g > 0 and r == 0):
        g -= 1
    if (b == 255 and r < 255 and g == 0):
        r += 1
    if (r == 255 and b > 0 and g == 0):
        b -= 1
    pix[0] = r
    pix[1] = g
    pix[2] = b


while True:
    for pix in pixels:
        next_colour(pix)

    sense.set_pixels(pixels)
    msleep(2)
```

Please press Ctrl+O to save, press Ctrl+X to quit.

The code of the experiment, please refer to **rainbow.py** in the Python sample program folder.

3.Running program

Input the following command to running:

python rainbow.py

```
pi@raspberrypi:~/sense_hat $ nano rainbow.py
pi@raspberrypi:~/sense_hat $ python rainbow.py
```

After running the program, the RGB matrix will light up the colorful lights, the color is red, orange, yellow, green, cyan, blue, purple, like a rainbow. The color changes with time, and it is a bit like a wave of colored waves.

Exit: Ctrl+C.

After exiting the program, the RGB matrix color will still be bright, but it will not change color. We need to execute the following command to clear the RGB matrix to be extinguished.

python clear_display.py