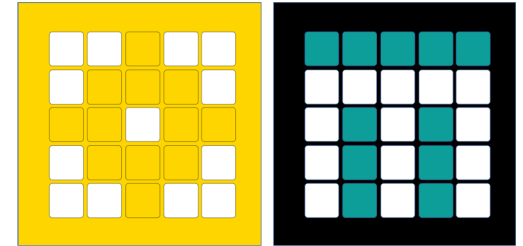


PRIME LESSONS

By the Makers of EV3Lessons



USING THE LIGHT FUNCTIONS

BY SANJAY AND ARVIND SESHAN

This lesson uses SPIKE 3 software

LESSON OBJECTIVES

Learn how program the LED lights on the Hub

Learn how to turn on the lights of the Distance Sensor

Learn how to display sensor values to the LED Matrix

CONTROLLING THE LIGHT MATRIX

You can display a predefined image to the Light Matrix

```
light_matrix.show_image(image)
```

The list of available images can be found in the Knowledge Base under the Light Matrix topic.

You can also set the brightness/intensity of specific pixels. Pixel x,y values range from 0-4

```
light_matrix.set_pixel(x, y, intensity=100)
```

You can write text to the Light Matrix (the letters will scroll by). This is an asynchronous function and needs an await.

```
await light_matrix.write(text)
```

Finally, you can turn off all the pixels

```
light_matrix.clear()
```

CONTROLLING THE DISTANCE SENSOR LIGHTS

You can light up all of the Distance Sensor lights (there are 4 separate lights) with the following method. Pixels is a list of 4 intensity values.

```
distance_sensor.show(port, pixels)
```

Example:

```
pixels = [100] * 4  
distance_sensor.show(port.F, pixels)
```

You can also get/set the brightness of each of the four lights separately, x,y range from 0-1

```
distance_sensor.set_pixel(port, x, y, intensity)  
distance_sensor.get_pixel(port, x, y)
```

Example:

```
distance_sensor.show(port.F, 0, 100)
```

You can clear all lights using:

```
distance_sensor.clear()
```

CONTROLLING THE POWER AND CONNECT LIGHTS

You can change the power button light color:

```
light.color(light.POWER, color.RED)
```

You can change the Bluetooth connect light color.

```
light.color(light.CONNECT, color.RED)
```

Available colors are listed in the Color topic in the Knowledge Base

CHALLENGE: LIGHT UP THE WORLD

Write “Hello World” using the light matrix

Then display a Happy Face for 4 seconds

Light up all the lights around the left “eye” of the Distance Sensor

Change the Center Button Light to a color of your choice

Change the Bluetooth connector Button Light to a color of your choice

CHALLENGE SOLUTION

```
from hub import light, light_matrix, port
import runloop, color, distance_sensor, sys
```

```
async def main():
    await light_matrix.write("Hello world")
    light_matrix.show_image(light_matrix.IMAGE_HAPPY)
    await runloop.sleep_ms(4000)
    pixels = [0, 100, 0, 100]
    distance_sensor.show(port.F, pixels)
    light.color(light.POWER, color.PURPLE)
    light.color(light.CONNECT, color.ORANGE)
    await runloop.sleep_ms(3000)
    sys.exit("Lights Out")
```

```
runloop.run(main())
```

CHALLENGE: DISPLAYING SENSOR VALUES

How hard am I pushing the Force Sensor?

Create a program in a loop that lets you view the force applied to the Force Sensor on the LED Matrix

Display the results in DeciNewtons (0-100)

Hint, consider using:

```
light_matrix.write()
```

```
force_sensor.force()
```


CHALLENGE SOLUTION

This program displays the value of the Force Sensor to the LED Matrix

```
from hub import light_matrix, port
import runloop, force_sensor

async def main():
    while True:
        decinewtons = force_sensor.force(port.F)
        await light_matrix.write(str(decinewtons))

runloop.run(main())
```

CREDITS

This lesson was created by Sanjay and Arvind Seshan for Prime Lessons

Additional contributions by FLL Share & Learn community members

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