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Uso de un módulo de pantalla OLED I2C con Raspberry Pi

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POR MATT EN 8 DE ABRIL DE 2018 I2C , TUTORIALES Y AYUDA

Los módulos de pantalla OLED en miniatura son una excelente manera de agregar una pantalla pequeña a sus proyectos de Raspberry Pi. Están disponibles en varios tamaños, pero los tamaños comunes incluyen 128 × 32 y 128 × 64 píxeles. Los más baratos tienen píxeles de un solo color que son blanco, amarillo o azul. Mi dispositivo tiene píxeles blancos y utiliza una interfaz I2C que solo requiere cuatro cables para conectarse a la Pi.

En este tutorial explicaré cómo configuro mi módulo de pantalla OLED de 0.96 " utilizando la interfaz I2C de Pi. Una vez configurado, es fácil usar Python para colocar texto, dibujar formas o incluso mostrar imágenes y animaciones simples.

El módulo OLED

Mi módulo de pantalla OLED es un módulo de pantalla LED LCD OLED serie 128X64 I2C IIC SPI de 0.96 ".

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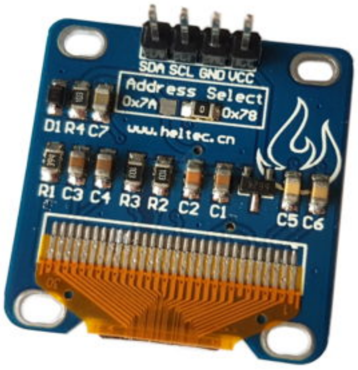

Tiene cuatro pines. Dos son de alimentación (Vcc y Gnd) y dos son para la interfaz I2C (SDA y SCL). Es posible que deba soldar el encabezado antes de poder usarlo.

Actualizar sistema operativo

Al igual que con todos mis proyectos, comencé creando una tarjeta SD con la última imagen de Raspbian. Luego me aseguré de que esto estuviera actualizado ejecutando los siguientes comandos:

```
sudo apt-get update
sudo apt-get upgrade
```

Este paso puede tardar unos minutos si hay muchos paquetes para actualizar, pero generalmente ahorra algo de frustración en el futuro.

Configuración del módulo de pantalla

Mi pantalla tenía cuatro pines, dos para la alimentación y dos para la interfaz I2C.

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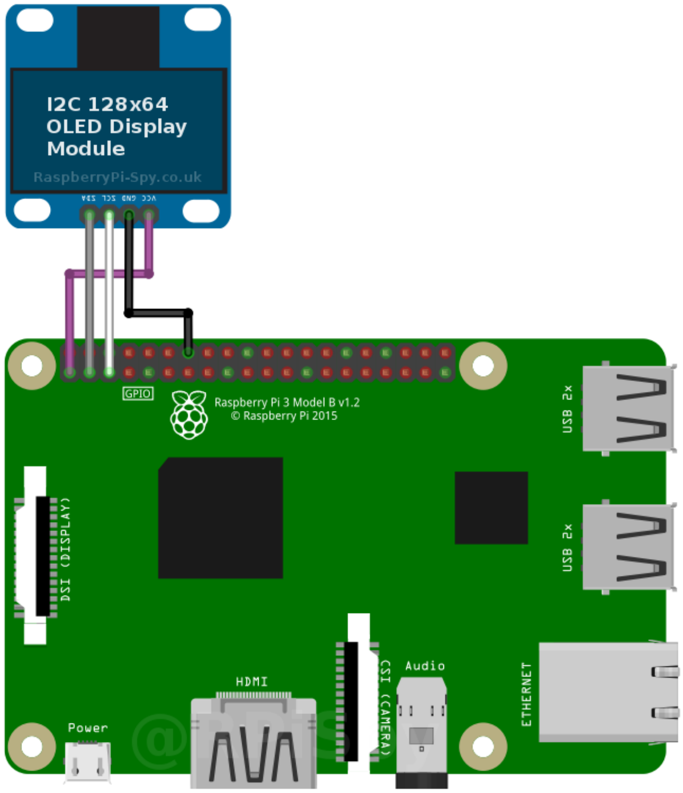

Los conecté directamente al encabezado GPIO de la Raspberry Pi usando el siguiente esquema:

Pin OLED	Pi GPIO Pin	Notas
Vcc	1 *	3.3V
Gnd	14 **	Suelo
SCL	5 5	I2C SCL
SDA	3	I2C SCA

* Puede conectar el pin Vcc al Pin 1 o 17, ya que ambos proporcionan 3.3V.

** Puede conectar el pin Gnd a los pines 6, 9, 14, 20, 25, 30, 34 o 39, ya que todos proporcionan tierra.

Habilitar interfaz I2C

The I2C interface is disabled by default so you need to enable it. You can do this within the raspi-config tool on the command line by running :

```
sudo raspi-config
```

For additional details on this step please see my how to Enable the I2C Interface on the Raspberry Pi post.

The following libraries may already be installed but run these commands anyway to make sure :

```
sudo apt install -y python3-dev
sudo apt install -y python-imaging python-smbus i2c-tools
sudo apt install -y python3-pil
sudo apt install -y python3-pip
sudo apt install -y python3-setuptools
sudo apt install -y python3-rpi.gpio
```

If you are using Python 2 then use these commands instead :

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```
sudo apt install -y python-dev
sudo apt install -y python-imaging python-smbus i2c-tools
sudo apt install -y python-pil
sudo apt install -y python-pip
sudo apt install -y python-setuptools
```

I would recommend using Python 3 unless you have a really good reason for using Python 2.

Finding the OLED Display Module's Address

With the I2C libraries installed I used the i2cdetect command to find the module on the I2C bus.

```
i2cdetect -y 1
```

and I got the following result :

This was good news as it showed the device had been detected with an address of "0x3c". This is the default hex address for this type of device. I've got no idea why the device PCB suggests the address is "0x78" when it is clearly "0x3c".

If you've got an original Model B Rev 1 Pi then type the following command instead :

```
i2cdetect -y 0
```

Install OLED Python Library

In order to display text, shapes and images you can use the Adafruit Python library. It should work with all SSD1306 based displays including their own 128×32 and 128×64 devices.

To install the library we will clone the Adafruit git repository. Ensure git is installed by running :

```
sudo apt install -y git
```

Then clone the repository using the following command :

```
git clone https://github.com/adafruit/Adafruit_Python_SSD1306.git
```

Once that completes navigate to the library's directory :

```
cd Adafruit_Python_SSD1306
```

and install the library for Python 2 :

```
sudo python setup.py install
```

and/or Python 3 :

```
sudo python3 setup.py install
```

This process will give you ability to include the library within your own Python scripts.

Example Python Scripts

Now we are ready to test some examples scripts. Navigate into the “examples” directory :

```
cd examples
```

In there you should find a number of example scripts such as :

- animate.py
- buttons.py
- image.py
- shapes.py
- stats.py

These examples can be run using :

```
python shapes.py
```

or using Python 3 :

```
python3 shapes.py
```

The examples should give you screens that appear in the examples below :

By modifying these scripts you can create your own graphics with shapes, images and text depending on your project. See if you can guess which ones were photos I downloaded to my Pi from Google Images!

Screen Size Adjustment

The Adafruit examples assume you have a 128×32 screen. They still run with a 128×64 pixel screen but it is better to change them before you move onto anything more complicated. To do this simply edit the scripts and disable the

128×32 config line by placing a # character at the front, and enable the 128×64 line by deleting the # character from the front. The section in the script should now look like this :

This step becomes essential if you want to start creating your own images to display on the screen.

Creating New Images

So you tried image.py example and wondered how you can create your own images? It's fairly easy if you have an image editing application such as Photoshop or GIMP. I prefer using GIMP because it is free.

Ideally you want the images to be :

- 128×64 resolution
- 1-bit colour (i.e. black and white)

By default the image.py example will convert the image to 1-bit but it assumes the resolution is correct.

You'll notice in the script an alternative line which resizes and converts an image so you can load images without worrying about their size and colour.

Load image and convert to 1-bit color :

```
image = Image.open('happycat_oled_64.ppm').convert('1')
```

Load an image, resize and convert to 1-bit :

```
image = Image.open('example.png').resize((disp.width, disp.height), Image.ANTIALIAS).convert('1')
```

Which technique you use is up to you. Resizing and converting takes extra processing time so in high performance applications you are better feeding the script images that have already been resized.

Resizing and Converting Images

If you want to load an image or photo then load it into your graphics application and perform the following steps :

- Load image
- Resize/scale to 128×64
- Convert to 1-bit colour (monchrome)
- Export as a ".pbm" or ".png" file
- Copy to your Pi in the same location as your Python script
- Update the Python script to use your new file

The Adafruit example image is a "ppm" file because it is colour although it is converted to monochrome at the point it is displayed on the screen. Adafruit use ppm as the library also supports their colour OLED modules. If you don't have a colour screen you can switch to pbm or png.

I prefer creating "pbm" files as they are black and white and much smaller files. It also means your Python script doesn't need to convert them. The library can handle both just make sure you use the correct filename and extension in your scripts.

Increasing I2C Bus Speed

If you are displaying multiple images per second it is worth increasing the bus speed of the interface as it can improve performance. Please see the Change Raspberry Pi I2C Bus Speed post .

Troubleshooting

If your screen isn't working you should start at the beginning of this tutorial and work through it. Here are some thing to consider :

- Did you enable I2C and instal "python-smbus" and "i2c-tools"?
- Are the four module connections correct? Did you get SDA and SCL mixed up?
- Did "i2cdetect -y 1" give you the address of the display on the I2C bus?
- If your screen is using an address other than 0x3c did you adjust the Python script?

Buy a Miniature OLED Screen

These screens are available from a number of retailers so take a look and pick one that is convenient for your location :

- Adafruit
- The PiHut
- ModMyPi
- eBay
- Amazon

Read the descriptions carefully as some OLED display modules use the SPI interface rather than I2C. Those are fine but you'll need to follow a different tutorial to use that style.

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