
Adafruit IS31FL3731 Library Documentation

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CircuitPython driver for the IS31FL3731 charlieplex IC.

This driver supports the following hardware:

- [Adafruit 16x9 Charlieplexed PWM LED Matrix Driver - IS31FL3731](#)
- [Adafruit 15x7 CharliePlex LED Matrix Display FeatherWings](#)
- [Adafruit 16x8 CharliePlex LED Matrix Bonnets](#)
- [Pimoroni 17x7 Scroll pHAT HD](#)
- [Pimoroni 28x3 \(r,g,b\) Led Shim](#)

CHAPTER 1

Dependencies

This driver depends on:

- [Adafruit CircuitPython](#)

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the [Adafruit library and driver bundle](#).

CHAPTER 2

Installing from PyPI

On supported GNU/Linux systems like the Raspberry Pi, you can install the driver locally [from PyPI](#). To install for current user:

```
pip3 install adafruit-circuitpython-is31fl3731
```

To install system-wide (this may be required in some cases):

```
sudo pip3 install adafruit-circuitpython-is31fl3731
```

To install in a virtual environment in your current project:

```
mkdir project-name && cd project-name
python3 -m venv .env
source .env/bin/activate
pip3 install adafruit-circuitpython-is31fl3731
```


CHAPTER 3

Usage Example

Matrix:

```
import adafruit_is31fl3731
import board
import busio
with busio.I2C(board.SCL, board.SDA) as i2c:
    display = adafruit_is31fl3731.Matrix(i2c)
    display.fill(127)
```

Charlie Wing:

```
import adafruit_is31fl3731
import board
import busio
with busio.I2C(board.SCL, board.SDA) as i2c:
    display = adafruit_is31fl3731.CharlieWing(i2c)
    display.fill(127)

    # Turn off pixel 4,4, change its brightness and turn it back on
    display.pixel(4, 4, 0)    # Turn off.
    display.pixel(4, 4, 50)   # Low brightness (50)
    display.pixel(4, 4, 192)  # Higher brightness (192)
```


CHAPTER 4

Contributing

Contributions are welcome! Please read our [Code of Conduct](#) before contributing to help this project stay welcoming.

CHAPTER 5

Documentation

For information on building library documentation, please check out [this guide](#).

6.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/is31fl3731_simpletest.py

```
1 import board
2 import busio
3 import adafruit_is31fl3731
4
5 i2c = busio.I2C(board.SCL, board.SDA)
6
7 # initialize display using Feather CharlieWing LED 15 x 7
8 display = adafruit_is31fl3731.CharlieWing(i2c)
9
10 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
11 # display = adafruit_is31fl3731.Matrix(i2c)
12
13 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
14 # display = adafruit_is31fl3731.CharlieBonnet(i2c)
15
16 # initial display using Pimoroni Scroll Phat HD LED 17 x 7
17 # display = adafruit_is31fl3731.ScrollPhatHD(i2c)
18
19 # draw a box on the display
20 # first draw the top and bottom edges
21 for x in range(display.width):
22     display.pixel(x, 0, 50)
23     display.pixel(x, display.height - 1, 50)
24 # now draw the left and right edges
25 for y in range(display.height):
26     display.pixel(0, y, 50)
27     display.pixel(display.width - 1, y, 50)
```

6.2 Other Examples

Listing 2: examples/is31fl3731_blink_example.py

```

1 import busio
2 import board
3 import adafruit_is31fl3731
4
5 i2c = busio.I2C(board.SCL, board.SDA)
6
7 # array pattern in bits; top row-> bottom row, 8 bits in each row
8 an_arrow = bytearray((0x08, 0x0C, 0xFE, 0xFF, 0xFE, 0x0C, 0x08, 0x00, 0x00))
9
10 # initial display using Feather CharlieWing LED 15 x 7
11 display = adafruit_is31fl3731.CharlieWing(i2c)
12 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
13 # display = adafruit_is31fl3731.Matrix(i2c)
14 # uncomment line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
15 # display = adafruit_is31fl3731.CharlieBonnet(i2c)
16 # initial display using Pimoroni Scroll Phat HD LED 17 x 7
17 # display = adafruit_is31fl3731.ScrollPhatHD(i2c)
18
19 # first load the frame with the arrows; moves the an_arrow to the right in each
20 # frame
21 display.sleep(True) # turn display off while updating blink bits
22 display.fill(0)
23 for y in range(display.height):
24     row = an_arrow[y]
25     for x in range(8):
26         bit = 1 << (7 - x) & row
27         if bit:
28             display.pixel(x + 4, y, 50, blink=True)
29
30 display.blink(1000) # ranges from 270 to 2159; smaller the number to faster blink
31 display.sleep(False) # turn display on

```

Listing 3: examples/is31fl3731_frame_example.py

```

1 import time
2 import board
3 import busio
4 import adafruit_is31fl3731
5
6 i2c = busio.I2C(board.SCL, board.SDA)
7
8 # arrow pattern in bits; top row-> bottom row, 8 bits in each row
9 arrow = bytearray((0x08, 0x0C, 0xFE, 0xFF, 0xFE, 0x0C, 0x08, 0x00, 0x00))
10
11 # initial display using Feather CharlieWing LED 15 x 7
12 display = adafruit_is31fl3731.CharlieWing(i2c)
13 # uncomment line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
14 # display = adafruit_is31fl3731.Matrix(i2c)
15 # uncomment line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
16 # display = adafruit_is31fl3731.CharlieBonnet(i2c)
17 # initial display using Pimoroni Scroll Phat HD LED 17 x 7
18 # display = adafruit_is31fl3731.ScrollPhatHD(i2c)

```

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```

19
20
21 # first load the frame with the arrows; moves the arrow to the right in each
22 # frame
23 display.sleep(True) # turn display off while frames are updated
24 for frame in range(8):
25     display.frame(frame, show=False)
26     display.fill(0)
27     for y in range(display.height):
28         row = arrow[y]
29         for x in range(8):
30             bit = 1 << (7 - x) & row
31             # display the pixel into selected frame with varying intensity
32             if bit:
33                 display.pixel(x + frame, y, frame ** 2 + 1)
34 display.sleep(False)
35 # now tell the display to show the frame one at time
36 while True:
37     for frame in range(8):
38         display.frame(frame)
39         time.sleep(0.1)

```

Listing 4: examples/is31fl3731_text_example.py

```

1 import board
2 import busio
3 import adafruit_framebuf
4 import adafruit_is31fl3731
5
6
7 i2c = busio.I2C(board.SCL, board.SDA)
8
9 # initial display using Feather CharlieWing LED 15 x 7
10 # display = adafruit_is31fl3731.CharlieWing(i2c)
11 # uncomment line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
12 # display = adafruit_is31fl3731.Matrix(i2c)
13 # uncomment line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
14 display = adafruit_is31fl3731.CharlieBonnet(i2c)
15 # initial display using Pimoroni Scroll Phat HD LED 17 x 7
16 # display = adafruit_is31fl3731.ScrollPhatHD(i2c)
17
18 text_to_show = "Adafruit!!"
19
20 # Create a framebuffer for our display
21 buf = bytearray(32) # 2 bytes tall x 16 wide = 32 bytes (9 bits is 2 bytes)
22 fb = adafruit_framebuf.FrameBuffer(
23     buf, display.width, display.height, adafruit_framebuf.MVLSB
24 )
25
26
27 frame = 0 # start with frame 0
28 while True:
29     for i in range(len(text_to_show) * 9):
30         fb.fill(0)
31         fb.text(text_to_show, -i + display.width, 0, color=1)
32

```

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```

33     # to improve the display flicker we can use two frame
34     # fill the next frame with scrolling text, then
35     # show it.
36     display.frame(frame, show=False)
37     # turn all LEDs off
38     display.fill(0)
39     for x in range(display.width):
40         # using the FrameBuffer text result
41         bite = buf[x]
42         for y in range(display.height):
43             bit = 1 << y & bite
44             # if bit > 0 then set the pixel brightness
45             if bit:
46                 display.pixel(x, y, 50)
47
48     # now that the frame is filled, show it.
49     display.frame(frame, show=True)
50     frame = 0 if frame else 1

```

Listing 5: examples/is31fl3731_wave_example.py

```

1  import board
2  import busio
3  import adafruit_is31fl3731
4
5  i2c = busio.I2C(board.SCL, board.SDA)
6
7  sweep = [
8      1,
9      2,
10     3,
11     4,
12     6,
13     8,
14     10,
15     15,
16     20,
17     30,
18     40,
19     60,
20     60,
21     40,
22     30,
23     20,
24     15,
25     10,
26     8,
27     6,
28     4,
29     3,
30     2,
31     1,
32 ]
33
34 frame = 0
35

```

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```

36 # initialize display using Feather CharlieWing LED 15 x 7
37 display = adafruit_is31fl3731.CharlieWing(i2c)
38 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
39 # display = adafruit_is31fl3731.Matrix(i2c)
40 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
41 # display = adafruit_is31fl3731.CharlieBonnet(i2c)
42 # initial display using Pimoroni Scroll Phat HD LED 17 x 7
43 # display = adafruit_is31fl3731.ScrollPhatHD(i2c)
44
45 while True:
46     for incr in range(24):
47         # to reduce update flicker, use two frames
48         # make a frame active, don't show it yet
49         display.frame(frame, show=False)
50         # fill the display with the next frame
51         for x in range(display.width):
52             for y in range(display.height):
53                 display.pixel(x, y, sweep[(x + y + incr) % 24])
54         # show the next frame
55         display.frame(frame, show=True)
56         if frame:
57             frame = 0
58         else:
59             frame = 1

```

6.3 adafruit_is31fl3731

CircuitPython driver for the IS31FL3731 charlieplex IC.

- Author(s): Tony DiCola, Melissa LeBlanc-Williams

6.3.1 Implementation Notes

Hardware:

- Adafruit 16x9 Charlieplexed PWM LED Matrix Driver - IS31FL3731
- Adafruit 15x7 CharliePlex LED Matrix Display FeatherWings

Software and Dependencies:

- Adafruit CircuitPython firmware (2.2.0+) for the ESP8622 and M0-based boards: <https://github.com/adafruit/circuitpython/releases>

class adafruit_is31fl3731.**CharlieBonnet** (i2c, address=116)

Supports the Charlieplexed bonnet

static pixel_addr (x, y)

Calculate the offset into the device array for x,y pixel

class adafruit_is31fl3731.**CharlieWing** (i2c, address=116)

Supports the Charlieplexed feather wing

static pixel_addr (x, y)

Calculate the offset into the device array for x,y pixel

class adafruit_is31fl3731.LedShim(*i2c*, *address=117*)

Supports the LED SHIM by Pimoroni

static pixel_addr (*x*, *y*)

Translate an x,y coordinate to a pixel index.

pixelrgb (*x*, *r*, *g*, *b*, *blink=None*, *frame=None*)

Blink or brightness for x-pixel

Parameters

- **x** – horizontal pixel position
- **r** – red brightness value 0->255
- **g** – green brightness value 0->255
- **b** – blue brightness value 0->255
- **blink** – True to blink
- **frame** – the frame to set the pixel

class adafruit_is31fl3731.Matrix(*i2c*, *address=116*)

The Matrix class support the main function for driving the 16x9 matrix Display

Parameters

- **i2c_device** (*i2c_device*) – the connected i2c bus i2c_device
- **address** – the device address; defaults to 0x74

audio_play (*sample_rate*, *audio_gain=0*, *agc_enable=False*, *agc_fast=False*)

Controls the audio play feature

audio_sync (*value=None*)

Set the audio sync feature register

autoplay (*delay=0*, *loops=0*, *frames=0*)

Start autoplay

Parameters

- **delay** – in ms
- **loops** – number of loops - 0->7
- **frames** – number of frames: 0->7

blink (*rate=None*)

Updates the blink register

fade (*fade_in=None*, *fade_out=None*, *pause=0*)

Start and stop the fade feature. If both fade_in and fade_out are None (the default), the breath feature is used for fading. if fade_in is None, then fade_in = fade_out. If fade_out is None, then fade_out = fade_in

Parameters

- **fade_in** – positive number; 0->100
- **fade-out** – positive number; 0->100
- **pause** – breath register 2 pause value

fill (*color=None*, *blink=None*, *frame=None*)

Fill the display with a brightness level

Parameters

- **color** – brightness 0->255
- **blink** – True if blinking is required
- **frame** – which frame to fill 0->7

frame (*frame=None, show=True*)

Set the current frame

Parameters

- **frame** – frame number; 0-7 or None. If None function returns current frame
- **show** – True to show the frame; False to not show.

image (*img, blink=None, frame=None*)

Set buffer to value of Python Imaging Library image. The image should be in 8-bit mode (L) and a size equal to the display size.

Parameters

- **img** – Python Imaging Library image
- **blink** – True to blink
- **frame** – the frame to set the image

pixel (*x, y, color=None, blink=None, frame=None*)

Blink or brightness for x-, y-pixel

Parameters

- **x** – horizontal pixel position
- **y** – vertical pixel position
- **color** – brightness value 0->255
- **blink** – True to blink
- **frame** – the frame to set the pixel

static pixel_addr (*x, y*)

Calculate the offset into the device array for x,y pixel

reset ()

Kill the display for 10MS

sleep (*value*)

Set the Software Shutdown Register bit

Parameters value – True to set software shutdown bit; False unset

class `adafruit_is31fl3731.ScrollPhatHD` (*i2c, address=116*)

Supports the Scroll pHAT HD by Pimoroni

static pixel_addr (*x, y*)

Translate an x,y coordinate to a pixel index.

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