
Adafruit IS31FL3731 Library Documentation

Release 1.0

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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](#)
- [Pimoroni Keybow 2040 with 4x4 matrix of RGB LEDs](#)
- [Pimoroni 5x5 RGB Matrix Breakout](#)

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:

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

Charlie Wing:

```
from adafruit_is31fl3731.charlie_wing import CharlieWing
import board
import busio
with busio.I2C(board.SCL, board.SDA) as i2c:
    display = 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](#).

Table of Contents

6.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/is31fl3731_simpletest.py

```
1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  import board
5  import busio
6
7  # uncomment next line if you are using Feather CharlieWing LED 15 x 7
8  from adafruit_is31fl3731.charlie_wing import CharlieWing as Display
9
10 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
11 # from adafruit_is31fl3731.matrix import Matrix as Display
12 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
13 # from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
14 # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
15 # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display
16 # uncomment next line if you are using Pimoroni 11x7 LED Matrix Breakout
17 # from adafruit_is31fl3731.matrix_11x7 import Matrix11x7 as Display
18
19 # uncomment this line if you use a Pico, here with SCL=GP21 and SDA=GP20.
20 # i2c = busio.I2C(board.GP21, board.GP20)
21
22 i2c = busio.I2C(board.SCL, board.SDA)
23
24 display = Display(i2c)
25
26 # draw a box on the display
27 # first draw the top and bottom edges
```

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```

28 for x in range(display.width):
29     display.pixel(x, 0, 50)
30     display.pixel(x, display.height - 1, 50)
31 # now draw the left and right edges
32 for y in range(display.height):
33     display.pixel(0, y, 50)
34     display.pixel(display.width - 1, y, 50)

```

6.2 Matrix Examples

Other examples working on matrix display.

Listing 2: examples/is31fl3731_blink_example.py

```

1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  import board
5  import busio
6
7  # uncomment next line if you are using Feather CharlieWing LED 15 x 7
8  from adafruit_is31fl3731.charlie_wing import CharlieWing as Display
9
10 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
11 # from adafruit_is31fl3731.matrix import Matrix as Display
12 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
13 # from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
14 # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
15 # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display
16 # uncomment next line if you are using Pimoroni 11x7 LED Matrix Breakout
17 # from adafruit_is31fl3731.matrix_11x7 import Matrix11x7 as Display
18
19 # uncomment this line if you use a Pico, here with SCL=GP21 and SDA=GP20.
20 # i2c = busio.I2C(board.GP21, board.GP20)
21
22 i2c = busio.I2C(board.SCL, board.SDA)
23
24 # array pattern in bits; top row-> bottom row, 8 bits in each row
25 an_arrow = bytearray((0x08, 0x0C, 0xFE, 0xFF, 0xFE, 0x0C, 0x08, 0x00, 0x00))
26
27 display = Display(i2c)
28
29 offset = (display.width - 8) // 2
30
31 # first load the frame with the arrows; moves the an_arrow to the right in each
32 # frame
33 display.sleep(True) # turn display off while updating blink bits
34 display.fill(0)
35 for y in range(display.height):
36     row = an_arrow[y]
37     for x in range(8):
38         bit = 1 << (7 - x) & row
39         if bit:
40             display.pixel(x + offset, y, 50, blink=True)

```

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```

41 display.blink(1000)  # ranges from 270 to 2159; smaller the number to faster blink
42 display.sleep(False) # turn display on
43

```

Listing 3: examples/is31fl3731_frame_example.py

```

1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  import time
5  import board
6  import busio
7
8  # uncomment next line if you are using Feather CharlieWing LED 15 x 7
9  from adafruit_is31fl3731.charlie_wing import CharlieWing as Display
10
11 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
12 # from adafruit_is31fl3731.matrix import Matrix as Display
13 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
14 # from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
15 # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
16 # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display
17 # uncomment next line if you are using Pimoroni 11x7 LED Matrix Breakout
18 # from adafruit_is31fl3731.matrix_11x7 import Matrix11x7 as Display
19
20 # uncomment this line if you use a Pico, here with SCL=GP21 and SDA=GP20.
21 # i2c = busio.I2C(board.GP21, board.GP20)
22
23 i2c = busio.I2C(board.SCL, board.SDA)
24
25 # arrow pattern in bits; top row-> bottom row, 8 bits in each row
26 arrow = bytearray((0x08, 0x0C, 0xFE, 0xFF, 0xFE, 0x0C, 0x08, 0x00, 0x00))
27
28 display = Display(i2c)
29
30 # first load the frame with the arrows; moves the arrow to the right in each
31 # frame
32 display.sleep(True) # turn display off while frames are updated
33 for frame in range(display.width - 8):
34     display.frame(frame, show=False)
35     display.fill(0)
36     for y in range(display.height):
37         row = arrow[y]
38         for x in range(8):
39             bit = 1 << (7 - x) & row
40             # display the pixel into selected frame with varying intensity
41             if bit:
42                 display.pixel(x + frame, y, frame * 2 + 1)
43 display.sleep(False)
44 # now tell the display to show the frame one at time
45 while True:
46     for frame in range(8):
47         display.frame(frame)
48         time.sleep(0.1)

```

Listing 4: examples/is31fl3731_text_example.py

```

1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  import board
5  import busio
6  import adafruit_framebuf
7
8  # uncomment next line if you are using Feather CharlieWing LED 15 x 7
9  # from adafruit_is31fl3731.charlie_wing import CharlieWing as Display
10 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
11 # from adafruit_is31fl3731.matrix import Matrix as Display
12 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
13 from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
14
15 # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
16 # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display
17 # uncomment next line if you are using Pimoroni 11x7 LED Matrix Breakout
18 # from adafruit_is31fl3731.matrix_11x7 import Matrix11x7 as Display
19
20 # uncomment this line if you use a Pico, here with SCL=GP21 and SDA=GP20.
21 # i2c = busio.I2C(board.GP21, board.GP20)
22
23 i2c = busio.I2C(board.SCL, board.SDA)
24
25 display = Display(i2c)
26
27 text_to_show = "Adafruit!!"
28
29 # Create a framebuffer for our display
30 buf = bytearray(32) # 2 bytes tall x 16 wide = 32 bytes (9 bits is 2 bytes)
31 fb = adafruit_framebuf.FrameBuffer(
32     buf, display.width, display.height, adafruit_framebuf.MVLSB
33 )
34
35
36 frame = 0 # start with frame 0
37 while True:
38     for i in range(len(text_to_show) * 9):
39         fb.fill(0)
40         fb.text(text_to_show, -i + display.width, 0, color=1)
41
42         # to improve the display flicker we can use two frame
43         # fill the next frame with scrolling text, then
44         # show it.
45         display.frame(frame, show=False)
46         # turn all LEDs off
47         display.fill(0)
48         for x in range(display.width):
49             # using the FrameBuffer text result
50             bite = buf[x]
51             for y in range(display.height):
52                 bit = 1 << y & bite
53                 # if bit > 0 then set the pixel brightness
54                 if bit:
55                     display.pixel(x, y, 50)

```

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```

56
57     # now that the frame is filled, show it.
58     display.frame(frame, show=True)
59     frame = 0 if frame else 1

```

Listing 5: examples/is31fl3731_wave_example.py

```

1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  import board
5  import busio
6
7  # uncomment next line if you are using Feather CharlieWing LED 15 x 7
8  from adafruit_is31fl3731.charlie_wing import CharlieWing as Display
9
10 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
11 # from adafruit_is31fl3731.matrix import Matrix as Display
12 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
13 # from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
14 # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
15 # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display
16 # uncomment next line if you are using Pimoroni 11x7 LED Matrix Breakout
17 # from adafruit_is31fl3731.matrix_11x7 import Matrix11x7 as Display
18
19 # uncomment this line if you use a Pico, here with SCL=GP21 and SDA=GP20.
20 # i2c = busio.I2C(board.GP21, board.GP20)
21
22 i2c = busio.I2C(board.SCL, board.SDA)
23
24 # fmt: off
25 sweep = [ 1, 2, 3, 4, 6, 8, 10, 15, 20, 30, 40, 60,
26           60, 40, 30, 20, 15, 10, 8, 6, 4, 3, 2, 1, ]
27 # fmt: on
28
29 frame = 0
30
31 display = Display(i2c)
32
33 while True:
34     for incr in range(24):
35         # to reduce update flicker, use two frames
36         # make a frame active, don't show it yet
37         display.frame(frame, show=False)
38         # fill the display with the next frame
39         for x in range(display.width):
40             for y in range(display.height):
41                 display.pixel(x, y, sweep[(x + y + incr) % 24])
42         # show the next frame
43         display.frame(frame, show=True)
44         if frame:
45             frame = 0
46         else:
47             frame = 1

```

6.3 Pillow Examples

Examples that utilize the Python Imaging Library (Pillow) for use on (Linux) computers that are using CPython with Adafruit Blinka to support CircuitPython libraries. CircuitPython does not support PIL/pillow (python imaging library)!

Listing 6: examples/is31fl3731_pillow_animated_gif.py

```

1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  """
5  Example to extract the frames and other parameters from an animated gif
6  and then run the animation on the display.
7
8  Usage:
9  python3 is31fl3731_pillow_animated_gif.py animated.gif
10
11  This example is for use on (Linux) computers that are using CPython with
12  Adafruit Blinka to support CircuitPython libraries. CircuitPython does
13  not support PIL/pillow (python imaging library)!
14
15  Author(s): Melissa LeBlanc-Williams for Adafruit Industries
16  """
17
18  import sys
19  import board
20  from PIL import Image
21
22  # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
23  # from adafruit_is31fl3731.matrix import Matrix as Display
24  # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
25  from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
26
27  # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
28  # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display
29
30  i2c = board.I2C()
31
32  display = Display(i2c)
33
34
35  # Open the gif
36  if len(sys.argv) < 2:
37      print("No image file specified")
38      print("Usage: python3 is31fl3731_pillow_animated_gif.py animated.gif")
39      sys.exit()
40
41  image = Image.open(sys.argv[1])
42
43  # Make sure it's animated
44  if not image.is_animated:
45      print("Specified image is not animated")
46      sys.exit()
47
48  # Get the autoplay information from the gif
49  delay = image.info["duration"]

```

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```

50
51 # Figure out the correct loop count
52 if "loop" in image.info:
53     loops = image.info["loop"]
54     if loops > 0:
55         loops += 1
56 else:
57     loops = 1
58
59 # IS31FL3731 only supports 0-7
60 loops = min(loops, 7)
61
62 # Get the frame count (maximum 8 frames)
63 frame_count = min(image.n_frames, 8)
64
65 # Load each frame of the gif onto the Matrix
66 for frame in range(frame_count):
67     image.seek(frame)
68     frame_image = Image.new("L", (display.width, display.height))
69     frame_image.paste(
70         image.convert("L"),
71         (
72             display.width // 2 - image.width // 2,
73             display.height // 2 - image.height // 2,
74         ),
75     )
76     display.image(frame_image, frame=frame)
77
78 display.autoplay(delay=delay, loops=loops)

```

Listing 7: examples/is31fl3731_pillow_marquee.py

```

1 # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2 # SPDX-License-Identifier: MIT
3
4 """
5 Example to scroll some text as a marquee
6
7 This example is for use on (Linux) computers that are using CPython with
8 Adafruit Blinka to support CircuitPython libraries. CircuitPython does
9 not support PIL/pillow (python imaging library)!
10
11 Author(s): Melissa LeBlanc-Williams for Adafruit Industries
12 """
13
14 import board
15 from PIL import Image, ImageDraw, ImageFont
16
17 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
18 # from adafruit_is31fl3731.matrix import Matrix as Display
19 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
20 from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
21
22 # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
23 # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display
24

```

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```

25 SCROLLING_TEXT = "You can display a personal message here..."
26 BRIGHTNESS = 64 # Brightness can be between 0-255
27
28 i2c = board.I2C()
29
30 display = Display(i2c)
31
32 # Load a font
33 font = ImageFont.truetype("/usr/share/fonts/truetype/dejavu/DejaVuSans.ttf", 8)
34
35 # Create an image that contains the text
36 text_width, text_height = font.getsize(SCROLLING_TEXT)
37 text_image = Image.new("L", (text_width, text_height))
38 text_draw = ImageDraw.Draw(text_image)
39 text_draw.text((0, 0), SCROLLING_TEXT, font=font, fill=BRIGHTNESS)
40
41 # Create an image for the display
42 image = Image.new("L", (display.width, display.height))
43 draw = ImageDraw.Draw(image)
44
45 # Load the text in each frame
46 while True:
47     for x in range(text_width + display.width):
48         draw.rectangle((0, 0, display.width, display.height), outline=0, fill=0)
49         image.paste(
50             text_image, (display.width - x, display.height // 2 - text_height // 2 -
51 ↪1)
52             )
53         display.image(image)

```

Listing 8: examples/is31fl3731_pillow_numbers.py

```

1 # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2 # SPDX-License-Identifier: MIT
3
4 """
5 Example to utilize the Python Imaging Library (Pillow) and draw bitmapped text
6 to 8 frames and then run autoplay on those frames.
7
8 This example is for use on (Linux) computers that are using CPython with
9 Adafruit Blinka to support CircuitPython libraries. CircuitPython does
10 not support PIL/pillow (python imaging library)!
11
12 Author(s): Melissa LeBlanc-Williams for Adafruit Industries
13 """
14
15 import board
16 from PIL import Image, ImageDraw, ImageFont
17
18 # uncomment next line if you are using Adafruit 16x9 Charlieplexed PWM LED Matrix
19 # from adafruit_is31fl3731.matrix import Matrix as Display
20 # uncomment next line if you are using Adafruit 16x8 Charlieplexed Bonnet
21 from adafruit_is31fl3731.charlie_bonnet import CharlieBonnet as Display
22
23 # uncomment next line if you are using Pimoroni Scroll Phat HD LED 17 x 7
24 # from adafruit_is31fl3731.scroll_phat_hd import ScrollPhatHD as Display

```

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```

25
26 BRIGHTNESS = 32 # Brightness can be between 0-255
27
28 i2c = board.I2C()
29
30 display = Display(i2c)
31
32 display.fill(0)
33
34 # 256 Color Grayscale Mode
35 image = Image.new("L", (display.width, display.height))
36 draw = ImageDraw.Draw(image)
37
38 # Load a font in 2 different sizes.
39 font = ImageFont.truetype("/usr/share/fonts/truetype/dejavu/DejaVuSans.ttf", 10)
40
41 # Load the text in each frame
42 for x in range(8):
43     draw.rectangle((0, 0, display.width, display.height), outline=0, fill=0)
44     draw.text((x + 1, -2), str(x + 1), font=font, fill=BRIGHTNESS)
45     display.image(image, frame=x)
46
47 display.autoplay(delay=500)

```

6.4 Colorful Examples

Example that works on the RGB Led Shim.

Listing 9: examples/is31fl3731_ledshim_rainbow.py

```

1 # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2 # SPDX-License-Identifier: MIT
3
4 import time
5 import board
6 import busio
7 from adafruit_is31fl3731_led_shim import LedShim as Display
8
9 i2c = busio.I2C(board.SCL, board.SDA)
10
11 # initial display if you are using Pimoroni LED SHIM
12 display = Display(i2c)
13
14 # fmt: off
15 # This list 28 colors from a rainbow...
16 rainbow = [
17     (255, 0, 0), (255, 54, 0), (255, 109, 0), (255, 163, 0),
18     (255, 218, 0), (236, 255, 0), (182, 255, 0), (127, 255, 0),
19     (72, 255, 0), (18, 255, 0), (0, 255, 36), (0, 255, 91),
20     (0, 255, 145), (0, 255, 200), (0, 255, 255), (0, 200, 255),
21     (0, 145, 255), (0, 91, 255), (0, 36, 255), (18, 0, 255),
22     (72, 0, 255), (127, 0, 255), (182, 0, 255), (236, 0, 255),
23     (255, 0, 218), (255, 0, 163), (255, 0, 109), (255, 0, 54),
24 ]

```

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```

25 # fmt: on
26
27
28 for y in range(3):
29     for x in range(28):
30         display.pixel(x, y, 255)
31         time.sleep(0.1)
32         display.pixel(x, y, 0)
33
34 while True:
35     for offset in range(28):
36         for x in range(28):
37             r, g, b = rainbow[(x + offset) % 28]
38             display.pixelrgb(x, r, g, b)

```

Example that works on the RGB Matrix 5x5.

Listing 10: examples/is31fl3731_rgbmatrix5x5_rainbow.py

```

1  # SPDX-FileCopyrightText: 2021 Sandy Macdonald, David Glaude, James Carr
2  # SPDX-License-Identifier: MIT
3
4  """
5  Example to display a rainbow animation on the 5x5 RGB Matrix Breakout.
6
7  Usage:
8  Rename this file code.py and pop it on your Raspberry Pico's
9  CIRCUITPY drive.
10
11  This example is for use on the Pico Explorer Base or other board that use the same_
12  ↳SDA/SCL pin.
13
14  Author(s): Sandy Macdonald, David Glaude, James Carr
15  """
16
17 import time
18 import math
19 import busio
20 import board
21
22 from adafruit_is31fl3731_rgbmatrix5x5 import RGBmatrix5x5 as Display
23
24 def hsv_to_rgb(hue, sat, val):
25     # pylint: disable=too-many-return-statements
26     """
27     Convert HSV colour to RGB
28
29     :param hue: hue; 0.0-1.0
30     :param sat: saturation; 0.0-1.0
31     :param val: value; 0.0-1.0
32     """
33
34     if sat == 0.0:
35         return val, val, val
36
37     i = int(hue * 6.0)

```

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```

38
39     p = val * (1.0 - sat)
40     f = (hue * 6.0) - i
41     q = val * (1.0 - sat * f)
42     t = val * (1.0 - sat * (1.0 - f))
43
44     i %= 6
45
46     if i == 0:
47         return val, t, p
48     if i == 1:
49         return q, val, p
50     if i == 2:
51         return p, val, t
52     if i == 3:
53         return p, q, val
54     if i == 4:
55         return t, p, val
56     if i == 5:
57         return val, p, q
58
59     # Will never reach here but it keeps pylint happier
60     return val, val, val
61
62
63 # Create the I2C bus on a Pico Explorer Base
64 i2c = busio.I2C(board.GP5, board.GP4)
65
66 # Set up 5x5 RGB matrix Breakout
67 display = Display(i2c)
68
69
70 def test_pixels(r, g, b):
71     # Draw each row from left to right, top to bottom
72     for y in range(0, 5):
73         for x in range(0, 5):
74             display.fill(0) # Clear display
75             display.pixelrgb(x, y, r, g, b)
76             time.sleep(0.05)
77
78
79 def test_rows(r, g, b):
80     # Draw full rows from top to bottom
81     for y in range(0, 5):
82         display.fill(0) # Clear display
83         for x in range(0, 5):
84             display.pixelrgb(x, y, r, g, b)
85         time.sleep(0.2)
86
87
88 def test_columns(r, g, b):
89     # Draw full columns from left to right
90     for x in range(0, 5):
91         display.fill(0) # Clear display
92         for y in range(0, 5):
93             display.pixelrgb(x, y, r, g, b)
94         time.sleep(0.2)

```

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```

95
96
97 def test_rainbow_sweep():
98     step = 0
99
100     for _ in range(100):
101         for y in range(0, 5):
102             for x in range(0, 5):
103                 pixel_hue = (x + y + (step / 20)) / 8
104                 pixel_hue = pixel_hue - int(pixel_hue)
105                 pixel_hue += 0
106                 pixel_hue = pixel_hue - math.floor(pixel_hue)
107
108                 rgb = hsv_to_rgb(pixel_hue, 1, 1)
109
110                 display.pixelrgb(
111                     x, y, int(rgb[0] * 255), int(rgb[1] * 255), int(rgb[2] * 255)
112                 )
113
114                 time.sleep(0.01)
115                 step += 3
116
117
118 while True:
119     test_pixels(64, 0, 0) # RED
120     test_pixels(0, 64, 0) # GREEN
121     test_pixels(0, 0, 64) # BLUE
122     test_pixels(64, 64, 64) # WHITE
123
124     test_rows(64, 0, 0) # RED
125     test_rows(0, 64, 0) # GREEN
126     test_rows(0, 0, 64) # BLUE
127     test_rows(64, 64, 64) # WHITE
128
129     test_columns(64, 0, 0) # RED
130     test_columns(0, 64, 0) # GREEN
131     test_columns(0, 0, 64) # BLUE
132     test_columns(64, 64, 64) # WHITE
133
134     test_rainbow_sweep()

```

6.5 adafruit_is31fl3731

CircuitPython driver for the IS31FL3731 charlieplex IC.

Base library.

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

6.5.1 Implementation Notes

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
- Pimoroni LED SHIM
- Pimoroni Keybow 2040
- Pimoroni 11x7 LED Matrix Breakout

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

class `adafruit_is31fl3731.IS31FL3731` (*i2c, address=116*)

The IS31FL3731 is an abstract class contain the main function related to this chip. Each board needs to define width, height and pixel_addr.

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

6.6 adafruit_is31fl3731.charlie_bonnet

CircuitPython driver for the IS31FL3731 charlieplex IC.

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

6.6.1 Implementation Notes

Hardware:

- [Adafruit 16x8 CharliePlex LED Matrix Bonnets](#)

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

```
class adafruit_is31fl3731.charlie_bonnet.CharlieBonnet (i2c, address=116)
    Supports the Charlieplexed bonnet

    static pixel_addr (x, y)
        Calculate the offset into the device array for x,y pixel
```

6.7 adafruit_is31fl3731.charlie_wing

CircuitPython driver for the IS31FL3731 charlieplex IC.

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

6.7.1 Implementation Notes

Hardware:

- [Adafruit 15x7 CharliePlex LED Matrix Display FeatherWings](#)

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

```
class adafruit_is31fl3731.charlie_wing.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
```

6.8 adafruit_is31fl3731.keybow2040

CircuitPython driver for the IS31FL3731 charlieplex IC.

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

6.8.1 Implementation Notes

Hardware:

- [Pimoroni Keybow 2040](#)

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

```
class adafruit_is31fl3731.keybow2040.Keybow2040 (i2c, address=116)
    Supports the Pimoroni Keybow 2040 with 4x4 matrix of RGB LEDs

    static pixel_addr (x, y)
        Calculate the offset into the device array for x,y pixel

    pixelrgb (x, y, r, g, b, blink=None, frame=None)
        Blink or brightness for x, y-pixel

    Parameters
```

- **x** – horizontal pixel position
- **y** – vertical 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

6.9 adafruit_is31fl3731.led_shim

CircuitPython driver for the IS31FL3731 charlieplex IC.

- Author: David Glaude

6.9.1 Implementation Notes

Hardware:

- [Pimoroni 28 RGB Led Shim](#)

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

class adafruit_is31fl3731.led_shim.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

6.10 adafruit_is31fl3731.matrix

CircuitPython driver for the IS31FL3731 charlieplex IC.

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

6.10.1 Implementation Notes

Hardware:

- Adafruit 16x9 Charlieplexed PWM LED Matrix Driver - IS31FL3731

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

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

Supports the Charlieplexed feather wing

static pixel_addr (*x*, *y*)

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

6.11 adafruit_is31fl3731.charlie_bonnet

CircuitPython driver for the IS31FL3731 charlieplex IC.

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

6.11.1 Implementation Notes

Hardware:

- Pimoroni 11x7 LED Matrix Breakout

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

class `adafruit_is31fl3731.matrix_11x7.Matrix11x7` (*i2c*, *address=117*)

Supports the 11x7 LED Matrix Breakout by Pimoroni

static pixel_addr (*x*, *y*)

Translate an x,y coordinate to a pixel index.

6.12 adafruit_is31fl3731.rgbmatrix5x5

CircuitPython driver for the IS31FL3731 charlieplex IC.

- Author(s): Tony DiCola, Melissa LeBlanc-Williams, David Glaude, James Carr

6.12.1 Implementation Notes

Hardware:

- 5x5 RGB Matrix Breakout

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

class `adafruit_is31fl3731.rgbmatrix5x5.RGBmatrix5x5` (*i2c*, *address=116*)

Supports the Pimoroni RGBmatrix5x5 with 5x5 matrix of RGB LEDs

```
static pixel_addr (x, y)
    Calculate the offset into the device array for x,y pixel

pixelrgb (x, y, r, g, b, blink=None, frame=None)
    Blink or brightness for x, y-pixel
```

Parameters

- **x** – horizontal pixel position
- **y** – vertical 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

6.13 adafruit_is31fl3731.scroll_phat_hd

CircuitPython driver for the Pimoroni 17x7 Scroll pHAT HD.

- Author: David Glaude

6.13.1 Implementation Notes

Hardware:

- Pimoroni 17x7 Scroll pHAT HD

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>

```
class adafruit_is31fl3731.scroll_phat_hd.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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