Adafruit MPR121 Library Documentation

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Contents

1 Dependencies **3**

2 Usage Example **5**

3 Contributing **7**

4 Building locally **9**
4.1 Sphinx documentation 9

5 Table of Contents **11**
5.1 Simple test 11
5.2 `adafruit_mpr121` 13
5.2.1 Implementation Notes 13

6 Indices and tables **15**

Python Module Index **17**

Adafruit CircuitPython module for the MPR121 capacitive touch breakout board.

CHAPTER 1

Dependencies

This driver depends on:

- Adafruit CircuitPython
- Bus Device

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

CHAPTER 2

Usage Example

See usage in the examples/mpr121_simpletest.py file.

CHAPTER 3

Contributing

Contributions are welcome! Please read our Code of Conduct before contributing to help this project stay welcoming.

CHAPTER 4

Building locally

To build this library locally you'll need to install the circuitpython-build-tools package.

```
python3 -m venv .env
source .env/bin/activate
pip install circuitpython-build-tools
```

Once installed, make sure you are in the virtual environment:

```
source .env/bin/activate
```

Then run the build:

```
circuitpython-build-bundles --filename_prefix adafruit-circuitpython-mpr121 --library_
↪location .
```

4.1 Sphinx documentation

Sphinx is used to build the documentation based on rST files and comments in the code. First, install dependencies (feel free to reuse the virtual environment from above):

```
python3 -m venv .env
source .env/bin/activate
pip install Sphinx sphinx-rtd-theme
```

Now, once you have the virtual environment activated:

```
cd docs
sphinx-build -E -W -b html . _build/html
```

This will output the documentation to `docs/_build/html`. Open the index.html in your browser to view them. It will also (due to -W) error out on any warning like Travis will. This is a good way to locally verify it will pass.

CHAPTER 5

Table of Contents

5.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/mpr121_simpletest.py

```
# Simple test of the MPR121 capacitive touch sensor library.
# Will print out a message when any of the 12 capacitive touch inputs of the
# board are touched.  Open the serial REPL after running to see the output.
# Author: Tony DiCola
import time
import board
import busio
# Import MPR121 module.
import adafruit_mpr121

# Create I2C bus.
i2c = busio.I2C(board.SCL, board.SDA)

# Create MPR121 class.
mpr121 = adafruit_mpr121.MPR121(i2c)
# Note you can optionally change the address of the device:
#mpr121 = adafruit_mpr121.MPR121(i2c, address=0x91)

# Loop forever testing each input and printing when they're touched.
while True:
    # Loop through all 12 inputs (0-11).
    for i in range(12):
        # Call is_touched and pass it then number of the input.  If it's touched
        # it will return True, otherwise it will return False.
        if mpr121.is_touched(i):
            print('Input {} touched!'.format(i))
    time.sleep(0.25)  # Small delay to keep from spamming output messages.
```

Listing 2: examples/piano.py

```
# MPR121 piano demo.
# Listens to the first 7 inputs of the MPR121 and plays a middle scale note
# when an input is touched.  Note only one note is played at a time!
# For use with microcontrollers or computers with PWM support only!
# Author: Tony DiCola
import time

import board
import busio
import pulseio

# Import MPR121 module.
import adafruit_mpr121


# Configure PWM buzzer and other state:
BUZZER_PIN = board.D9
TONE_ON_DUTY = 2**15   # Duty cycle of tone when turned on, a square wave.
TONE_OFF_DUTY = 0      # Duty cycle of tone when turned off, 0 or no signal.
NOTE_FREQS = [261,  # Input 0 = 261 hz = middle C
              294,  # Input 1 = middle D
              329,  # Input 2 = middle E
              349,  # Input 3 = middle F
              392,  # Input 4 = middle G
              440,  # Input 5 = middle A
              493,  # Input 6 = middle B
              0,    # Input 7 = nothing (set to a frequency in hertz!)
              0,    # Input 8
              0,    # Input 9
              0,    # Input 10
              0]    # Input 11


# Create I2C bus.
i2c = busio.I2C(board.SCL, board.SDA)

# Create MPR121 class.
mpr121 = adafruit_mpr121.MPR121(i2c)
# Note you can optionally change the address of the device:
#mpr121 = adafruit_mpr121.MPR121(i2c, address=0x91)

# Setup buzzer PWM output.
buzzer = pulseio.PWMOut(BUZZER_PIN, duty_cycle=TONE_OFF_DUTY, frequency=440,
                        variable_frequency=True)

# Main loop.
# First grab an initial touch state for all of the inputs.  The touched()
# function can quickly get the state of all input pins and returns them as a
# 12-bit value with a bit set to 1 for each appropriate input (i.e. bit 0 is
# input 0, bit 1 is input 1, etc.)
last = mpr121.touched()
while True:
    # Every loop iteration get an updated touch state and look to see if it
    # changed since the last iteration.
    current = mpr121.touched()
```

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```
    if last != current:
        # Some pin changed, turn off playback and look for any touched pins.
        buzzer.duty_cycle = TONE_OFF_DUTY
        # Loop through all 12 inputs (0-11) and look at their bits in the
        # current touch state.  A bit that's set is touched!
        for i in range(12):
            if (1 << i) & current > 0:
                print('Input {} touched!'.format(i))
                # Grab the frequency for the associated pin and check that it's
                # not zero (unused).
                freq = NOTE_FREQS[i]
                if freq != 0:
                    # Pin with a specified frequency was touched, play the tone!
                    buzzer.frequency = NOTE_FREQS[i]
                    buzzer.duty_cycle = TONE_ON_DUTY
    # Update touch state and delay a bit before next loop iteration.
    last = current
    time.sleep(0.01)
```

5.2 adafruit_mpr121

CircuitPython driver for the MPR121 capacitive touch breakout board.

See usage in the examples/simpletest.py file.

- Author(s): Tony DiCola

5.2.1 Implementation Notes

Hardware:

- Adafruit 12-Key Capacitive Touch Sensor Breakout - MPR121 (Product ID: 1982)
- Adafruit 12 x Capacitive Touch Shield for Arduino - MPR121 (Product ID: 2024)

Software and Dependencies:

- Adafruit CircuitPython firmware for the ESP8622 and M0-based boards: https://github.com/adafruit/circuitpython/releases
- Adafruit's Bus Device library: https://github.com/adafruit/Adafruit_CircuitPython_BusDevice

class adafruit_mpr121.**MPR121**(*i2c*, *address=90*)

Driver for the MPR121 capacitive touch breakout board.

baseline_data(*pin*)

Return baseline data register value for the provided pin (0-11). Useful for debugging.

filtered_data(*pin*)

Return filtered data register value for the provided pin (0-11). Useful for debugging.

is_touched(*pin*)

Return True if the specified pin is being touched, otherwise returns False.

reset()

Reset the MPR121 into a default state ready to detect touch inputs.

set_thresholds(*touch*, *release*)

Set the touch and release threshold for all inputs to the provided values. Both touch and release should be a value between 0 to 255 (inclusive).

touched()

Return touch state of all pins as a 12-bit value where each bit represents a pin, with a value of 1 being touched and 0 not being touched.

CHAPTER 6

Indices and tables

- genindex
- modindex
- search

Python Module Index

a

adafruit_mpr121, 13

Index

A

adafruit_mpr121 (module), 13

B

baseline_data() (adafruit_mpr121.MPR121 method), 13

F

filtered_data() (adafruit_mpr121.MPR121 method), 13

I

is_touched() (adafruit_mpr121.MPR121 method), 13

M

MPR121 (class in adafruit_mpr121), 13

R

reset() (adafruit_mpr121.MPR121 method), 13

S

set_thresholds() (adafruit_mpr121.MPR121 method), 13

T

touched() (adafruit_mpr121.MPR121 method), 14