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# **AdafruitFingerprint Library Documentation**

***Release 1.0***

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This library will let you use an Adafruit Fingerprint sensor on any UART to get, store, retrieve and query fingerprints! Great for adding bio-sensing security to your next build.



# CHAPTER 1

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## Dependencies

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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

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### Installing from PyPI

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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-fingerprint
```

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

```
sudo pip3 install adafruit-circuitpython-fingerprint
```

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-fingerprint
```



## CHAPTER 3

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### Usage Example

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See 'examples' folder for full usage demo!



### 4.1 adafruit\_fingerprint

This library will let you use an Adafruit Fingerprint sensor on any UART to get, store, retrieve and query fingerprints! Great for adding bio-sensing security to your next build.

- Author(s): ladyada

#### 4.1.1 Implementation Notes

##### Hardware:

- [Fingerprint sensor](#) (Product ID: 751)

##### Software and Dependencies:

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

**class** `adafruit_fingerprint.Adafruit_Fingerprint` (*uart, passwd=(0, 0, 0, 0)*)

UART based fingerprint sensor.

**count\_templates** ()

Requests the sensor to count the number of templates and stores it in `self.template_count`. Returns the packet error code or OK success

**create\_model** ()

Requests the sensor take the template data and turn it into a model returns the packet error code or OK success

**delete\_model** (*location*)

Requests the sensor delete a model from flash memory given by the argument location. Returns the packet error code or OK success

**`finger_fast_search()`**

Asks the sensor to search for a matching fingerprint template to the last model generated. Stores the location and confidence in `self.finger_id` and `self.confidence`. Returns the packet error code or OK success

**`get_image()`**

Requests the sensor to take an image and store it memory, returns the packet error code or OK success

**`image_2_tz(slot)`**

Requests the sensor convert the image to a template, returns the packet error code or OK success

**`read_templates()`**

Requests the sensor to list of all template locations in use and stores them in `self.templates`. Returns the packet error code or OK success

**`store_model(location)`**

Requests the sensor store the model into flash memory and assign a location. Returns the packet error code or OK success

**`verify_password()`**

Checks if the password/connection is correct, returns True/False

## CHAPTER 5

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### Contributing

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





## CHAPTER 6

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### Documentation

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



## 7.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/fingerprint\_simpletest.py

```

1  import time
2  import board
3  import busio
4  from digitalio import DigitalInOut, Direction
5  import adafruit_fingerprint
6
7  led = DigitalInOut(board.D13)
8  led.direction = Direction.OUTPUT
9
10 uart = busio.UART(board.TX, board.RX, baudrate=57600)
11
12 # If using with a computer such as Linux/RaspberryPi, Mac, Windows with USB/serial_
   ↳ converter:
13 #import serial
14 #uart = serial.Serial("/dev/ttyUSB0", baudrate=57600, timeout=1)
15
16 # If using with Linux/Raspberry Pi and hardware UART:
17 #import serial
18 #uart = serial.Serial("/dev/ttyS0", baudrate=57600, timeout=1)
19
20 finger = adafruit_fingerprint.Adafruit_Fingerprint(uart)
21
22 #####
23
24
25 def get_fingerprint():
26     """Get a finger print image, template it, and see if it matches!"""

```

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```

27     print("Waiting for image...")
28     while finger.get_image() != adafruit_fingerprint.OK:
29         pass
30     print("Templating...")
31     if finger.image_2_tz(1) != adafruit_fingerprint.OK:
32         return False
33     print("Searching...")
34     if finger.finger_fast_search() != adafruit_fingerprint.OK:
35         return False
36     return True
37
38 # pylint: disable=too-many-branches
39 def get_fingerprint_detail():
40     """Get a finger print image, template it, and see if it matches!
41     This time, print out each error instead of just returning on failure"""
42     print("Getting image...", end="", flush=True)
43     i = finger.get_image()
44     if i == adafruit_fingerprint.OK:
45         print("Image taken")
46     else:
47         if i == adafruit_fingerprint.NO_FINGER:
48             print("No finger detected")
49         elif i == adafruit_fingerprint.IMAGEFAIL:
50             print("Imaging error")
51         else:
52             print("Other error")
53         return False
54
55     print("Templating...", end="", flush=True)
56     i = finger.image_2_tz(1)
57     if i == adafruit_fingerprint.OK:
58         print("Templated")
59     else:
60         if i == adafruit_fingerprint.IMAGEMESS:
61             print("Image too messy")
62         elif i == adafruit_fingerprint.FEATUREFAIL:
63             print("Could not identify features")
64         elif i == adafruit_fingerprint.INVALIDIMAGE:
65             print("Image invalid")
66         else:
67             print("Other error")
68         return False
69
70     print("Searching...", end="", flush=True)
71     i = finger.finger_fast_search()
72     # pylint: disable=no-else-return
73     # This block needs to be refactored when it can be tested.
74     if i == adafruit_fingerprint.OK:
75         print("Found fingerprint!")
76         return True
77     else:
78         if i == adafruit_fingerprint.NOTFOUND:
79             print("No match found")
80         else:
81             print("Other error")
82         return False
83

```

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```

84 # pylint: disable=too-many-statements
85 def enroll_finger(location):
86     """Take a 2 finger images and template it, then store in 'location'"""
87     for fingerimg in range(1, 3):
88         if fingerimg == 1:
89             print("Place finger on sensor...", end="", flush=True)
90         else:
91             print("Place same finger again...", end="", flush=True)
92
93         while True:
94             i = finger.get_image()
95             if i == adafruit_fingerprint.OK:
96                 print("Image taken")
97                 break
98             elif i == adafruit_fingerprint.NOFINGER:
99                 print(".", end="", flush=True)
100             elif i == adafruit_fingerprint.IMAGEFAIL:
101                 print("Imaging error")
102                 return False
103             else:
104                 print("Other error")
105                 return False
106
107         print("Templating...", end="", flush=True)
108         i = finger.image_2_tz(fingerimg)
109         if i == adafruit_fingerprint.OK:
110             print("Templated")
111         else:
112             if i == adafruit_fingerprint.IMAGEMESS:
113                 print("Image too messy")
114             elif i == adafruit_fingerprint.FEATUREFAIL:
115                 print("Could not identify features")
116             elif i == adafruit_fingerprint.INVALIDIMAGE:
117                 print("Image invalid")
118             else:
119                 print("Other error")
120             return False
121
122         if fingerimg == 1:
123             print("Remove finger")
124             time.sleep(1)
125             while i != adafruit_fingerprint.NOFINGER:
126                 i = finger.get_image()
127
128         print("Creating model...", end="", flush=True)
129         i = finger.create_model()
130         if i == adafruit_fingerprint.OK:
131             print("Created")
132         else:
133             if i == adafruit_fingerprint.ENROLLMISMATCH:
134                 print("Prints did not match")
135             else:
136                 print("Other error")
137             return False
138
139         print("Storing model #%d..." % location, end="", flush=True)
140         i = finger.store_model(location)

```

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```

141     if i == adafruit_fingerprint.OK:
142         print("Stored")
143     else:
144         if i == adafruit_fingerprint.BADLOCATION:
145             print("Bad storage location")
146         elif i == adafruit_fingerprint.FLASHERR:
147             print("Flash storage error")
148         else:
149             print("Other error")
150         return False
151
152     return True
153
154 #####
155
156
157 def get_num():
158     """Use input() to get a valid number from 1 to 127. Retry till success!"""
159     i = 0
160     while (i > 127) or (i < 1):
161         try:
162             i = int(input("Enter ID # from 1-127: "))
163         except ValueError:
164             pass
165     return i
166
167
168 while True:
169     print("-----")
170     if finger.read_templates() != adafruit_fingerprint.OK:
171         raise RuntimeError('Failed to read templates')
172     print("Fingerprint templates:", finger.templates)
173     print("e) enroll print")
174     print("f) find print")
175     print("d) delete print")
176     print("-----")
177     c = input("> ")
178
179     if c == 'e':
180         enroll_finger(get_num())
181     if c == 'f':
182         if get_fingerprint():
183             print("Detected #", finger.finger_id, "with confidence", finger.
184 ↪confidence)
185         else:
186             print("Finger not found")
187     if c == 'd':
188         if finger.delete_model(get_num()) == adafruit_fingerprint.OK:
189             print("Deleted!")
190         else:
191             print("Failed to delete")

```

## CHAPTER 8

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### Indices and tables

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- `genindex`
- `modindex`
- `search`





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