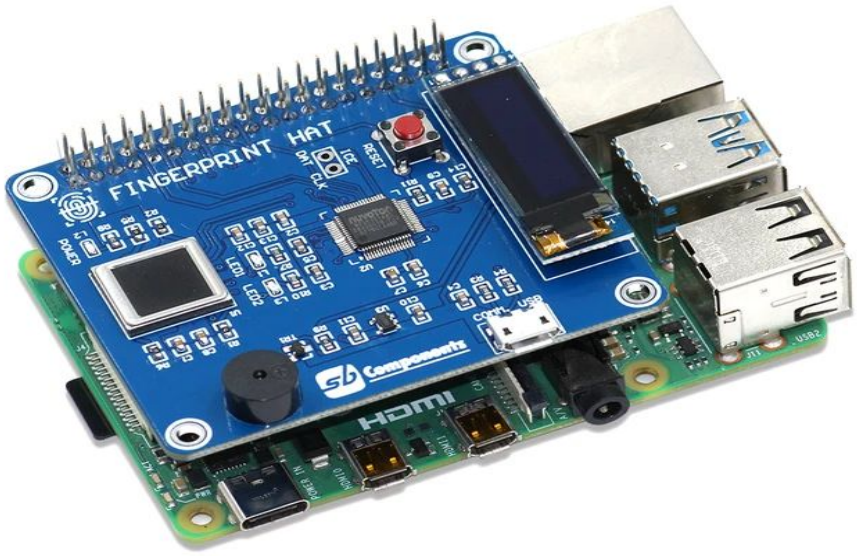
PiFinger : Fingerprint HAT for Raspberry Pi



Contents

PiFinger For Raspberry Pi

Introduction

PiFinger HAT for Raspberry Pi Comprise of onboard Nuvoton MCU with an on-chip crypto-accelerator, Cortex-M23 TrustZone, and XOM facilities. A user can use the communication protocol to the PiFinger with commands over the UART protocol with the Baud rate 115200 bps or USB 2.0 full speed.

Pinout

PiFinger Peripheral	Raspberry Pi Pin (BCM)
Fingerprint TX	GPIO15 (RXD)
Fingerprint RX	GPIO14 (TXD)
OLED SDA	GPIO2 (SDA)
OLED SCL	GPIO3 (SCL)
BUZZER	GPIO13

Note: First registered fingerprint will act as an administrator Fingerprint. A user needs to confirm the admin fingerprint before running the registration command or else PiFinger will stay in compare mode.

Features

- Capacitive Contact Technology
- On Chip-Crypto Accelerator
- High-Speed UART Interface
- Register up to 24 Fingerprints
- Nuvoton MCU
- Cortex-M23 Trust zone

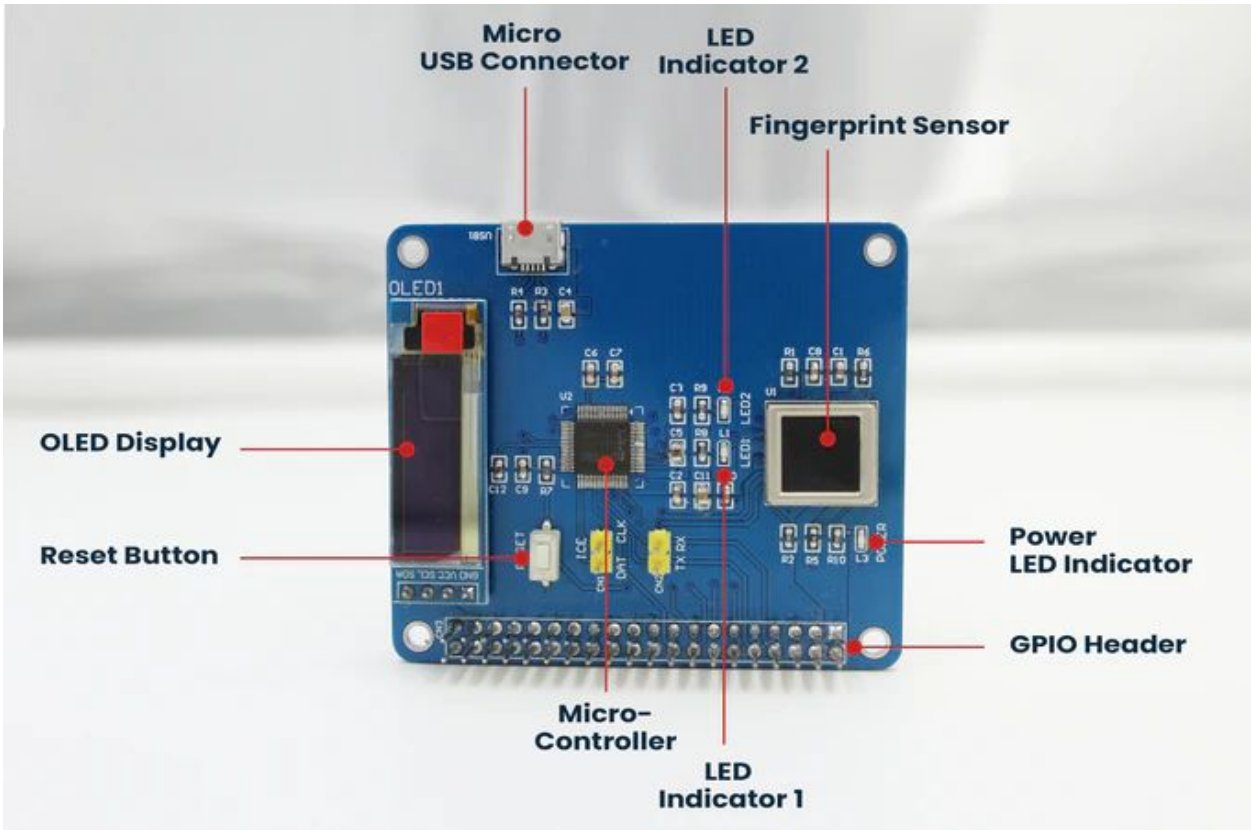
Specification of Board

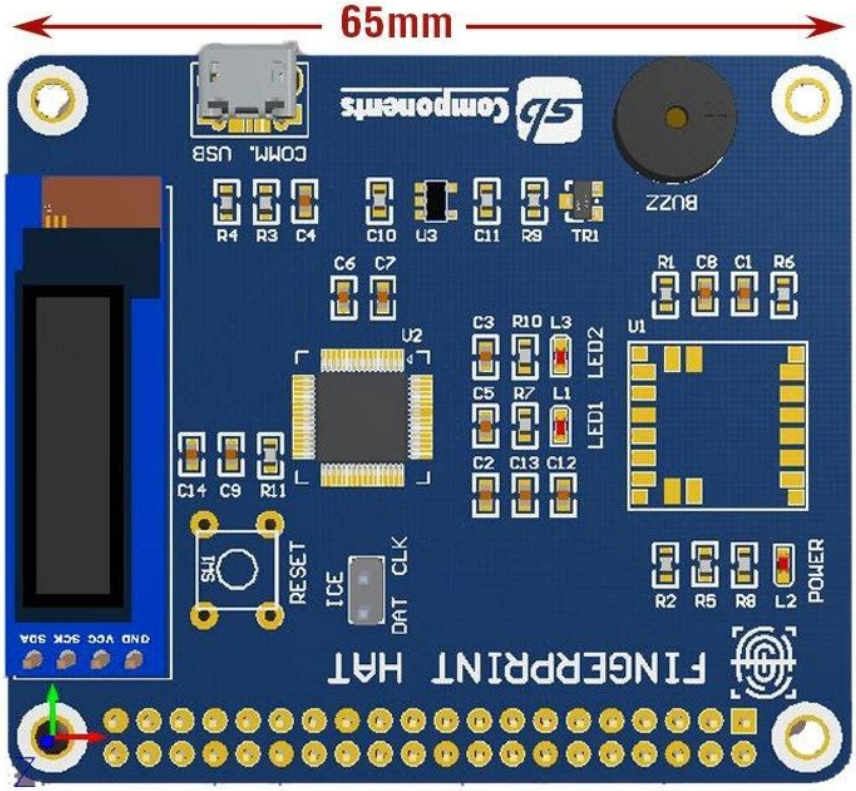
- Sensor - Capacitive Chip Sensor
- Active sensing area - 8.8 x 8.8 mm
- Scanning speed - 25 Frame/ sec
- Image resolution - 508dpi
- Gray level - 8 bits/pixel, max 256 grayscales
- Image ratio to width - 1:1
- Interface - UART / USB
- Power - DC 3V±10%(Standby:45mA, Matching duration: 470 mA)
- Operating Temperature - (20 ~ 60 ℃)
- Operating humidity - 0 ~ 90% Non-Condense
- Matching Mode - 1:1; 1:N
- Matching speed - < 0.3 sec
- Enrollment time - < 0.2 sec
- FRR(False Rejection Rate) - <0.1% (Security Level, 3)
- FAR(False Acceptance Rate) - < 0.001%(Security level, 3)
- Sensor Coating surface color - Black Matte
- Sensor Coating RCA @175 g - >700 cycles

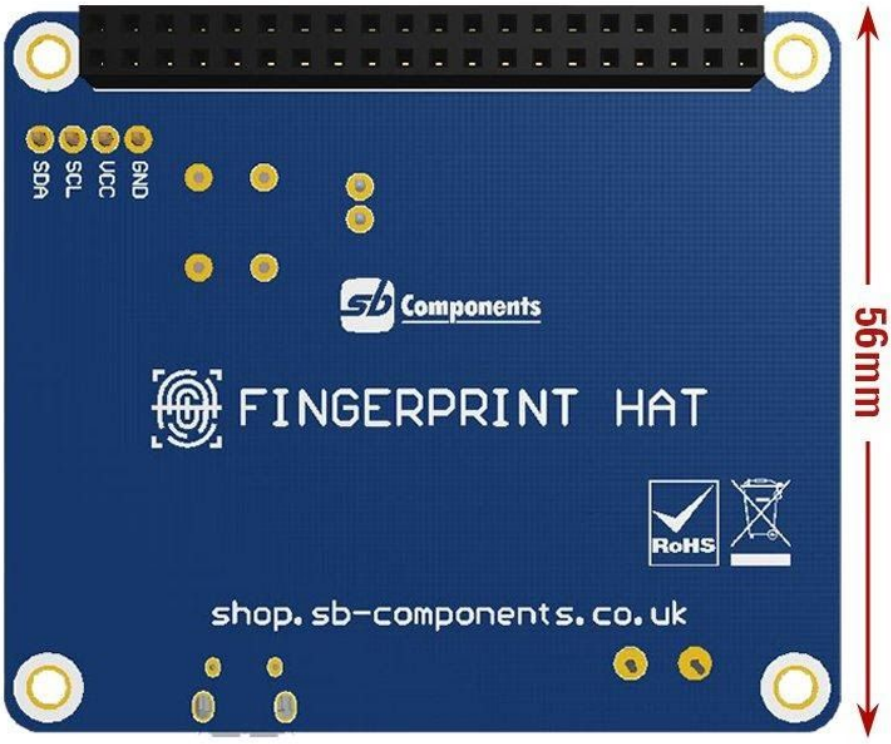
Specification of Sensor

- Dimensions - 13.75 x 12.65 x 1.95 mm
- Dimensions (sensor) - 9.6 x 9.4 mm
- ESD (IEC 61000-4-2, level X, air discharge) - ±15 kV
- Operating temperature - (-20 ~ 80 ℃)
- Extended humidity range < 90 %
- Operating voltage range - 2.7~3.3 V
- IO pin voltage range - 1.8~3.3 V
- Normal mode current - 2 mA
- Stand-by mode current - 20 uA
- Interface SPI
- 2D capacitive Fingerprint area sensor
- High-performance fingerprint algorithm
- Register at most 24 fingerprints
- High comparison speed
- Matching mode 1:1; 1:N

Hardware


Micro
USB Connector
LED
Indicator 2
Fingerprint Sensor
OLED Display
Reset Button
Power
LED Indicator
GPIO Header
Micro-
Controller
LED
Indicator 1


65mm
COMM. USB
BUZZ
R4 R3 C4 C10 U3 C11 R9 TR1
C6 C7
R1 C8 C1 R6
C3 R10 L3 LED2
C5 R7 L1 LED1
C2 C13 C12
U1
U2
C14 C9 R11
SW1
RESET
ICE
DAT CLK
R2 R5 R8 L2 POWER
GND VCC SCK SDA
FINGERPRINT HAT


SDA SCL VCC GND
Components
FINGERPRINT HAT
RoHS
shop.sb-components.co.uk
56mm

Installation Process

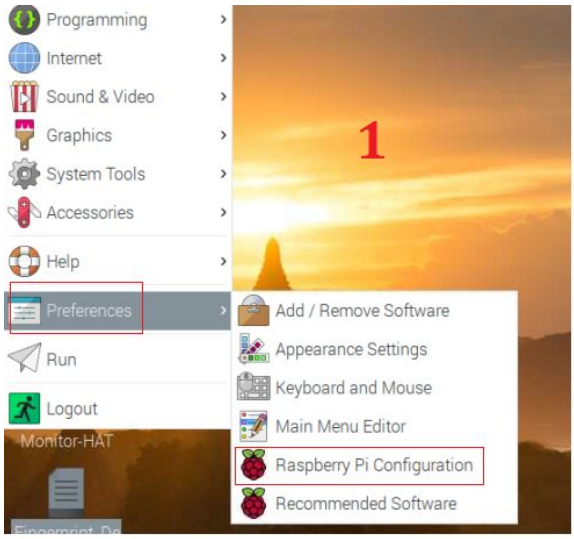
Enable I2C and Serial Interface for Raspberry Pi

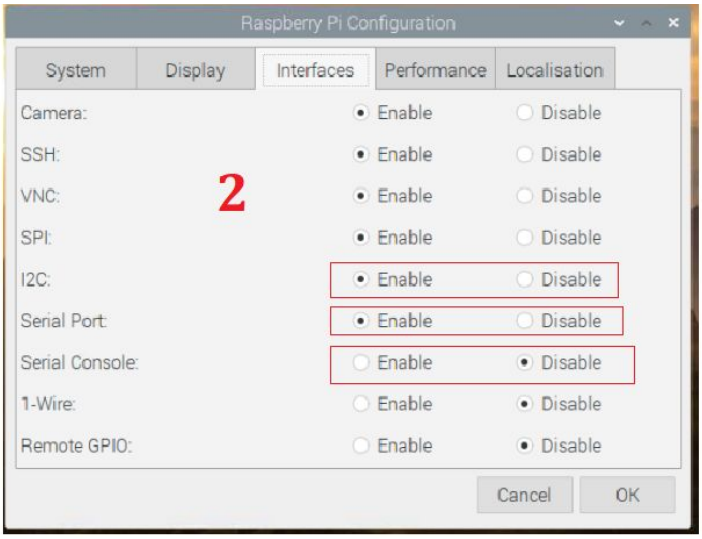
Open a terminal or GUI and run the following commands to enable I2C and Serial :

- *sudo raspi-config*

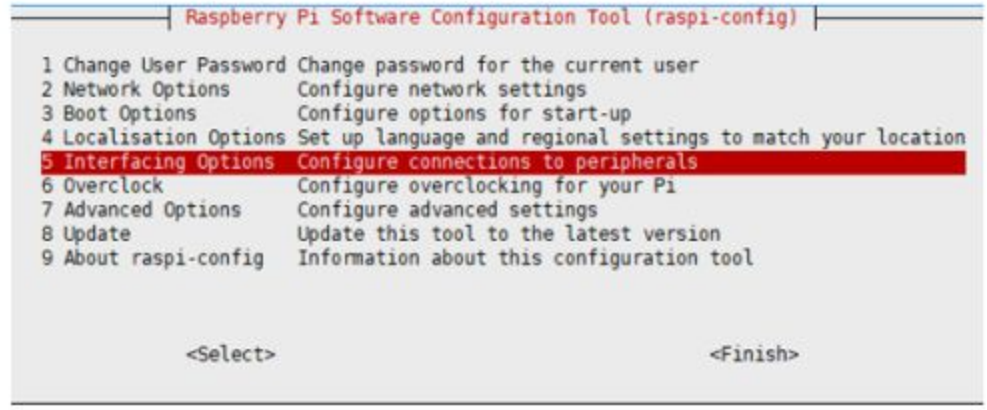
Choose Interfacing Options -> I2C ->yes

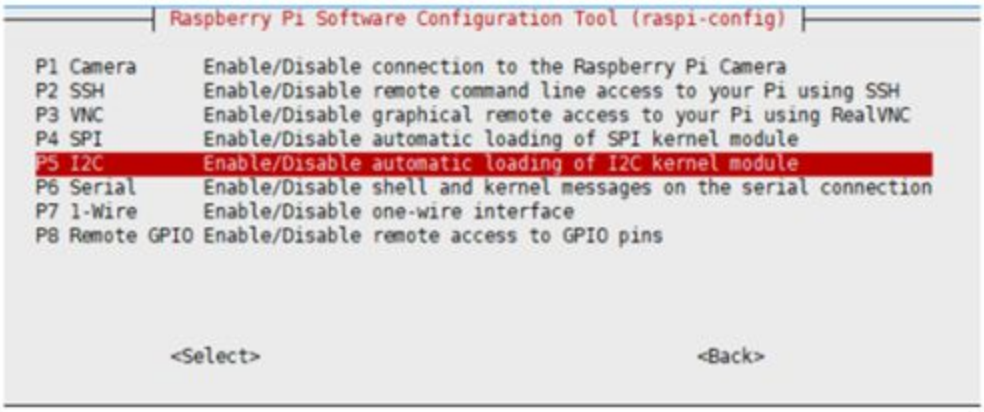
- GUI Method to enable i2c and Serial

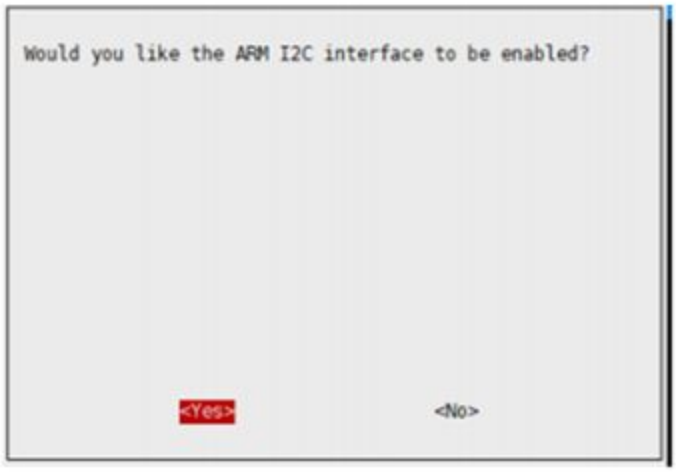




Terminal method to enable i2c and serial can be followed as:

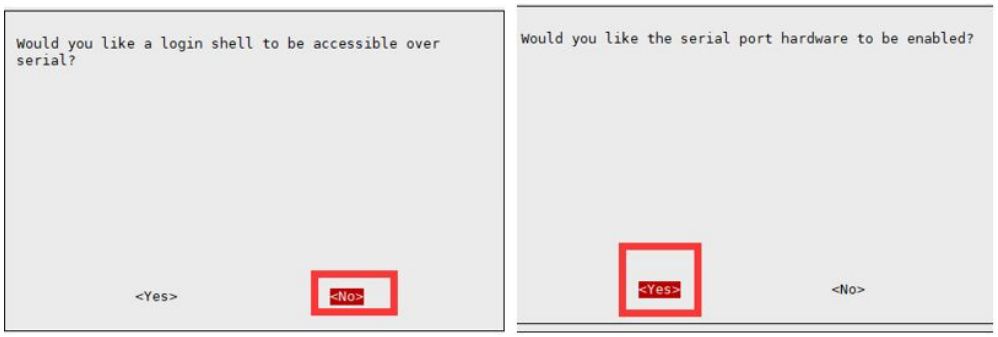






- *sudo raspi-config*

Choose Interfacing Options -> Serial -> No -> Yes



Testing

- Connect PiFinger on top of 40 pins stackable GPIO header of Raspberry Pi.
- Now Clone/Download PiFinger Repository by running below command or directly download from github

  git clone https://github.com/sbcshop/PiFinger.git

- Open cloned/downloaded folder and choose your environment folder (i.e.: Raspberry Pi or Windows)

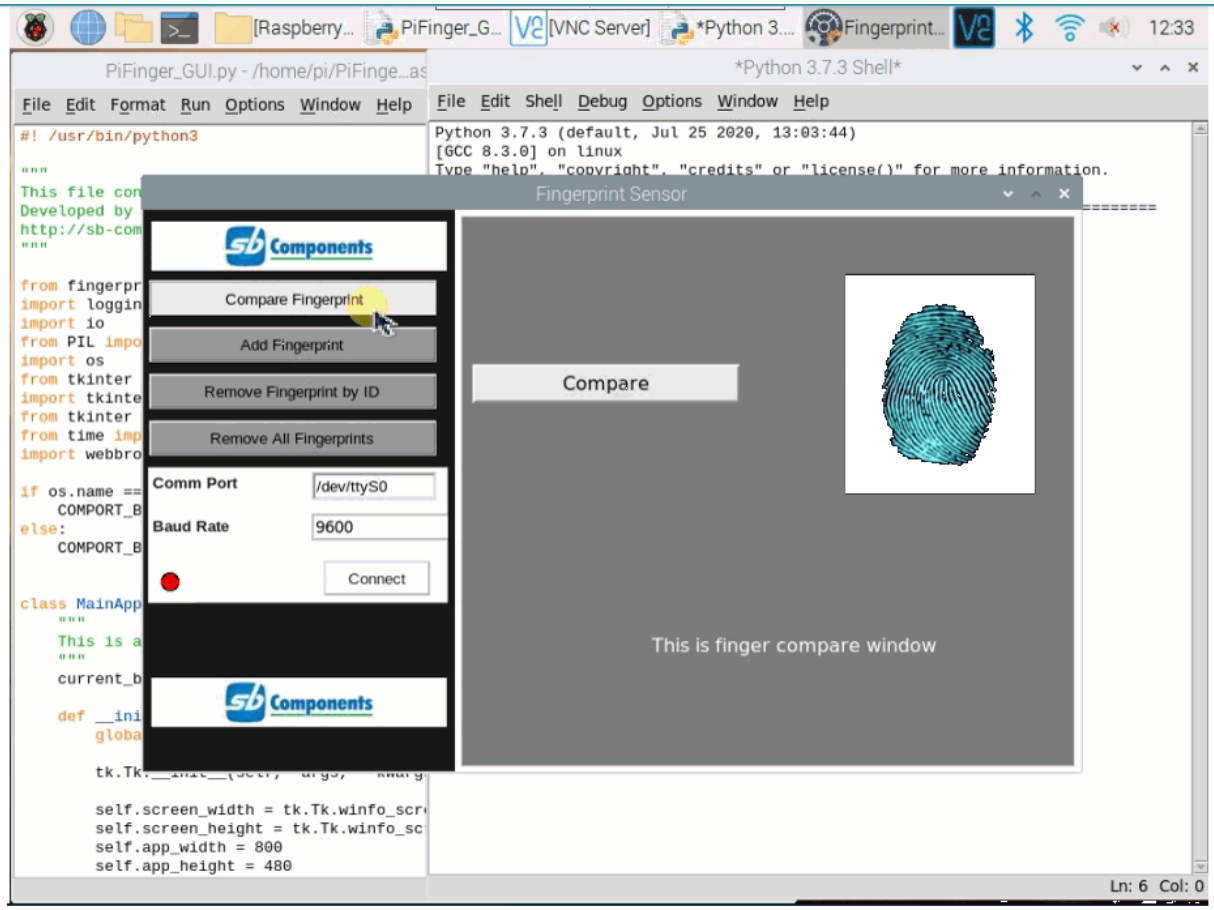
Source code Link : https://github.com/sbcshop/PiFinger

For Raspberry Pi

- Run PiFinger GUI by running the below command:

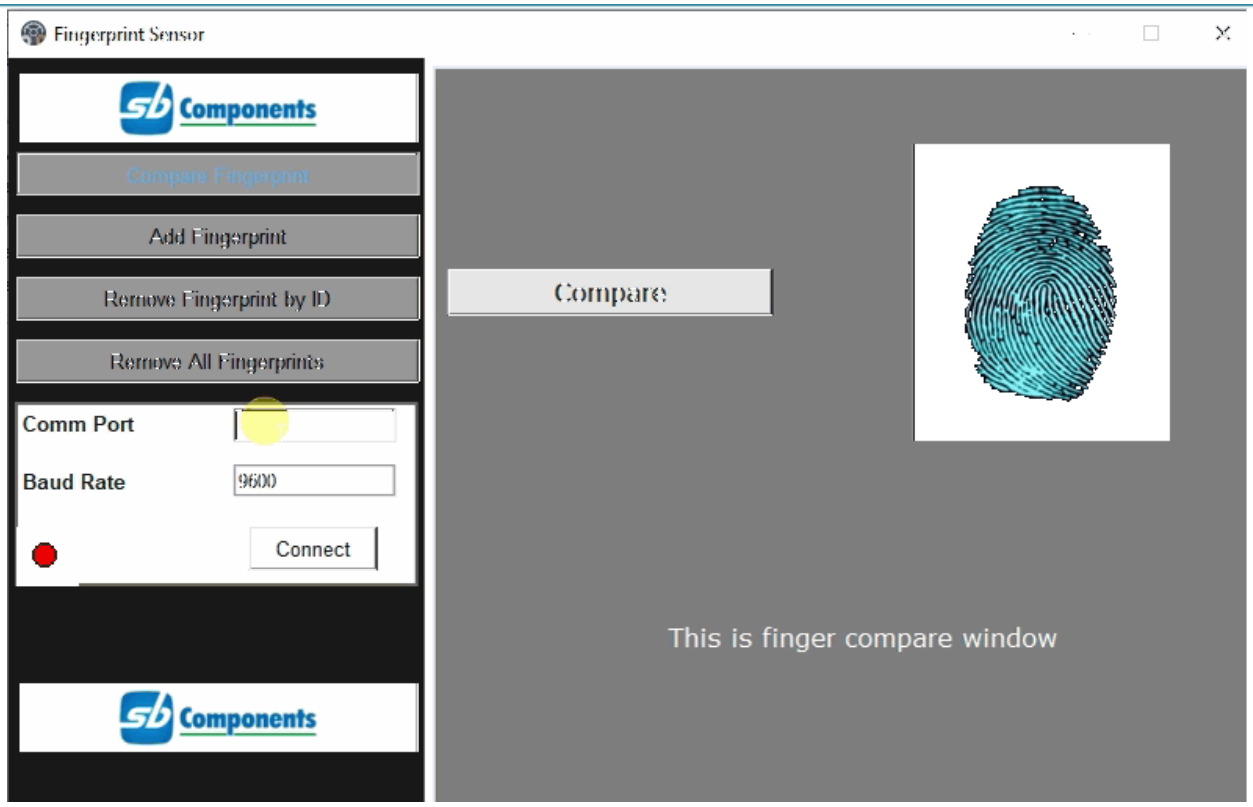
  python3 PiFinger_GUI.py or using any python3 supported ide.

- Select **COM port** and Baud Rate (default is 9600) from the above GUI ("/dev/ttyS0" in case of default connection), and click on connect button to start communication with a fingerprint sensor.



For Windows

- Run PiFinger GUI by running "PiFinger_GUI.py" file with any python3 supported ide.
- Select **COM port** and Baud Rate (default is 9600) from above GUI ("COM7 '' (check com port from device manager) in case of default connection), and click on connect button to start communication with a fingerprint sensor.



GUI Features

1. Compare Fingerprint - Option to compare registered Fingerprint.
2. Adds Fingerprint - Add New Fingerprint, will assign an ID for each successful registration.
3. Remove Fingerprint (By ID) - Remove registered Fingerprint for a specific ID.
4. Remove All Fingerprint (Registered) - Remove all fingerprints in a single click.

LED display explanation

The LED light of the PiFinger shows the current working status.

If the LED1 and the LED2 flash, in turn, it means that the PiFinger is in operation mode. If the LED1 or the LED2 is blinking alone, it means that the PiFinger is in demo mode.

The PiFinger will be in the demo mode after powered on or reset. Send any command to it will make it leave demo mode and enter operation mode immediately, and it will process the received command. When the PiFinger is in operation mode, only power on or resets it can make it back to demo mode.

Communication Protocol :
https://github.com/sbcshop/PiFinger/wiki/Communication-Protocol