EN: This Datasheet/Document is presented by the manufacturer.

Please visit our website for pricing and availability at www.hestore.hu.

AS608 Optical Finger Print Sensor Module

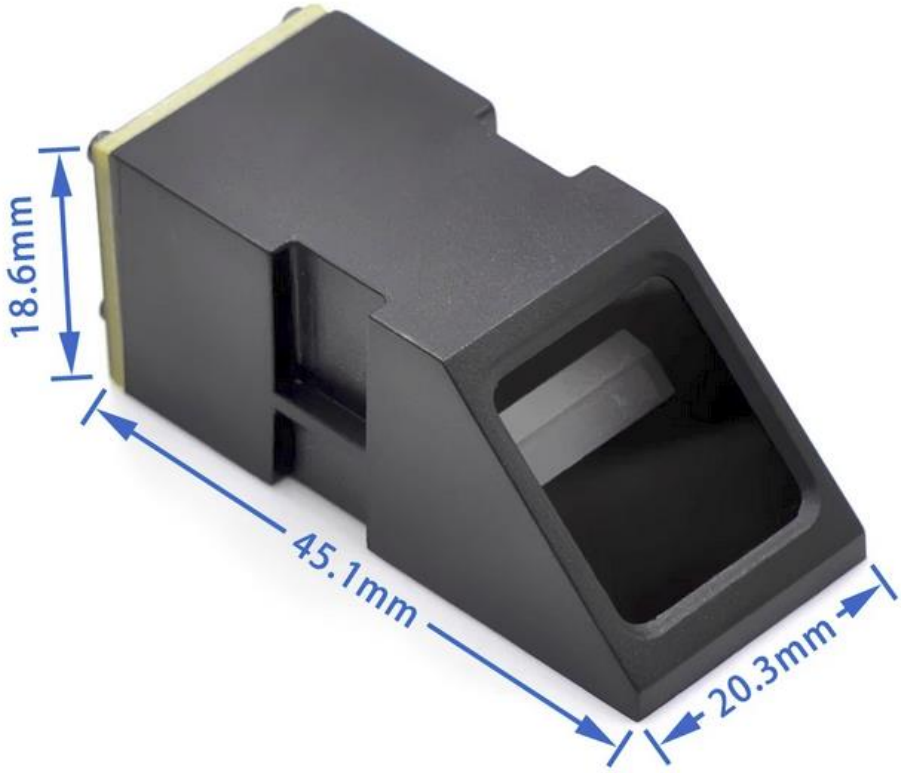
The AS608 optical fingerprint sensor can be used to scan fingerprint and it can send the processed data to a microcontroller via serial communication as well. All registered fingerprints are stored in this module. The AS608 is capable of storing up to 120 individual fingerprints records. This all-in-one optical fingerprint sensor will make adding fingerprint detection and verification super simple.

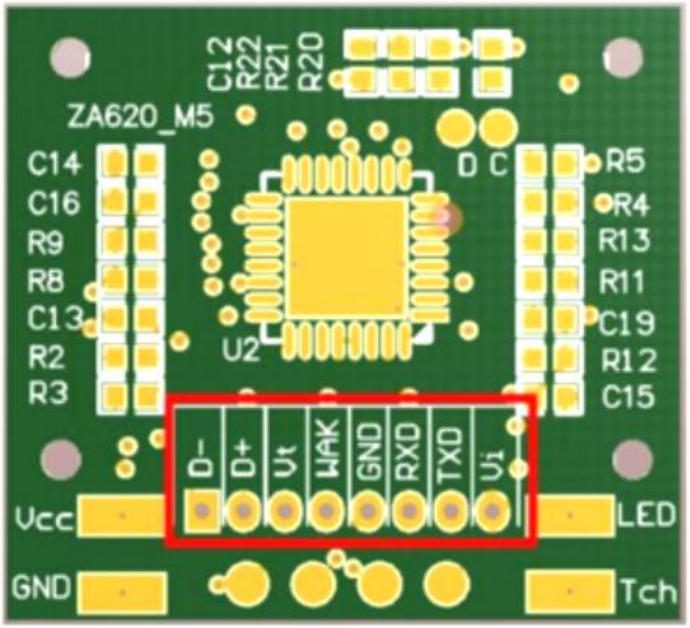
Brief Data:

- Name: AS608 Optical Fingerprint Reader Module.
- Operation Voltage: (3.3~5)Vdc.
- Interface: TTL Serial.
- Baud rate: (9600~57600) (default 57600).
- Rated Current: ~120mA.
- Fingerprint imaging time: <1.0 seconds.
- Storage capacity: 162 templates.
- Template file: 512 bytes.
- False Acceptance Rate: <0.001% (Security level 3).
- False Reject Rate: <1.0% (Security level 3).
- Safety Level: 1~5 low to high safety.
- Temperature: -20 - +50 degrees.
- Sensing Window: (16x18) mm.
- Dimension: (56x20x21) mm.

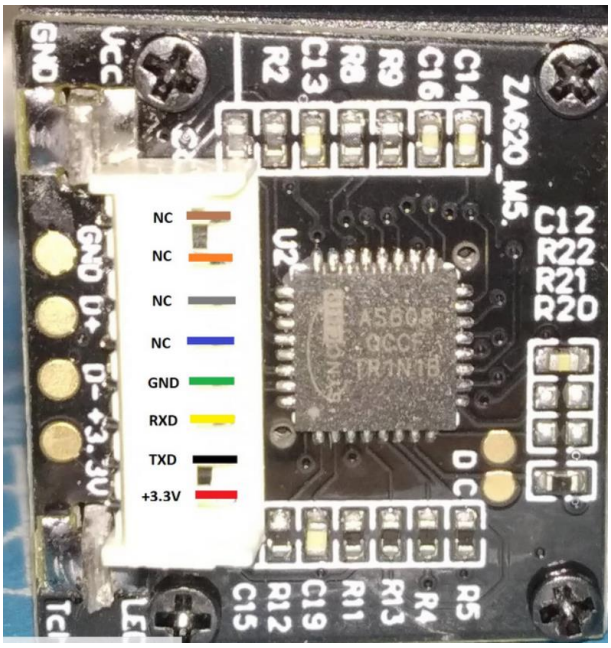
Mechanical Dimension:

Unit: mm





Pin Function Assignment:



Pin Name	Pin Function
V+ (Red)	Module power supply +3.3~5 V.
TXD (Black)	Serial Data Output. TTL.
RXD (Yellow)	Serial Data Input. TTL.
GND (Green)	Ground
NC	No Connection

Application Examples:

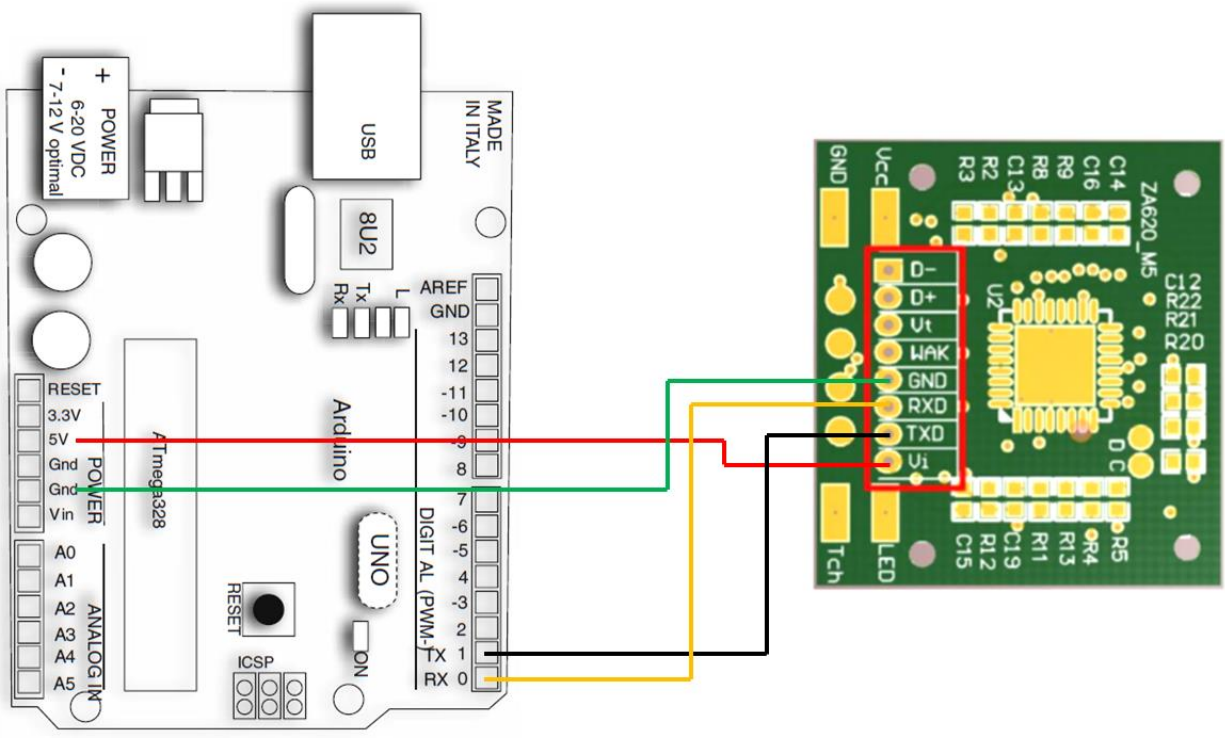
Enrolling New Users with Windows:

The easiest way to enroll a new fingerprint is to use the Windows software. The interface/test software is unfortunately windows-only and the fingerprint image preview section only seems to work with these sensors:

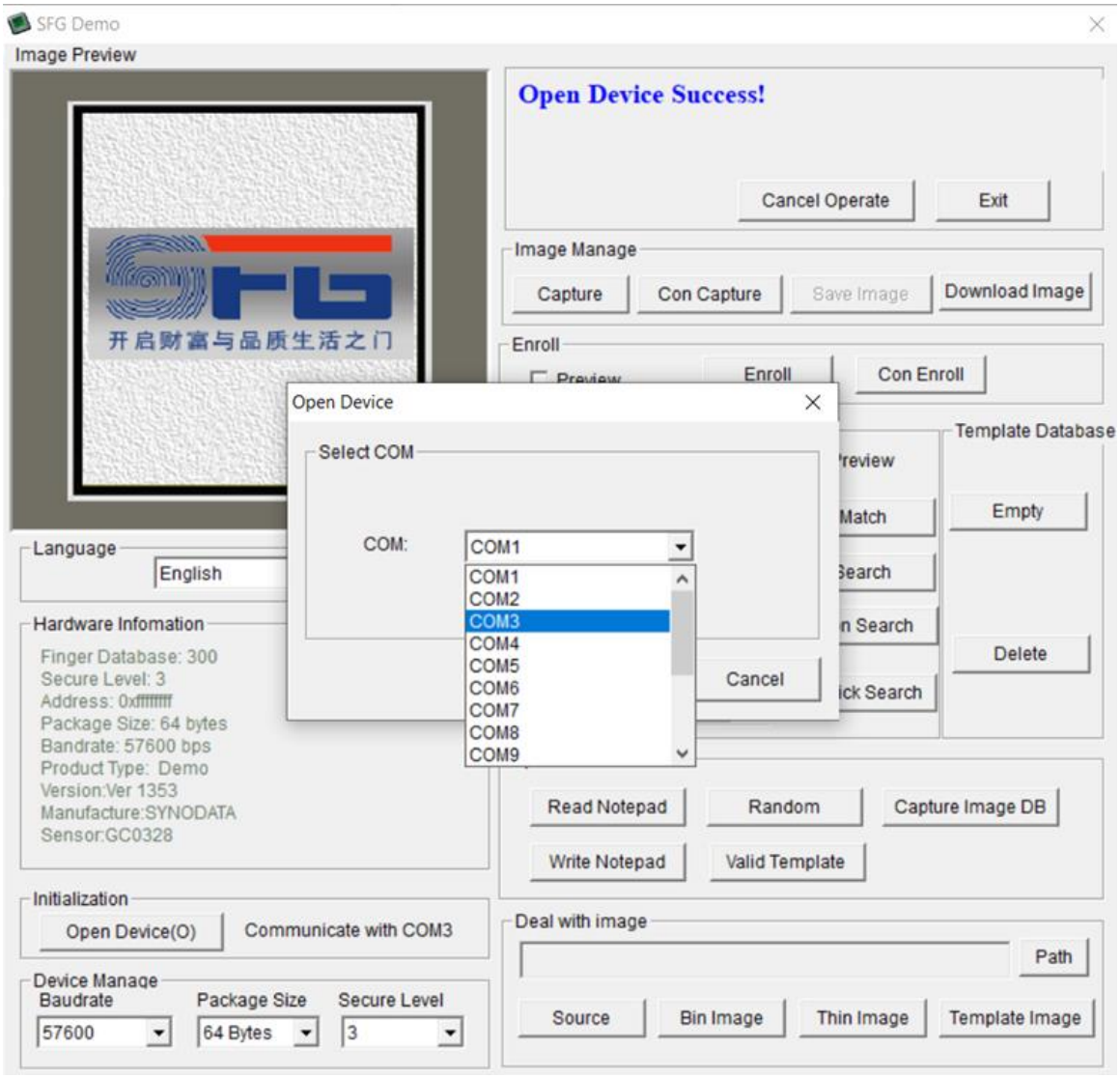
First up, you'll want to connect the sensor to the computer via a USB-serial converter. The easiest way to do this is to connect it directly to the USB/Serial converter in the Arduino. To do this, you'll need to upload a 'blank sketch' this one works well for "traditional" Arduinos, like the Uno and the Mega:

```
// this sketch will allow you to bypass the Atmega chip
// and connect the fingerprint sensor directly to the USB/Serial
// chip converter.

// Red connects to +5V
// Black connects to Ground
// White goes to Digital 0
// Green goes to Digital 1

void setup() {}
void loop() {}
```

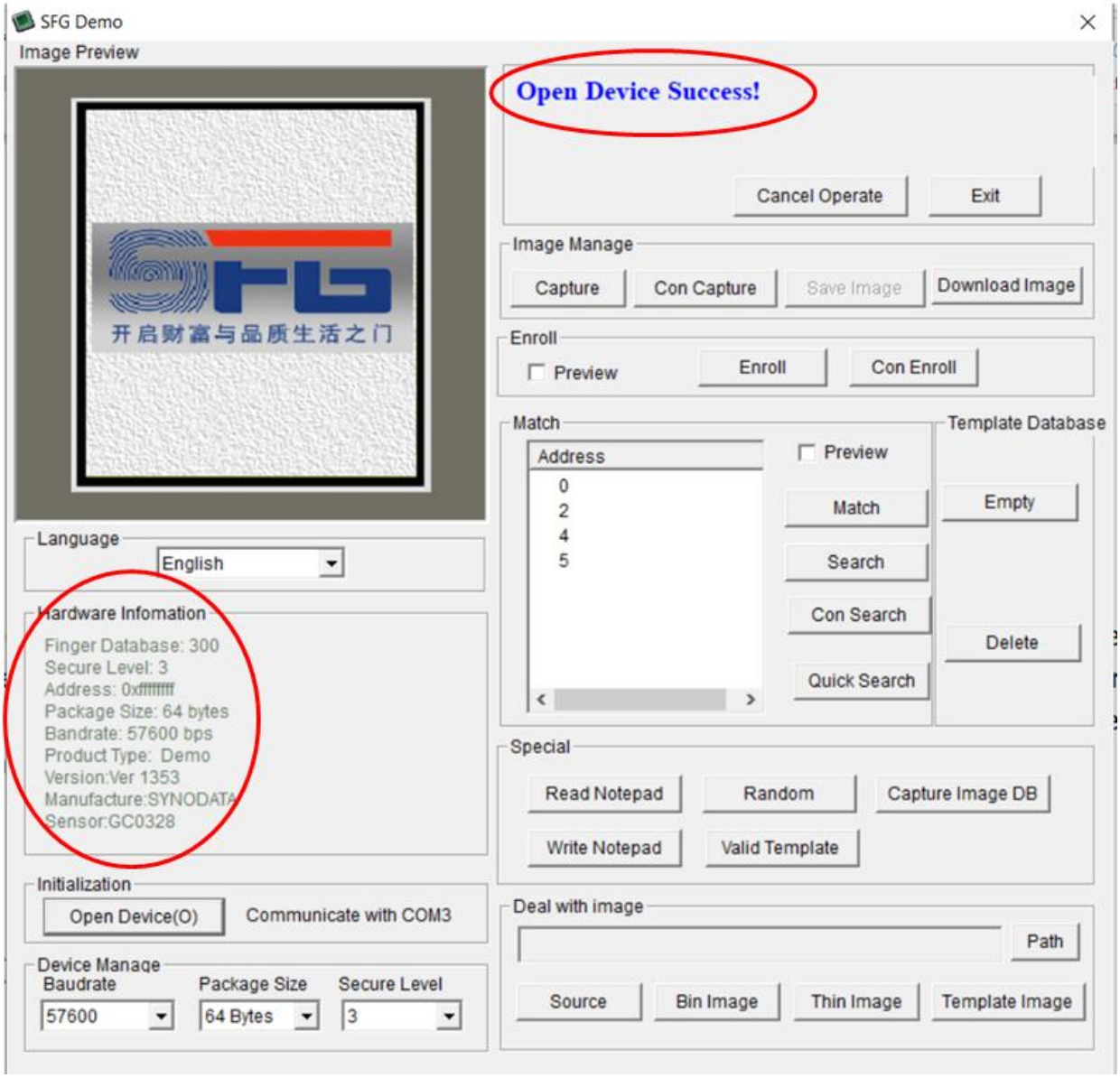
Wire up the sensor to Arduino Uno as described below:



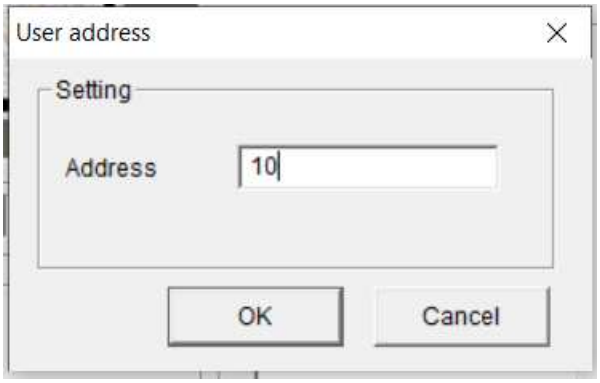
Start up the SFGDemo software and click Open Device from the bottom left corner. Select the COM port used by the Arduino.



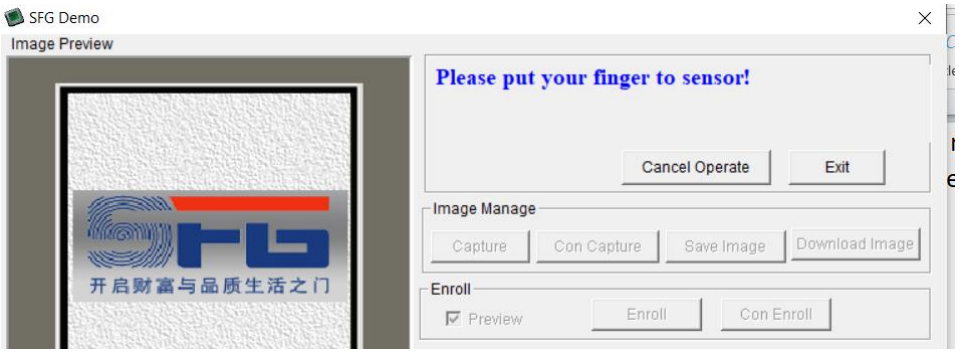
And press OK when done. You should see the following, with a blue success message and some device statistics in the bottom corner. You can change the baud rate in the bottom left hand corner, as well as the "security level" (how sensitive it is) but we suggest leaving those alone until you have everything running and you want to experiment. They should default to 57600 baud and security level 3 so set them if they're wrong.



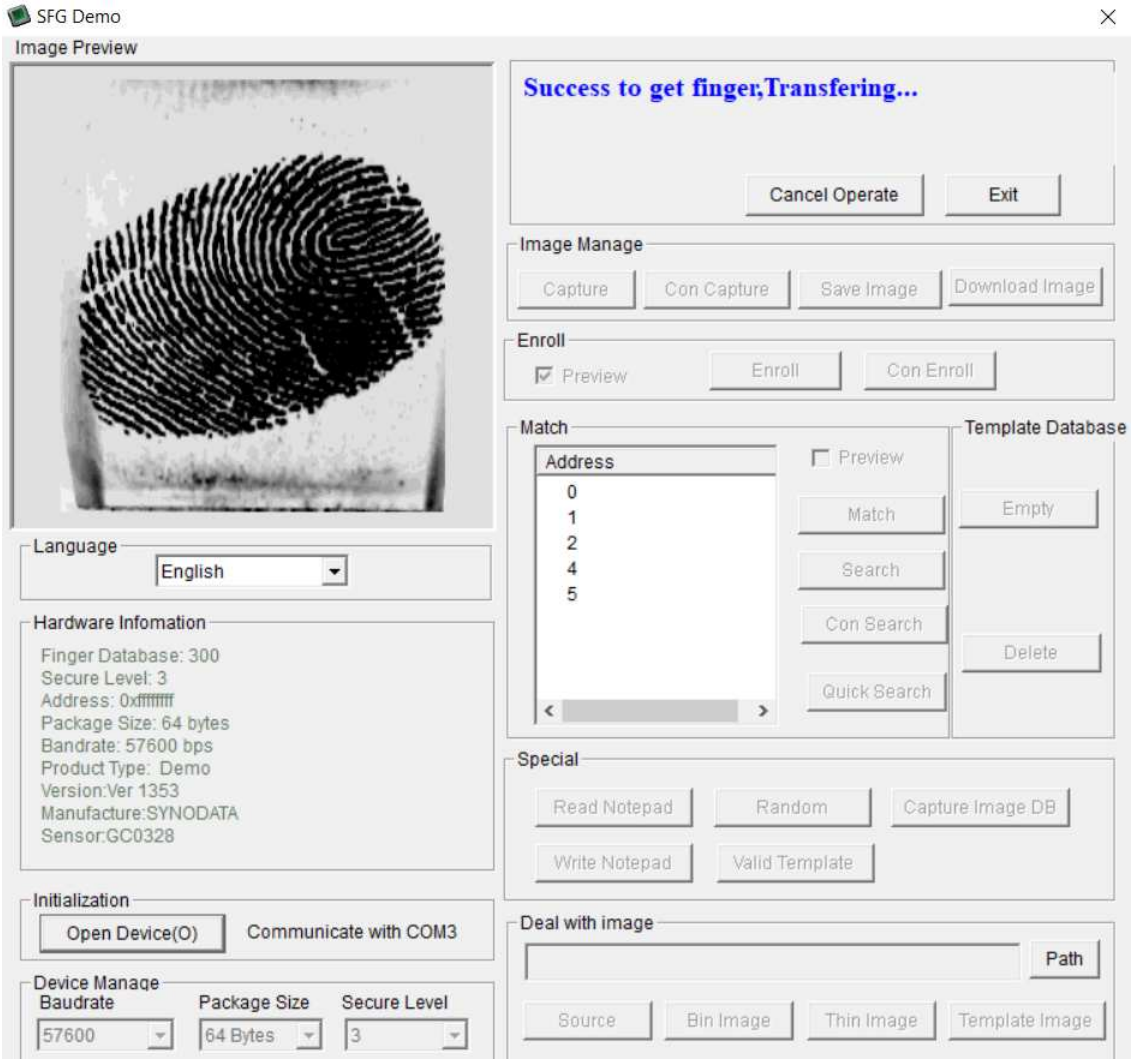
Let's enroll a new finger! Click the Preview checkbox and press the Enroll button next to it (Con Enroll means 'Continuous' enroll, which you may want to do if you have many fingers to enroll). When the box comes up, enter in the ID # you want to use. You can use up to 162 ID numbers.



The software will ask you to press the finger to the sensor.



You can then see a preview (if you clicked the preview checkbox) of the fingerprint.



On success you will get a notice.

If there's a problem such as a bad print or image, you'll have to do it again.

Fingerprint close-up image. Source: Wikipedia

The skin on the palms of our hands has a special pattern called friction ridges that help us grab things effectively without slipping. These patterns consist of ridges and valleys arranged in certain configurations and are unique for each individual. Our fingertips also have them as you can see from the above image. When a finger comes in contact with a surface, the ridges make strong contact with it. When we strongly grab something, the moisture, oil, dirt, and dead skin cells on our finger can attach to the surface of the thing we are grabbing, leaving an impression we call a fingerprint. Various forensic methods involving the use of chemicals are used to extract such fingerprints from crime scenes and are called latent fingerprints. But an optical fingerprint scanner works a bit differently.

An optical fingerprint scanner works based on the principle of Total Internal Reflection (TIR). In such a scanner, a glass prism is used to facilitate TIR. Light from an LED (usually blue color) is allowed to enter through one face of the prism at a certain angle for the TIR to occur. The reflected light exits the prism through the other face where a lens and an image sensor (essentially a camera) are placed.

When there is no finger on the prism, the light will be completely reflected off from the surface, producing a plain image in the image sensor. When TIR occurs, a small amount of light is leaked to the external medium and it is called the Evanescent Wave. Materials with different refractive indexes (RI) interact with the evanescent wave differently. When we touch a glass surface, only the ridges make good contact with it. The valleys remain separated from the surface by air packets. Our skin and air have different RIs and thus affect the evanescent field differently. This effect is called Frustrated Total Internal Reflection (FTIR). This effect alters the intensities of the internally reflected light and is detected by the image sensor (see this image). The image sensor data is processed to produce a high-contrast image which will be the digital version of the fingerprint.

In capacitive sensors, which are more accurate and less bulky, there is no light involved. Instead, an array of capacitive sensors are arranged on the surface of the sensor and allowed to come in contact with the finger. The ridges and air packets affect the capacitive sensors differently. The data from the sensor array can be used to generate a digital image of the fingerprint.

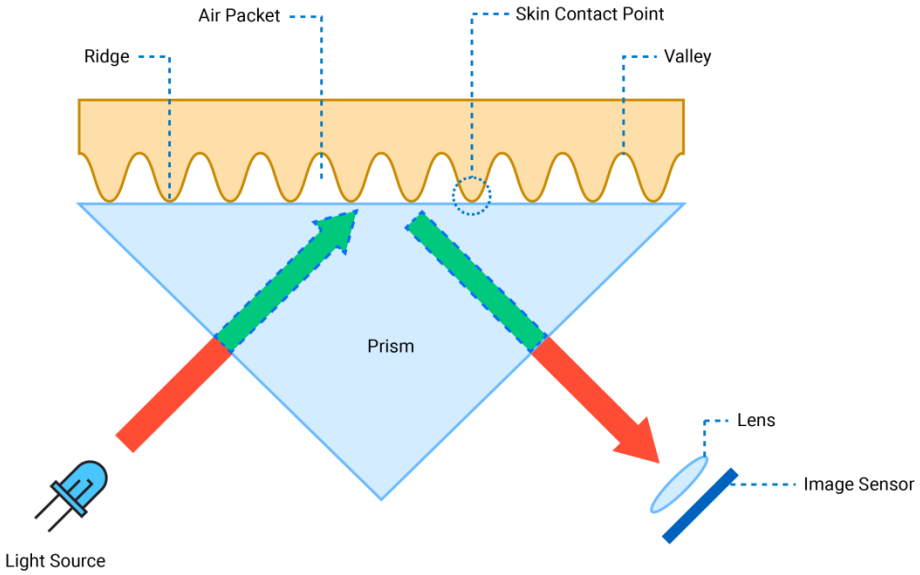


Fig. Optical Fingerprint Scanner Working Principle

Optical fingerprint scanner working principle

Construction & Disassembly

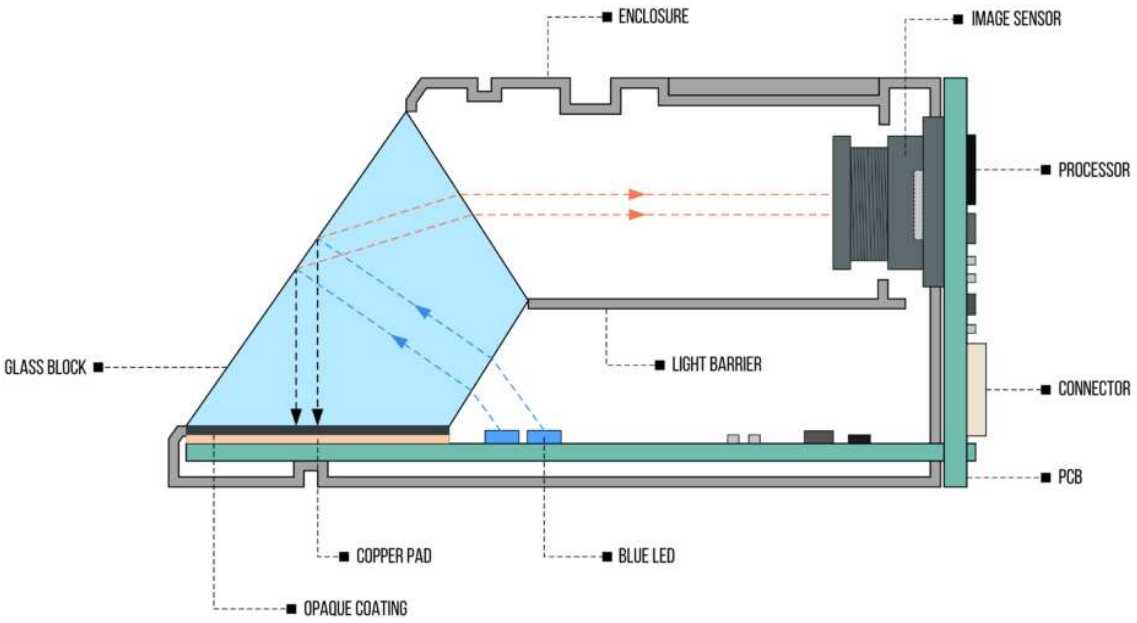


FIG. R307 FINGERPRINT SCANNER CROSS-SECTION

R307 Fingerprint Scanner cross-section (illustrative only)

Above is a cross-sectional diagram I made to better understand the construction (illustrative only, not a physically exact one). Opening the module was easy; there are four Philips screws on the back. Unscrew them and you can remove the PCB. There are two PCBs; one arranged horizontally and one vertically (shown in washed green). These PCBs are connected by solder. The four blue LEDs and the touch sense pad are on the horizontal PCB. The vertical PCB has the image sensor, the processor, and the connector. When inserted, the touch sense pad comes in contact with the glass block above. The image sensor is soldered and glued. Strangely, I couldn't find any lens on it. Maybe it doesn't need one. The enclosure has an internal barrier to separate the light from the LEDs and the light coming out of the prism. On the bottom side of the prism, a black epoxy is coated which gives a high-contrast background for the fingerprint image. To access the prism, remove the cap on the front.

Web Resources:

- https://electropeak.com/learn/interfacing-fpm10a-as608-optical-fingerprint-reader-sensor-module-with-arduino/
- https://learn.adafruit.com/adafruit-optical-fingerprint-sensor?view=all
- https://how2electronics.com/fingerprint-biometric-attendance-system-arduino/
- https://www.circuitstate.com/libraries/r307-optical-fingerprint-scanner-library-for-arduino-documentation/