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BIOMETRIC FINGERPRINT SENSOR



Introduction:

These modules are typically used in safes. There's a high powered DSP chip that does the image rendering, calculation, feature-finding, and searching. Connect to any microcontroller or system with TTL serial, and send packets of data to take photos, detect prints, hash, and search.

Specification:

Fingerprint Storage Capacity	300
Supply / Operating Voltage	3.3V – 6.5V (Typical = 3.3V Stable)
Operating Current	30mA – 60mA
Working Environment Temperature	-20°C – 60°C
Image Processing Time	<0.4s
USB Communication	2.0 Full Speed
UART Speed / Baud Rate	(9600 × N) N=-12, default N=6, bps 57600
	(Data bits: 8 Stop Bits: 1 Check bit: none
	TTL level)

Preparation:

- 1. Arduino (UNO / Nano / Mega)
- 2. Fingerprint Module
- 3. Jumper Wire
- 4. Breadboard

Objective:

To register fingerprint, test the fingerprint accuracy & delete the fingerprint database.



A. Installing Library

1. Navigate to **Tools> Manage Libraries...**. Search for **'Adafruit Fingerprint Sensor Library'** and Install the latest version of Library.



2. Once Library installed it will show up program examples as below. (File > Example)

0	sketch_aug17a	Arduino 1.8.1	3		
File	Edit Sketch	Tools Help			
	New Open Open Recent Sketchbook	Ctrl+N Ctrl+O	>		
	Examples		>	▲	
	Close	Ctrl+W		SpacebrewYun	>
	Save	Ctrl+S		Stepper	>
	Save As	Ctrl+Shift+S		Temboo	>
	Page Setup Print	Ctrl+Shift+P Ctrl+P		RETIRED Examples for Arduino Uno	>
	Preferences	Ctrl+Comma		SoftwareSerial	>
	Quit	Ctrl+Q		SPI	>
				Wire Examples from Custom Libraries Adafruit BusIO Adafruit Circuit Playground Adafruit ESP8266 Adafruit Fingerprint Sensor Library	> > >
				Adofesit GEV Library	



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B. Hardware Setup / Connection

Fingerprint Module	Arduino UNO	Arduino MEGA
VCC (<mark>Red</mark>)	3.3v	3.3v
GND (Green)	GND	GND
TX (Black)	D2	19 (Rx1)
RX (Yellow)	D3	18 (Tx1)





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C. Registering Fingerprint.

1. Navigate to File > Example > Adafruit Fingerprint Sensor Library > Enroll.

0	enroll Arduin	o 1.8.13	_		>	<	
File	Edit Sketch	Tools Help	▲				
	New Open	Ctrl+N Ctrl+O	Temboo RETIRED	>	Q	2	
	Open Recent	;	Examples for Arduino Uno		•		
	Sketchbook	3	EEPROM	>		^	
	Examples	3	SoftwareSerial	>			
	Close	Ctrl+W	SPI	>			
	Save	Ctrl+S	Wire	>		T	
	Save As	Ctrl+Shift+S	Examples from Custom Libraries	_	or er	11	
	Page Setup	Ctrl+Shift+P	Adafruit BuslO	>	rt		
	Print	Ctrl+P	Adafruit Circuit Playground	>			
	Preferences	Ctrl+Comma	Adafruit ESP8266	>			
	Therefore	carrie continu	Adafruit Fingerprint Sensor Library	r 3	b	lank	
	Quit	Ctrl+Q	Adafruit GFX Library	>	c	hang	gepassword
5	2 Ser	ial.println	Adafruit GPS Library	>	d	elete	2
5	3 whi	le (1) { de	Adafruit ILI9341	>	e	mpty	yDatabase
5	4 }		Adafruit LED Backpack Library	>	e	nroll	l
5	5 6 Seria	l.println(F	Adafruit SleepyDog Library	>	fi	nger	print
	<		Adafruit STMPE610	>	le	dco	ntrol
			Adafruit TFTLCD Library	;	L	eo_p	assthru
			Adafruit TouchScreen	2	sł	now_	_fingerprint_templates

2. New windows of code will pop-out. Make sure correct Board type & port selected. Then **Upload** the code to Arduino. If using **Arduino MEGA** make sure to **change Pin**.

💿 enroll Arduino 1.8.13 — 🗆 🗙	💿 enroll Arduino 1.8.18 — 🗆 🗙
File Edit Sketch Tools Help	File Edit Sketch Tools Help
enroll	
1 🗄 /***********************************	enroll §
16	1 + /***********************************
17 <pre>#include <adafruit_fingerprint.h></adafruit_fingerprint.h></pre>	16
18	17 #include <adafruit_fingerprint.h></adafruit_fingerprint.h>
19	10
20 #if (defined(_AVR_) defined(ESP8266)) && !define	
21 // For UNO and others without hardware serial, we mus	20 FII (defined (_AVK) defined (ESP8266)) && !defined
22 // pin #2 is IN from sensor (GREEN wire)	21 // for UNU and others without hardware serial, we must
23 // pin #3 is out from arduino (WHITE wire)	<pre>22 // pin #2 is iN irom sensor (GREEN Wire) 22 // pin #2 is OUT from and inter (UUTTE view)</pre>
24 // set up the serial port to use softwareserial.	23 // pin #3 is our from arduino (WHITE wire)
26 Soldwareserial mysellal(2, 3);	24 // set up the serial pro to the softwareserial
27 #else	25 SOLCWARESERIAI MYSERIAI(19, 18);
28 // On Leonardo/M0/etc, others with hardware serial.	20 27 felse
29 // #0 is green wire, #1 is white	28 // On Leonardo/M0/etc others with hardware serial w
30 #define mySerial Serial1	29 // f0 is green wire f1 is white
31	30 #define mvSerial Serial1
32 #endif v	31
>	32 fendif
	< >
awaluda dapa Thank yay	
Aviauue done. Thank you.	
	avrdude done. Thank you.
< · · · · · · · · · · · · · · · · · · ·	
1 Arduino Uno on COM6	v
	25 Arduino Mega or Mega 2560, Al mega2560 (Mega 2560) on COM7



3. Once code uploaded, open Serial Monitor to interact with module.



4. At first serial will display the connected sensor Parameter. These will include the Capacity of fingerprint supported, Security Level, Baud Rate & etc. (as picture below).

	💿 COM6 — 🗆 X
	Send
1	Adafruit Fingerprint sensor enrollment Found fingerprint sensor!
	Reading sensor parameters Status: 0x0
	Sys ID: 0x0 Capacity: 300
	Security level: 3 Device address: FFFFFFF
	Packet len: 128 Baud rate: 57600
	Please type in the ID # (from 1 to 127) you want to save this finger as
	Autoscroll Show timestamp No line ending > 9600 baud >

5. To register fingerprint user will need to input an ID which is a Number. Input random number from 1 to 127 into serial monitor, as an example number '1' was entered in these guide. (Example: Input number 1 + Enter key / Send)

COM6	_	
1		Send
Adafruit Fingerprint sensor enrollment		
Found fingerprint sensor!		
Reading sensor parameters		
Status: 0x0		
Sys ID: 0x0		
Capacity: 300		
Security level: 3		
Device address: FFFFFFF		
Packet len: 128		
Baud rate: 57600		
Ready to enroll a fingerprint!		
Please type in the ID # (from 1 to 127) you want to save t	his f	inger as
Autoscroll Show timestamp No line ending V 9600 bau	4 v	Clear output



6. Once number 1 was entered, the module will start scanning for Fingerprint. Place your Finger on the Module. Follow the further instruction from the serial monitor. (Normally this code will ask user to place an index finger twice per ID)

COM6	-		×
			Send
Device address: FFFFFFF Packet len: 128 Baud rate: 57600 Ready to enroll a fingerprint! Please type in the ID # (from 1 to 127) you want to save thi Enrolling ID #1 Waiting for valid finger to enroll as #1	s fin.	ger a	15
•			>
Autoscroll Show timestamp No line ending V 9600 baud	~	Clear	output
© COM6	_		×
			Send
Image taken Image converted Remove finger ID 1 Place same finger again Image taken Image converted Creating model for #1 Prints matched! ID 1 Stored! Ready to enroll a fingerprint! Please type in the ID # (from 1 to 127) you want to save thi	s fin	ger a	.5 v
			/

- 7. Once the Fingerprint successfully stored, the serial motor reply Stored!
- 8. The program will restart to Enrolment process as before, user can register other ID.



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D. Scanning The Fingerprint

1. Navigate to File > Example > Adafruit Fingerprint Sensor Library > Fingerprint. Then Upload the code. If using Arduino MEGA make sure to change Pin.

0	fingerprint Aı	rduino 1.8.13	-		×	
File	Edit Sketch	Tools Help				
	New Open Open Recent	Ctrl+N Ctrl+O	▲ Temboo RETIRED	>	₽. ▼	
	Sketchbook Examples	:	Examples for Arduino Uno		***** ^ gerpr:	
	Close Save Save As	Ctrl+W Ctrl+S Ctrl+Shift+S	EEPROM SoftwareSerial SPI Wire	> > >	it BMI	
	Page Setup Print Preferences	Ctrl+Shift+P Ctrl+P Ctrl+Comma	Examples from Custom Libraries Adafruit BuslO Adafruit Circuit Playground	5 > >	this are by	
	Quit	Ctrl+Q	Adatruit ESP8266	, 10 1	blank	
14 19 10 17 18	BSD 1 ******	icense, all *********** e <adafruit< td=""><td>Adafruit GFX Library Adafruit GFX Library Adafruit ILI9341 Adafruit LED Backpack Library</td><td>, y</td><td>chang delete empty enroll</td><td>jepassword v/Database</td></adafruit<>	Adafruit GFX Library Adafruit GFX Library Adafruit ILI9341 Adafruit LED Backpack Library	, y	chang delete empty enroll	jepassword v/Database
			Adafruit SleepyDog Library Adafruit STMPE610 Adafruit TFTLCD Library		ledcor Leo_p	print ntrol assthru
			Adatruit TouchScreen	1	show_	_ringerprint_templates

2. Once code uploaded open **Serial Monitor** to start fingerprint scanning.

💿 СОМ6				_		×
						Send
Adafruit finger detect test						^
Found fingerprint sensor!						
Reading sensor parameters						
Status: 0x0						
Sys ID: 0x0						
Capacity: 300						
Security level: 3						
Device address: FFFFFFFF						
Packet len: 128						
Baud rate: 57600						
Waiting for valid finger						
Sensor contains 1 templates						
No finger detected						
No finger detected						
No finger detected						
No finger detected						×
Autoscroll Show timestamp	No line ending	\sim	9600 baud	~	Clear	r output



3. Place the registered finger on sensor, **Serial Monitor** will display the result. If the result is match It will show the ID number.

👳 сомб	-	. 🗆	×
			Send
Image taken			^
Could not find fingerprint features			
Communication error			
No finger detected			
Image taken			
Image converted			
Found a print match!			
Found ID #1 with confidence of 89			
Image taken			
Image converted			
Unknown error			
			*
Autoscroll Show timestamp No line ending V	9600 baud	Clea	ar output

4. If place other unregistered Finger the result will be shown as below.

💿 СОМб			_		Х
					Send
No finger detected					^
No finger detected					
No finger detected					
No finger detected					
No finger detected					
Image taken					
Image converted					
Did not find a match					
Image taken					
Image converted					
Did not find a match					
Image taken					
Image converted					
Unknown error					
Image taken					
					~
Autoscroll Show timestamp	No line ending	✓ 9600 baud	~	Clear o	output



E. Deleting The Registered Fingerprint

- 1. Navigate to File > Example > Adafruit Fingerprint Sensor Library > EmptyDatabase. Then Upload the code. If using Arduino MEGA make sure to change Pin.
- 2. Once code uploaded open **Serial Monitor** to start Fingerprint deletion.

COM6			_		×
					Send
Deleting all fingerprint templates!					
Press 'Y' key to continue					
Autoscroll Show timestamp	No line ending \sim	9600 baud	\sim	Clear	output

3. Input key 'Y' to delete all database.

COM6	>	<
Y	Send	
Deleting all fingerprint templates!		
Press 'Y' key to continue		
Found fingerprint sensor!		
Now database is empty :)		
Autoscroll Show timestamp	No line ending 🗸 9600 baud 🗸 Clear output	Jt