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# Capacitive Fingerprint Sensor with Arduino or ESP8266

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**ABSTRACT** -First, a refresher on how fingerprint scanners work. The basic idea is a simple Place your finger on a smartphone or Laptop Scanner or smart lock and the sensor extracts an image of your fingerprint. Each type of scanner recognizes fingerprints in its own way.

Capacitive scanners are the most common they create an image by means of a small electric charge generated by miniature built-in capacitors that can store electricity. When the finger touches the scanner, it discharges these capacitors.

Fingerprint sensors are security systems, they are used in police stations, security industries, smartphones and other security purposes. Today we are going to add a protective layer to our projects. Don't worry we are not going to appoint any bodyguards for the same. It will be a cute little good looking fingerprint sensor from DF Robot.

So as I mentioned above, today we are going to interface a Capacitive Fingerprint Sensor from DF Robot with Arduino UNO and after that, we will test three functions of this sensor which are adding a fingerprint, Checking the added fingerprint, and after that deleting the added fingerprint.

So let's get to the fun part now

## I. INTRODUCTION

In this project we are going to add a protective layer to our projects. Don't worry we are not going to appoint any bodyguards for the same. It will be a cute little good looking fingerprint sensor from DF Robot. So as I mentioned above, today we are going to interface a capacitive fingerprint sensor from DF robot with Arduino UNO and after that we will test three functions of this sensor which are adding a fingerprint and after that deleting the added fingerprint. Fingerprint scanners aren't just reserved for the [very top-tier smartphones](#) anymore. Even many budget phones sport the tech these days and it's a cornerstone of app security. The technology has also moved on a lot from its early iterations, becoming faster and more accurate at capturing your fingerprint. With all that in mind, let's take a look at how the latest fingerprint scanners work and what the differences are.

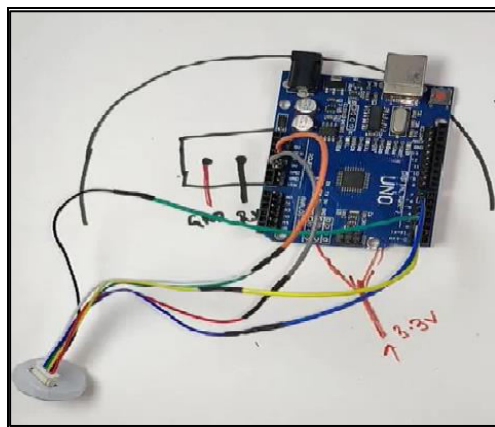
## II. OBJECTIVE

- Provide easy and comfortable relation between customers and machine.
- To provide safe and convenient identification and authentication with a human touch.
- It is unique and highly secure.
- They are easier, cheaper and faster to setup.
- It is using for data security purpose.

## 2.1 Components

- Arduino uno
- ESP8266
- Capacitive Fingerprint Sensor
- Power supply

## III. PROPOSED SYSTEM



**Fig-1 Main model**

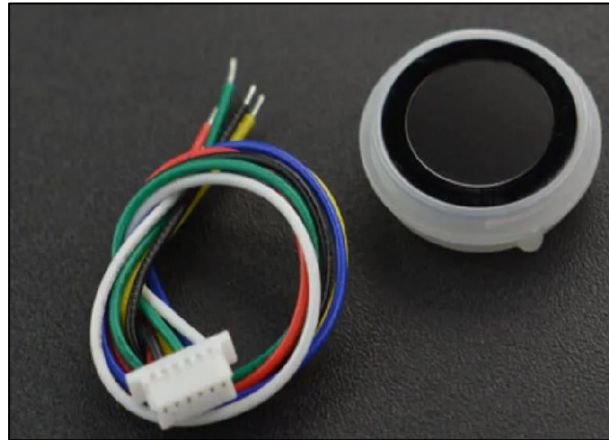
i.e Capacitive Finger Print Sensor with Arduino

we are going to add a protective layer to our projects. Don't worry we are not going to appoint any bodyguards for the same. It will be a cute little good looking fingerprint sensor from DFRobot.

So as I mentioned above, today we are going to interface a Capacitive Fingerprint Sensor from DFRobot with Arduino UNO and after that, we will test three functions of this sensor which are adding a fingerprint, Checking the added fingerprint, and after that deleting the added fingerprint.

## IV. METHODOLOGY

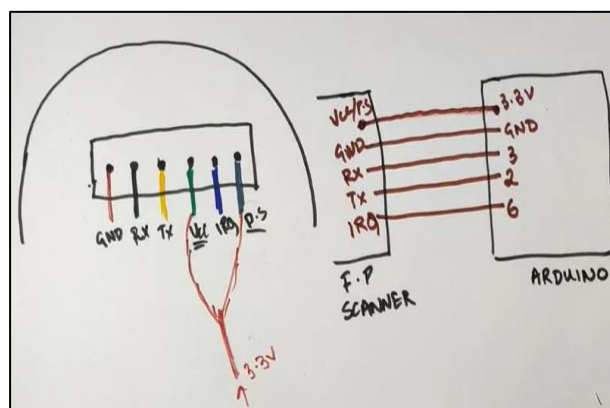
The Capacitive Fingerprint Sensor is a nice and compact one that is similar to the one at the back of your smartphone. It comes with round breathing LEDs and has a simple structure, small size, and delicate appearance. The sensor offers fast recognition speed and high security. It supports 360-degree arbitrary angle recognition and deep self-learning function, high performance, and low power consumption. Loaded with ID809 high-performance processor and semiconductor fingerprint sensor as the core, the sensor adopts a built-in IDfinger6.0 algorithm, which can complete all fingerprint identification work independently. This sensor supports UART communication and while working with the Arduino library, it can easily realize functions like fingerprint registration, fingerprint deletion, etc. It is a 6 pin device that can be easily connected to microcontrollers by virtue of the pitch connector that comes with it. But one thing to keep in mind is that the color- the coding of the wires that comes with this device is different from normal coding. So we need to take care of it while doing the connections.



**Fig-2 Capacitive Finger print Sensor**

For performing the operations such as Fingerprint recording, Recognizing, and Deleting we first need to connect the Sensor to Arduino UNO by following the steps given below:-

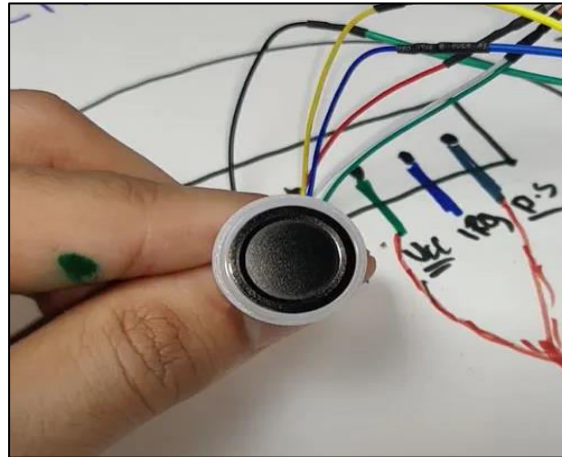
- Connect the Vcc and Power Supply Pin(Green and White Wire respectively) of the Fingerprint Scanner to the 3.3V pin of the Arduino UNO.
- Connect the Ground Pin(Red Wire) of the Scanner to the GND pin of the Arduino.
- Connect the Rx Pin(Black Wire) of the Scanner to the Digital Pin 3 of the Arduino.
- Connect the Tx Pin(Yellow Wire) of the Scanner to the Digital Pin 2 of the Arduino.
- And at last, Connect the IRQ Pin(Blue Wire) of the Scanner to the Digital Pin 6 of the Arduino.



**Fig- 3 Connections Diagram**

**Adding a new fingerprint:** For this operation, we need to place our finger on the Scanner you will see a blue light blink. Keep finger placed there until the yellow light blinks three times and then release the finger. This shows that the scanner has entered the fingerprint adding mode and as our fingerprint is not already added to the scanner that's why it would show unregistered on the Serial Monitor and assign an ID to the same. After that, we need to put our finger on the scanner again and wait till the yellow light blinks and then we can release the scanner. We need to repeat this process of placing the finger on the scanner and releasing two more times and in total three times to add our fingerprint. As we complete the scanning for the third time we will see a green light in place of the yellow light. This shows that the fingerprint is added successfully and the same can be seen on the serial monitor as well.

**Testing a Fingerprint:** Now we can test the added fingerprint by placing the thumb on the scanner again. This time we have to remove our finger after the blinking of the blue light and we will see that the green light turns on and a message on the Serial monitor will appear saying successfully matched with the ID of the fingerprint.



**Fig- 4 Capacitive Fingerprint Sensor**

**Deleting the Fingerprint:** For deleting the fingerprint we need to place our finger on the scanner and keep it placed there until the red light blinks. First of all, a blue light will blink which is the option for testing the fingerprint. After that, a yellow light will blink which is the option for adding a new fingerprint and in the end, the red light will blink which shows that the fingerprint is deleted and a message on the Serial monitor will show that the Fingerprint with ID No. is deleted. After deletion, If we place our finger on the scanner for testing, The red light will blink and the serial monitor would show a message saying that the Fingerprint not matched. In this way, we will be able to interface the fingerprint scanner to the Arduino IDE and can add it to our projects wherever possible.

## V. CONCLUSIONS

This hardware and software of project is successfully functioned as the objectives of the project. This project helps to solve the problem faced by the restaurant entrepreneur in the attempt to organize the restaurant more efficiently skilled. It can also be used to reduce the lateness and the error caused on ordering foods by the customer's by waiters. By using this system, the complaints about the services are eliminated. This project can further be improved using tabs and help in development of more efficient food ordering system.

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