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Fingerprint Sensor for Security and starting of Bike

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ABSTRACT: Vehicle security is an important issue these days due to the rising number of vehicle thefts. Another issue with vehicles is handling its keys. Here, we propose a solution to this problem by Using a fingerprint authenticated vehicle starter system. This ignition system is designed using Arduino UNO. The biometric system provides a secure and hassle freeway to start the vehicle Engine and the system only allow authorized users to start the vehicle. Users must enroll into the System by uploading their fingerprints. It allows multiple users to register as authorized personnel. During the monitoring mode, the system scans for the user's biometrics and the engine gets started through authentication.

KEYWORDS: Biometrics**,** Fingerprint, Database, LED, Relay, GSM, Display, Arduino UNO, Buzzer.

I. INTRODUCTION

Biometric technologies in diverse domains have acted as robust protection measures for overtime. The oldest and most commonly used Method of biometric authentication is fingerprints. In exploring its benefits, a crucial move is to implement it for use as a form of protection in existing systems, such as automobiles. Over the years, the automobile safety system has become a source of significant concern due to the rising cases of vehicle theft recorded all over the world.

Many of the integrated protection solutions for automobiles suit the four wheelers better. As far as the Two-Wheeler mechanism is concerned, the devices present on the market do not stand against well- equipped criminals. These devices can only be immobilized when under threat, and sound a loud warning. The Proposed Two-Wheeler Protection system is a stable and durable concept with features that improve the safety of the vehicle and ensure the safety of the operator.The technology for fingerprint identification gives entry only to those whose fingerprints are pre-stored in memory. And in the case of full power outage or battery drain, preserved fingerprints are kept. This removes the need to keep track of keys, or to recall a password or PIN for a mix. It can be unlocked only if there is an authorized person. Therefore, the fingerprint-based lock offers a wonderful alternative to inconveniences conventionally experienced.

Paper is organized as follows. Section II describes various ways related to vehicle security. The flow diagram represents the step of the algorithm. After fingerprint is accepted, how it will ignite the vehicle(bike) that is given in Section III. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

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II. RELATED WORK

Nowadays there are demand of vehicles in the market with more modification and exciting features. As there is more demand of vehicles there is also a need of security in it to make sure your vehicle is safe in your hands. In order to implement Security in vehicles, some of the technologies have been implemented in different manner/ methods are mentioned here in the paper.Car alarms serve as a theft-deterrent system and are designed to alert individuals if any unauthorized person tries to tamper with a vehicle [1].The steering wheel lock is one of the simplest theft deterrent systems and also a fairly accessible car security measure, at least if one is after a more basic model [2].Motorcycle security chains are a very popular option for deterring theft. It's widely accepted that a chain is most effective when looped through the motorcycle's frame [3].The design of the motorcycle security system based on Global System for Mobile (GSM). The system was equipped with a tracking system and used a mobile phone as the input [4].A security system against motorcycles theft by using RFID (radio frequency identification) technology. It is based on RFID technology on ultra-high frequency range (905-925 MHz) which can be applied to use in access control by using RFID tag attached to motorcycles [5]. An efficient automotive security system is implemented for anti-theft using an embedded system integrated with Global Positioning System (GPS) and Global System for Mobile Communication (GSM) [6].When you have a fingerprint biometric identification system on your vehicle, you will have to have the right fingerprint to start the vehicle. The thief would have to do a great deal of homework to steal your bike, and it is unlikely that they have the fingerprint technology needed to fake your fingerprint [7].

II. METHODOLOGY

The study was preceded by designing a simple and streamlined device model, and the layout of the components. The preparation stage of the tool and materials consist of the provision of tools, measuring instruments, soldering apparatus, electronic components and software. Furthermore, the stage of making the device is divided into two parts, namely the design of hardware and software. Last is the testing phase of the device to find out if the whole system is well integrated.

In this project we are going to use components:-

1. Fingerprint Sensor
2. Relay
3. Arduino IDE.
4. Arduino UNO
5. Wires
6. Soldering kit
7. Buzzer
8. Red LED
9. GSM Module
10. Touch screen display

Project will Work in following manner:

- Register fingerprint in Arduino.
- Use fingerprint to Start Bike.
- If the fingerprint is matched with the registered fingerprint, then the bike will start.
- If the fingerprint does not match with the registered fingerprint, then the red LED will glow.
- If the attempt fails the red LED will glow and Buzzer will start making sounds.
- Buzzer sound will alert Owner of the bike.

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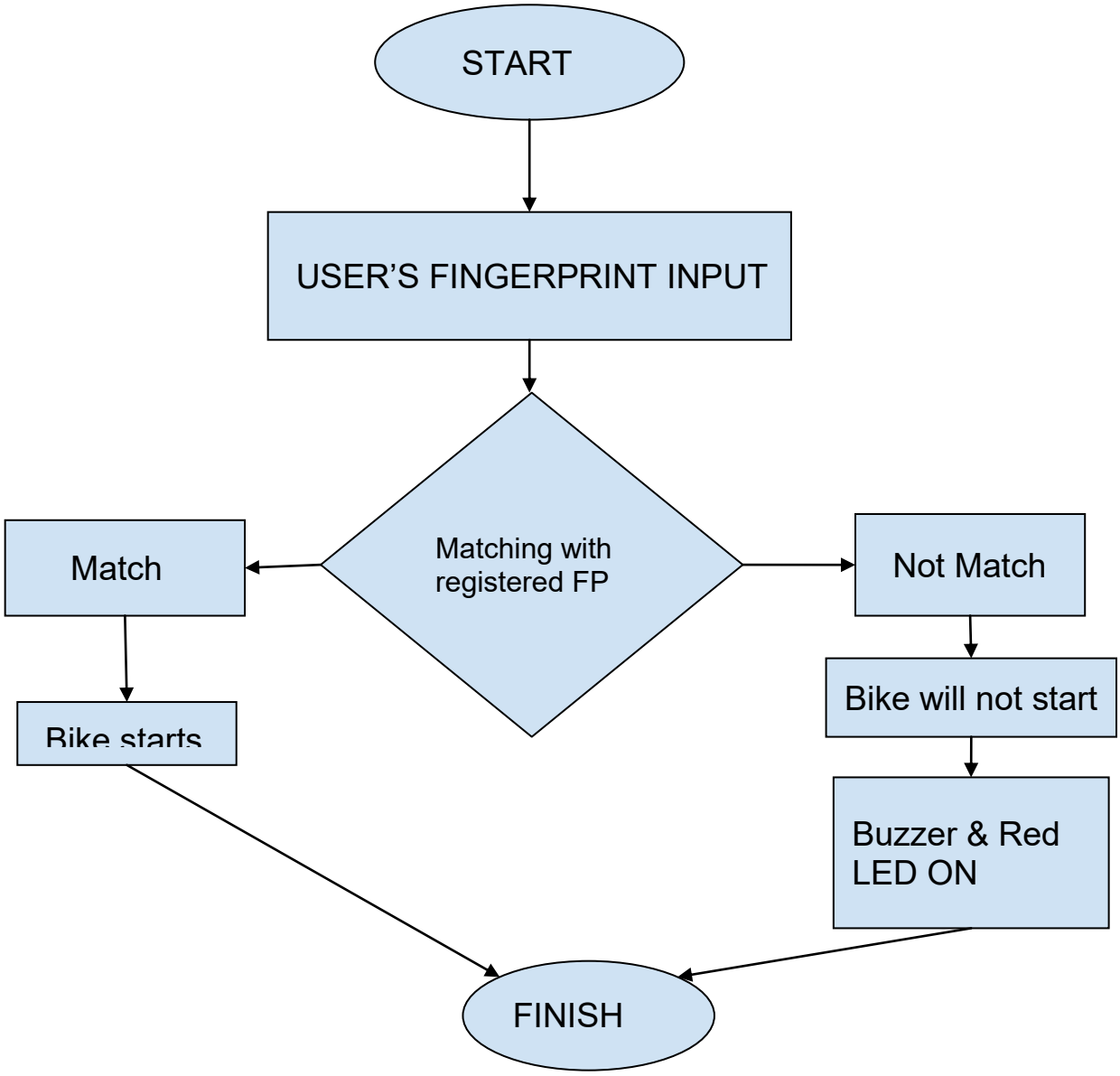

Fingerprint sensor R307: -

The R307 is one kind of fingerprint sensor module used in biometrics for security in fingerprint detection as well as verification. These devices are mainly used in safes where there is a high-powered DSP chip used in the rendering of image, feature-finding, searching and calculation by connecting it to any microcontroller (we are using Arduino) with the help of TTL serial, & send data packets to get photos, notice prints, search and hash. The enrollment of new fingers can be stored directly within the flash memory of on board.

Working principle: -

The working principle of the fingerprint sensor mainly depends on the processing. The fingerprint processing mainly includes two elements namely enrollment and matching. In fingerprint enrolling, every user requires to place the finger twice. So that the system will check the finger images to process as well as to generate a pattern of the finger and it will be stored. When matching, a user places the finger using an optical sensor then the system will produce a pattern of the finger & compares it with the finger library templates.For 1:1 fingerprint matching, the system will evaluate the exit finger with a precise pattern which is selected within the module. Similarly, for 1: N matching, the scanning system will look for the complete finger records for the finger matching. In both situations, the scanning system will go back to the corresponding result, success otherwise crash.

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Relay

A relay is an electrically operated switch. Many relays use an electromagnet tomechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

Arduino IDE

For the automation using BT module and Arduino, we use the Arduino IDE (IntegratedDevelopment Environment) for programming of Arduino.

Arduino is an open-source platform used for building electronics projects. Arduino consistsof a both physical programmable circuit board and piece of software, or IDE that runs onyour computer, used to write and upload computer code to the physical board.

Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9V Battery, though it accepts voltages between 7 and 20 volts.

GSM

GSM (Global System for Mobile Communications, originally Groupe Special Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI).It was created to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones and is now the default global standard for mobile communications – with over 90% market share, operating in over 219 countries and territories.

Procedure

System Operation

1. The first step of operation is fingerprint identification: -
   The fingerprint identification process has two steps that is

Enrolling Fingerprint.

1. Having the fingerprint sensor module wired to the Arduino, follow the next steps to enroll a new fingerprint. Make sure you've installed the Adafruit Fingerprint Sensor library previously.
2. In the Arduino IDE, go to File > Examples >Adafruit Fingerprint Sensor Library >Enroll.
3. Upload the code, and open the serial monitor at a baud rate of 9600.
4. You should enter an ID for the fingerprint. As this is your first fingerprint, type 1 at the top left corner, and then, click the Send button.
5. Place your finger on the scanner and follow the instructions on the serial monitor.

Matching Fingerprint.

Once we have stored the fingerprints the fingerprint sensor will keep on continuously
scanning for a fingerprint. Once it receives a valid fingerprint the Arduino will make relay output high, thus turning on the vehicle.

IV. EXPERIMENTAL RESULTS

An Experiment has performed for providing security to bike by using fingerprint sensor. In this the command is given through Arduino IDE. It is performed when Arduino UNO board is connected to it.

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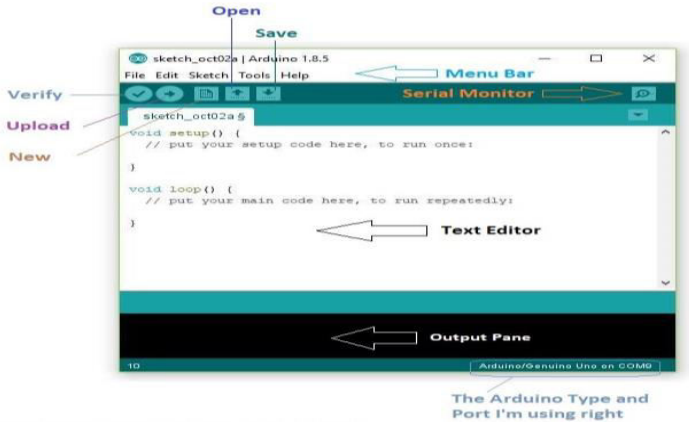
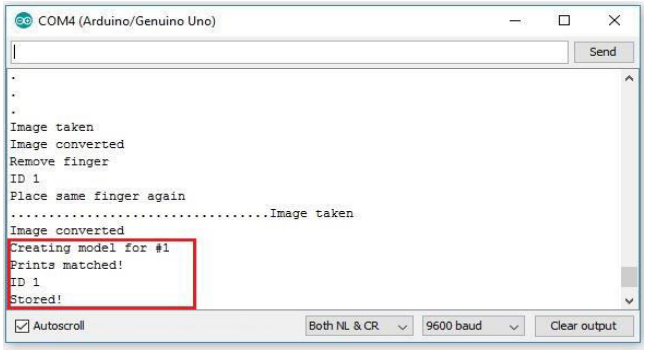
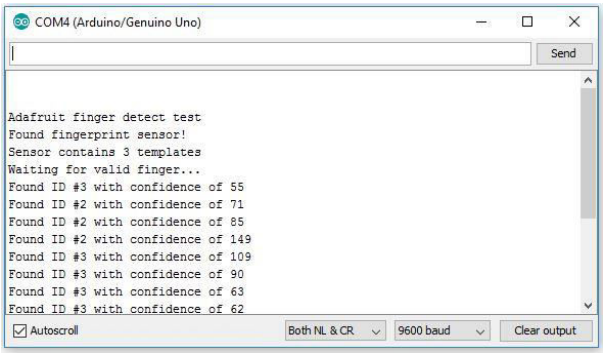


Fig.1 Arduino IDE

In this we have add a Library called Adafruit Fingerprint Sensor Library. So we can enrol and check Fingerprint data after compiling it we get output



(a)



(b)

Fig 2 fingerprint for starting of bike (a) shows enrolled fingerprint Id and (b) shows found fingerprint Id

After this fingerprint data is stored in sensor. Next, we are connecting single channel relay module to Arduino UNO Board and there is code for relay:

```
if (finger. fingerID>=1)
    {
  digitalWrite (8, HIGH);
     delay (1000);
  digitalWrite (8, LOW);
 }
```

Putting it in fingerprint found match. So that relay will give access to turn on bike after fingerprint is accepted.
That are results we got now. For further improvement we are going to include GSM module if fingerprint is failed three times, then it will send the alert to owner that your bike is under theft. We are also looking for touch screen display if any unauthorized user needs permission for him code will be generated by owner permission. So that he/she can get access to bike.

V. CONCLUSION

We have implemented a fingerprint sensor for security and starting of bike. Our algorithm successfully detects the fingerprint and gives access to authorized user. We have applied our algorithm on many images and found that it successfully detects fingerprint. We are going to add gsm for sending alert message and touch generate password to give access to unauthorized user after we give permission to that user.

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