



## SMART SAFEGUARD SYSTEM FOR MOTORCYCLE USING ARDUINO

J. Mala<sup>1</sup> and Dr.G.Saravanan <sup>2</sup>

<sup>1</sup>Assistant Professors Department of Information Technology Sri Ramakrishna Institute of Technology, Coimbatore, Tamilnadu, India

<sup>2</sup>Assistant Professors Department of Computer Science and Engineering Erode Sengunthar Engineering College, Erode, Tamilnadu, India

### ARTICLE INFO

#### Article History:

Received 4<sup>th</sup> November, 2019

Received in revised form 25<sup>th</sup> December, 2019

Accepted 18<sup>th</sup> January, 2020

Published online 28<sup>th</sup> February, 2020

#### Key words:

Fingerprint, Arduino microcontroller, Fingerprint scanner, Node MCU

### ABSTRACT

The main objective of this project is to provide safety locking system for motor vehicle which includes all the two wheelers. There is a need for more security-based locks to be avail for the motorcycle which is to be unique and different from other locking systems. Biometrics are used to identify the person. Among all the biometrics, an important and very reliable human identification is Fingerprint Recognition. In our project we are focusing on the fingerprint based ignition to start the vehicle. The vehicle accessing person has to store their fingerprint in the database template. Only the authorized person can access the vehicle. If any unauthorized person tries to access the vehicle an alarm will produce and it alerts message to nearby authorized person stored in the database template.

Copyright©2020 J. Mala and Dr.G.Saravanan . This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

There is a large number of theft cases occurring in the automobiles because of this there is a need to enhance the security level for the vehicles. In normally available locks, the user should carry the keys along with them. Misplacing of keys or losing of keys will also cause a serious issue. Thus there is a need for more security option to be avail for motor vehicle which is to be unique and different from the already existing methods. The most significant feature is the vehicle security from theft and it has been ensured by providing three layers of anti-theft protection. First the entry to the vehicle is limited only to the authorized persons are stored into the database template beforehand and at the time of entry to the vehicle, scanned fingerprints are being cross checked with the database which is already present. The biometric scheme is used as the primary layer of protection.

Biometric systems have in a long time served as a strong security system in many different applications and it will be implemented in automobile industry. Biometric system is a technological system that uses information about a person to identify such a person. It relies on specific data about unique biological trait in order to work effectively.

Biometric system includes various types of identifying the user. Some of them are face recognition, voice recognition, signature recognition, fingerprint recognition, eye (iris)

recognition. Among these techniques the fingerprint recognition is the most widely used. This is because fingerprint of every person on the earth is unique and can provide good reliability compared to the other traditional methods. Fingerprint biometrics are easy to implement and also cheaper than other biometrics.

The fingerprint biometric system has two significant parts. One is fingerprint identification and the other one is fingerprint authorization. The process of identification is about knowing who the user is whereas the process of authentication checks whether the user is valid or not. Thus we are proposing a model which utilizes the concept of fingerprint recognition in the motor vehicles.

#### Literature Survey

D.Loganathan, S.Santosh Kumar *et al* [1] discussed about the proposed system consists of a smart card capable of storing the fingerprint of particular person. While issuing the license, the specific person's fingerprint is to be stored in the card. Vehicles such as cars, bikes etc should have a card reader capable of reading the particular license. The same automobile should have the facility of fingerprint reader device. A person, who wishes to drive the vehicle, should insert the license in the vehicle and then swipe his/her finger. If the finger print stored in the card and fingerprint swiped in the device matches, he/she can proceed for ignition, otherwise ignition will not work. Moreover, the seat belt detector verifies and then prompts the user to wear the seat belt before driving. This

\*Corresponding author: J. Mala

Assistant Professors Department of Information Technology Sri Ramakrishna Institute of Technology,

increases the security of vehicles and also ensures safe driving by preventing accidents.

Zhaoxia Zhu, Fulong Chen [5] describes about the traditional way of identifying system for automobiles includes key system, door-controlling system, Ultra High Frequency (UHF) sending/receiving system, alarm system and so on. Once the key is lost or stolen, those persons that have not the ownership can also open the door of the car with it. Using biometric recognition technologies can overcome this shortcoming. Fingerprint based recognition access control system of automobiles is used, in which fingerprint encryption technique is also utilized, it also has some advantages such as smartness, security, low power, low cost, etc.

M. Karthik, M.N. Chandran *et al* [2] discussed about the fingerprint based ignition in bikes which includes all the two wheelers. Normally available locks in the bikes do not provide enough security to the bike owners. Traditional locks available in the bikes are well known to thieves and they can be easily broken by them. Thus there is a need for more security options to be available for the motorcycle which is unique and must be different from the traditional key locks. In this paper we are focusing on the use of fingerprint recognition to start or ignite the motorcycle against the use of conventional methods of key locks. Related work includes enhancing the security of the bikes by adding different types of locks and alarming unit to alert owner of the bike in case of danger.

Mani Susarla *et al* [3] discussed to study the biometric vehicle ignition. Keys need to be carried and misplacing keys or losing them will cause a serious issue. Here they propose a solution to this problem by using a fingerprint authenticated vehicle starter system. The system provides a secure and hassle free way to start/stop vehicle engine. User just needs to scan their finger to start the car. In this case, there is no need to carry any key. The system only allows authorized users to start the vehicle. Users can first register their fingerprints into the system. The system allows multiple users to register as authorized users. When into monitoring mode, the system checks for users to scan. On scanning, the system checks if user is authorized user and starts vehicle for authorized users only. Here they are using atmega 32 microcontrollers. The fingerprint sensor is connected to the microcontroller and, they have an LCD display along with push buttons and starter motor. The motor is used to demonstrate as vehicle starter. This system automates as well as vehicle security using fingerprint-based system.

G. Srikanth *et al* [4] discussed about this project, the access to a car can be controlled using finger prints. For this an embedded fingerprint module is used in which the finger prints of the owner and their other authorized users will feed their fingerprints into the embedded module. This fingerprint module is further connected to a microcontroller that controls the connection to the ignition of the car. Hence the car can only be started using a proper fingerprint match. Else the vehicle will not be started and sends an SMS to owner. The project will also include GSM module connected to the controller. In case of some unauthorized person trying to access the car using an unauthorized fingerprint then the controller, using the GSM module can automatically send SMS to the actual owner of the vehicle. Furthermore, since the controller already has a GSM modem it can also be used for additional applications like alcohol detection, over speed

driving. In all these cases, automatic SMS updates can be sent to the owner of the vehicle if someone else is driving the vehicle. If required, the vehicle can also be stopped if any of these conditions are detected [4].

### Proposed Methodology

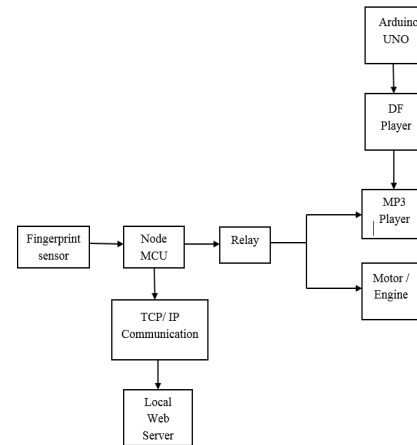


Fig 1 Block Diagram

The Methodology is explained in the Fig.1. Generally, Fingerprint provides high level of accuracy. Since the fingerprint of an individual is unique and immutable. The fingerprint scanner scans the fingerprint of the user and stores in the arduino. Relay is an electromagnetic coil or switch. It has two ends AC and DC. Whenever we apply 5V to the relay the coil will energize then the opposite that is the DC ends pins will get closed.

The MP3 Module has positive and negative pins [Vin and Vout]. Vin has been connected directly to the relay and Vout is connected to the ground in arduino. If we apply voltage the relay will get activated and then the MP3 player will be turned on. The DF player in the MP3 player consist of software serial. This software serial will read the audio file from the card and send this file to the arduino and make the audio to play.

The process flow is also explained in the Fig.2 If the user scans the fingerprint then the fingerprint scanner verifies the fingerprint with the database. If the database matches, the MP3 module tells the fingerprint is matched and the motor will start. If the unauthorized user tries to unlock the vehicle, the Mp3 module tells that the fingerprint does not match and alert the user through notification to their mobile phone.

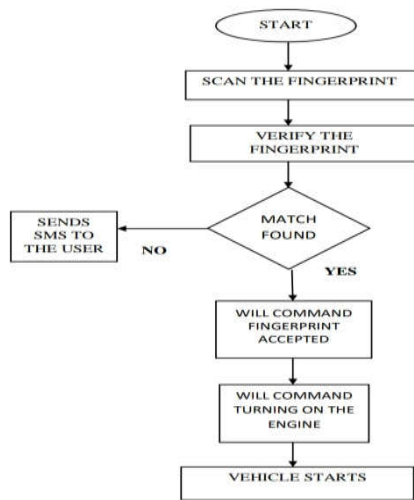


Fig 2 Flow Chart

**Electronic Component System**

In this project, there are six main parts of Hardware implementation they are Arduino UNO, Fingerprint Scanner, Relay, Node MCU, MP3 player, Motor.

**Arduino UNO**

Arduino Microcontroller UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The ATmega328 is a single-chip microcontroller. The current version of Arduino Uno comes with USB interface, 6 analog input pins, 14 I/O digital ports that are used to connect with external electronic circuits.



Fig 3 Arduino UNO

It can be directly connected to the computer through USB cable that is used transfer the code to the controller using IDE software, mainly developed to program arduino. Programming languages like C and C++ are used in IDE. The Arduino Uno has a number of facilities for communicating with a computer, another Arduino or other microcontroller.

**Fingerprint Scanner**

Fingerprint scanner is a biometric used for security systems. It is an electronic device used to capture a digital image of the fingerprint pattern. The basic function of these scanners is to get an image of a person’s fingerprint and find a match for this print in the database. To be able to use fingerprints to authenticate ourselves on the device, the entire process involves two steps: Enrollment and Verification.



Fig 4 Fingerprint Sensor

**Relay**

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals and a set

of operating contact terminals. The switch may have any number of contacts in multiple contact forms such as make contacts, break contacts, or combinations. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal.



Fig 5 Relay

**Node MCU**

NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems and hardware which was based on the ESP-12 module. The name “NodeMCU” combine “node” and “MCU” (micro-controller unit). The NodeMCU can be programmed using Lua script. Lua is an open source, lightweight, embeddable scripting language built on top of C programming language. It is asynchronous and event-driven.

**MP3 Player**

MP3 Module or otherwise called as DFPlayer with simplified output. It is a compact, low cost MP3 Player Module can be used as a standalone module with attached battery, speaker and push buttons. It provides 24-bit DAC output and also supports for 90db dynamic range. It can also be interface with Arduino UNO or any other RX/TX capabilities. Audio files can be played directly from a micro SD card, FAT16 and FAT32 file systems are supported.

**Motor**

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motors magnetic field and electric current in a wire winding to generate force in the form of rotation of a shaft. Electric motors may be classified by considerations such as power source type, internal construction, application and type of motion output.

**RESULT AND CONCLUSION**

The main motive of implementing this module using the fingerprint sensor for the two wheelers is to provide the security for vehicles. It enhances the level of security for vehicles. The main reason for using this, it is low in cost and the fingerprint biometric which is used it cannot be matched of any two people. The user will store the fingerprint in the database is shown in the Fig.6. The user touches the fingerprint sensor is shown in the Fig.7 and it authenticates the user, if the user is authorized is shown in the Fig.8, then it automatically starts the engine. If the user is not authorized, the alert will be sent to the authorized user through notification to their mobile phone. This technology reduces the theft cases.



Fig 6 Database Template

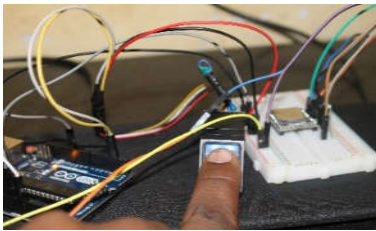


Fig 7 Fingerprint Scanning

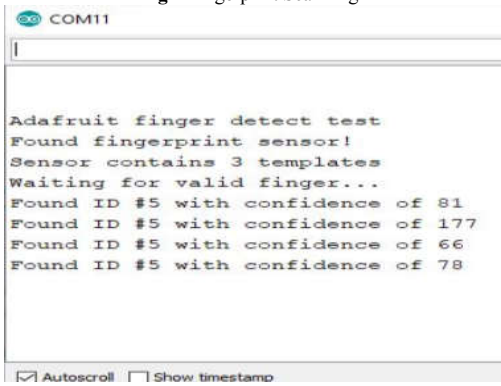


Fig 8 Fingerprint Acceptance

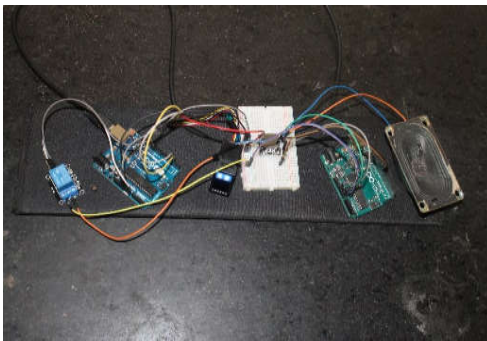


Fig 9 Working Model

## References

1. S.Ashwin, S.Loganathan, S.Santosh Kumar, P.Sivakumar, "Prototype of a Fingerprint based licensing system for Driving"2013 International Conference on Information Communication and Embedded Systems (ICICES).2013.
2. M.Karthick, M.N.Chandhan, R.Gobinath, D.Gokul, M.Gokul "Fingerprint Ignition System in Bike (Two wheeler)" EPH - *International Journal of Science and Engineering*, Volume-1, Issue Recent Advancements in Mechanical Engineering, Volume 1,pp.120-124, Apr 2018.
3. Mani Susarla, ChiranjeeviAkhil, Aravind Reddy, Samela Rizwana "Vehicle Ignition Using Biometric Data" *Journal of Network Communications and Emerging Technologies (JNCET)* Volume 8, Issue 5, pp.21-23, May 2018.
4. G. Srikanth, U. Ramakrishna and "Biometric Vehicle Access System Using Fingerprint Recognition" *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, Volume 5 Issue VII, pp. 2239-2243, July 2017.
5. Zhaoxia Zhu, Fulong Chen, "Fingerprint Recognition-Based Access Controlling System for Automobiles" 2011 4th International Congress on Image and Signal Processing, Volume 4,pp.1899-1902,2011.

### How to cite this article:

J. Mala and Dr.G.Saravanan (2020) 'Smart Safeguard System for Motorcycle Using Arduino', *International Journal of Current Advanced Research*, 09(02), pp. 21411-21414. DOI: <http://dx.doi.org/10.24327/ijcar.2020.21414.4206>

\*\*\*\*\*