Biometric Scanning Based on Vehicle Ignition System

Prof. Rahil Khan¹, Sajid Ahmed², Fazil Khan³, Payal Komte⁴, Bushraaaz Akhtar⁵
Department of Electronics & Telecommunication Engineering
Anjuman College of Engineering and Technology, Nagpur, Maharashtra, India

Abstract:
Among biometric methods, fingerprint identification is a very reliable method in human identification. This project implements the application of fingerprint identification in the car ignition systems. By Car Ignition System using fingerprint scanning as part of the car security system, it to protect the car from unauthorized access. In order to ignite the engine, the user is required to scan their fingerprint at the fingerprint sensor. The system will process the fingerprint image and compare it with the fingerprint stored in the database. If the fingerprint matches, a signal will be sent by the microcontroller to ignite the car engine. However, if the user has an unrecognizable fingerprint problem, this system will provide an alternative way to start the car, by entering a password. This system also allows the owner to enroll new users into the database or delete the existing user as well as changing the password. 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. A detailed comparison is shown in the paper related to this work. In this paper the work done before in this field is shown. Various other methods that can be used to enhance the security have been shown in a comparative way. Related work include 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.

Keywords: Fingerprint module, Microcontroller, Keypad, Relay, Ignition system

I. INTRODUCTION

Among biometric methods, fingerprint identification was most widely used in biometric technology [2]. Automation system based on fingerprint recognition turned out to be successful in forensics and hence expanded the application of fingerprint in wide areas such as locking systems, attendance systems and identification systems [3]. Fingerprint identification can also be applied to improve the security system by avoiding unauthorized access. Application of the fingerprint identification can be implemented in the car ignition system to provide a high security system to the car. Currently, the car theft crime is not a new issue to be discussed.

Figure 1. General View of TWVSS operation

The result which we expect from our project is that the motorcycle will be ignited only when the authorized person scans his/her finger on the fingerprint module. The fingerprints of the authorized person(s) are stored in the fingerprint module. When any person put his/her finger on the fingerprint module then the data of the placed finger is matched with the stored data in the module. If the fingerprint data is found in the module then match condition occurs and the microcontroller ignites the bike otherwise bike will not start.

II. LITERATURE SURVEY

Omidiora E. O. etal [1] in his paper basically focuses on the replacement of keys with the biometric specially fingerprint based lock systems in the vehicles because fingerprints are the oldest and most widely used form of biometric identification and also provide a robust security mechanism for various security domains. Their prototype consists of fingerprint software module used to store the database of the valid users, a hardware unit for interfacing and the ignition system module to ignite the vehicle. Database of the valid users is stored in the module. Now when a person tries to operate the vehicle then the CPU matches the fingerprint of the person with the stored database if the match result is successful then the vehicle is ignited and otherwise not. External devices (hardware) can be controlled through the PC parallel port. The parallel port is a simple and inexpensive tool for building computer controlled devices and projects. It is often used in computer controlled robots, Atmel/PIC programmers. Programming can be done with the help of Visual Basics, Visual C and Visual C++. The user mode program is then made to communicate with the written device driver. The programming of this prototype was done in Visual Basic 6.0 Enterprise Edition. The prototype was tested with 20 test images stored in the database. The results were successful and the controller was able to differentiate between the authentic user and the false user. The recognition software was able to distinguish high, medium and low quality test images on the basis of the minutiae extraction. Logic 1 was transferred on the matched case and the logic 0 was transferred on the mismatch occurrence.

Karthikeyan.A etal [2] in his paper focuses on the fingerprint security as every person has unique fingerprint. A keypad is also used to add or delete the valid user in the module. FIM3030 fingerprint module by NITGEN is used in this purpose. Microcontroller AT89C52 is used for controlling the
whole driving unit. LCD is used as a displaying unit for showing the information about the authorized and unauthorized user. Decoder DM742S138 is used for data routing and for interfacing with fast memory units as the decoder have short propagation delay. Latch 74HC373 is used which are high-speed Si-gate CMOS devices. A relay is used as a interfacing circuitry between the microcontroller output and the ignition system of the car. The amount od current required to drive the relay is amplified with the help of the transistor. Because of the limitation in the initiation of the spark plug and safety reasons only a prototype is developed whose success only depends on the ignition of the car battery.

Prashantkumar R etal [3] in his paper provides good and effective ways of securing the two wheeler vehicle with a combination of different types of locking options provided in the vehicle. This project does not use the concept of biometric identification but provide other security options that can be used in tracing out the vehicle if theft happens and also provide the owner of the bike the real time status of the vehicle. An engine immobilizer and alarm unit is used for isolating the fuel from the ignition system. In this paper different types of sensors are used to detect the movement of the vehicle. DTMF (Dual Tone Multi frequency) decoder IC is used to convert the frequency signals from the GSM module to discrete voltage levels which act as input to the microcontroller. When there is any danger of theft of the car through doors and the boots then microcontroller activates the GSM module and sends the message to the mobile phone number attached to the circuit. In this case the microcontroller disconnects the ignition system from the battery and also demobilizes the car. On testing the units the test result were found to be ok as the purpose of the project was successful. The unit efficiently disconnects the ignition from battery and demobilizes the car simultaneously sending alert message to the programmed person and start up an alarm.

Visa M. Ibrahim etal [4] in his paper provides a security/ alarming option to the car’s owner when the car is in the danger. In this project GSM technology is used for monitoring and safeguarding the car. There are sensors placed in the doors and the boots of the cars. If any type of tampering in the car happens then an alerting is signal is send to microcontroller. Intel AT89C51 microcontroller is used as a controlling unit of the device. DTMF (Dual Tone Multi frequency) decoder IC is used to convert the frequency signals from the GSM module to discrete voltage levels which act as input to the microcontroller. When there is any danger of theft of the car through doors and the boots then microcontroller activates the GSM module and sends the message to the mobile phone number attached to the circuit. In this case the microcontroller disconnects the ignition system from the battery and also demobilizes the car. On testing the units the test result were found to be ok as the purpose of the project was successful. The unit efficiently disconnects the ignition from battery and demobilizes the car simultaneously sending alert message to the programmed person and start up an alarm.

III. PROPOSED METHODOLOGY

This paper utilizes the fingerprint sensor to start the car engine. This project used interface circuit between the main controller and ignition circuit to start the car engine [3]. The fingerprint user will be scanned and analyse by a software. If the fingerprint is matched, the systems then send the signal to the interface circuit via the parallel port cable. Figure

Figure. 2. shows the block diagram of the project.

Generally the main part of this project is Arduino MEGA, fingerprint ZFM-20 module, and interface circuit between microcontroller and dc motor. As shown in Figure 3.1, push button is the input of this system. User would press a button to choose whether to enrol a new user, ignite the car engine, delete existing user or change the systems password. After that, the main microcontroller for this system which is Arduino MEGA will communicate with the processor on fingerprint sensor ZFM-20 module or keypad to process the input. Then any output process is showed on the Liquid Crystal Display (LCD) screen or a signal will be sent to the motor.
For better understanding, study the literature review, journal and any documented information about the ignition system, biometrics and related work that was carried out. From the studies, an overall overview of the projects system was identified and the ignition system based on fingerprint sensor is designed. Next, after finalizing the system design, the project implementation was carried out by using Arduino MEGA as a microcontroller. Beside hardware implementation, algorithm of the system was developed during this phase, which includes how to program the fingerprint sensor ZFM-20 and control the system using Arduino MEGA. After that, testing towards the system was carried out to make sure that the system was running successfully. If there are any problem or unfulfilled conditions occurred during the system testing, problem solving and modification will determine and applied to improve the system. The cycle of modification will continue if the system testing does not fulfil the project requirement. However, if there is no problem during the testing phase, the project flowchart will go directly to the result and discussion of the project. Figure 3.2 shows the flowchart of this project.

Electronic Component System
In this project, there are three main parts of hardware implementation, which is Arduino MEGA microcontroller, fingerprint sensor ZFM-20 and LCD keypad shield.

Arduino MEGA Microcontroller
In this project, Arduino MEGA has been used as the main controller for the system. Arduino is a board of microcontroller module that consists of an Atmel 8-bit AVR microcontroller with complementary components to facilitate the programming works [19]. Arduino popularity has been growing rapidly among students and project learners because of its simplicity, flexibility and open source library [20]. Arduino modules have already built in all essential circuits. Hence, it reduces the time development and becomes user friendly. The microcontroller board Arduino Uno is based on the ATmega328 that comes with 32KB flash memory and 2KB Static Random Access Memory (SRAM). It has six analog inputs, 14 digital input/output pins; and six pins can be used as Pulse Width Modulation (PWM) outputs. The board consist of everything needed to support the microcontroller including 16 MHz ceramic resonator, a USB connection, a power jack an In Circuit Serial Programming (ICSP) header and a reset button

Fingerprint Sensor ZFM-20 series
Fingerprint sensor ZFM-20 as shown in Figure 3.4 was manufactured by Zhian Technologies Co., Ltd. is an optical fingerprint sensor that proposed fingerprint identification modules. It consists of Synochip Digital Signal Processing (DSP) as the main processor and can perform multifunction in series such as fingerprint enrolment, fingerprint deletion, fingerprint verification, fingerprint searching and fingerprint template storage

LCD Keypad Shield.
For the purpose of user friendly, this project uses LCD keypad shield. This keypad shield is developed for the Arduino compatible board to provide the user a user friendly interface so that it allows the users to go through the menu and make a selection [23]. It consists of 2x16 LCD display and six momentary push buttons for select, up, down, left, right and reset button. Analog Pin 0 is used to read five push-button functions except the reset button function. This LCD keypad consists of 1602 white character blue backlight LCD, and it provides contrast adjustments by using a potentiometer. Figure 3.5 show the LCD Keypad shield.

IV. RESULTS
This module was designed to focus on the starting of the engine by the means of fingerprint. The reason for developing this model is to increase the security level and the robustness of the vehicles from day-to-day threatens. The user touches the fingerprint sensor and it authenticates the user, if the user is authorized then it automatically starts the engine. The sensor is directly connected to the engine, the wires are attached in such a way that it starts-up. 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. So it result in the accurate result for verifying the owner of the vehicle who can use only access their own vehicle. When the owner wants to handover the bike to the unknown person then it sends the code through the GSM technique and unknown person can access the bike.

APPLICATIONS
The application of this project is as follows:

- For the security of bikes and cars.
- For the purpose of locker security.
- For every security places.

ADVANTAGES
Here we are proposing a model which utilizes the concept of fingerprint recognition in the vehicle to enhance the security level. This lock pattern is unique in itself i.e. it is only unlocked by special and specific fingerprint.

- It provides better reliability than the traditional locks.
- It is cheaper than the other lock system.
- It is easy to use.
• Provide higher security.
• It gives protection against thief.

These are just a few advantages of the project that has been introduced in this report. We can use this lock system in vehicle as well as lockers, door etc. The microcontroller is capable of accepting analog inputs, which is the biggest advantage. Since all real world signals are analog in nature, by incorporating different sensors required purpose can be served.

V. CONCLUSIONS

In this proposed paper, by implementing the application of fingerprint identification, a system to improve the car security system has been successfully developed. The application of fingerprint identification in this system only allow authorized people to access the car. Besides, to overcome unrecognized fingerprint problem, this system has successfully developed a password system as an alternative to ignite the car. From several testing’s that has been made, this system has shown that it can work properly and cannot easily be hacked by unauthorized people. The user interface also has been successfully developed where the user can easily enroll new users or delete the existing user.

VI. REFERENCES


[2]. Karthikeyan.a “ Fingerprint Based Ignition System” Published in Karthikeyan.a, Sowndharya.j /International Journal Of Computational Engineering Research / ISSN: 2250–300


