

Finger Print Based Car Ignition System

Kanchan Gurule¹ Jyotsna Nikam² Roopali Doiphode³ Mangesh T. Nikam⁴

^{1,2,3,4}Department of Electronics & Telecommunication Engineering

^{1,2,3,4}Sandip Foundation's SIEM, Nashik, India

Abstract— The aim of this paper is to develop a finger print based car ignition system. Recently, car hijack has been on the increase as armed robbers focus on stealing cars especially the brand new ones. Hence the need to protect the cars from hijackers is considered to be essential. In this paper, nobody can ignite the vehicle except authorized by the designed system already captures its fingerprints pattern features through enrolment into the system. This is achieved with the use of fingerprint module, AVR microcontroller and Liquid Crystal Display (LCD) module. More so, after testing of the overall designed project, the results obtained were satisfactory. Hence, the approach adopted in this study can be applied to various systems and fields such as banks, attendance system management in school, hotels, and homes so on.

Key words: Fingerprint, Fingerprint Reader, License, Ignition System, Smart Card

I. INTRODUCTION

To prevent non-licensees a new system is proposed. An important and very reliable human identification method is fingerprint identification. Fingerprint identification is one of the most popular and reliable personal biometric identification methods. The proposed system consists of a smart card capable of storing the fingerprint of particular person. While issuing the license, the fingerprint is to be stored in the card. Vehicles such as cars, heavy vehicles should have a card reader capable of reading the particular license.

The automobile should have the facility of fingerprint reader device. If a person, who wishes to drive the vehicle, should insert the license card in the vehicle and then swipe their finger. The finger print stored in the card and finger print swiped in the device match, they can proceed for ignition, Or ignition will not work. Moreover, the seat belt detector verifies and then prompts the user to wear the seat belt before driving. This increases the security of vehicles and also ensures safe driving by preventing accidents.

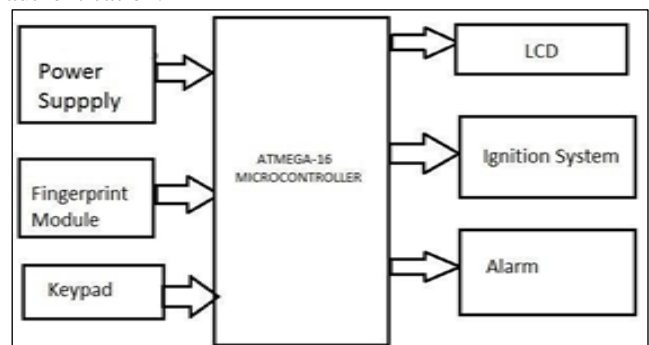
II. LITERATURE SURVEY

Omidiora E.O.etal in his paper basically focuses on the replacement of keys with the 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 when the mismatch occurs.

III. BLOCK DIAGRAM

From the block diagram we can see that with the help of fingerprint module and keypad input is provided to the micro-controller and on the basis of the input received from the 2 devices micro-controller drives the output devices i.e., ignition system of the car and the alarm. The ignition system of the bike is connected to the controlling unit i.e. the microcontroller. 16 bit AVR micro-controller is used which is the center of the User Authentication and the Vehicle Ignition. The Fingerprint sensors take in the fingerprint of the user which in turns sends the signals to the micro-controller. The micro-controller then matches the scanned fingerprint with the ones that are stored in its database. Once the finger print is match, the micro-controller sends the desired signal to the vehicle after which the vehicle can start. LCD display is also used which would display the status whether the fingerprints are being added, deleted or a successful authentication.



IV. ARCHITECTURE

A. Smart Card

The license issued by the Government is a smart card which stores different fields such as name, license number, expiry date, fingerprints of 10 fingers, type of license and blocked status of the license as well as fingerprint templates. These fingerprint templates are derived from the fingerprint scan by the process.

The biometric fingerprint sensor takes a digital picture of a fingerprint. The fingerprint scan detects the ridges

and valleys of a fingerprint and converts them into ones and zeros. Complex algorithms analyze this raw biometric scan to identify characteristics of the fingerprint, known as the "minutiae". Minutiae are stored in a fingerprint template (a data file usually smaller than the initial scans). Up to 200 minutiae are stored in a template, but only a subset of these has to match for identification or verification. In most systems, if 10 to 20 minutiae match, the fingerprint is considered as a match. In today's smart card systems approximately 40 minutiae are stored.

B. Smart Card Reader

The smart card is inserted into the slot of the reader. The card reader integrates with it a fingerprint scanner. This setup increases security by adding "something you are" along with "something you have". When a fingerprint impression is received, it is analyzed and then matched with the template stored in the card to find out if the fingerprints match.

C. Controller

The role of the controller is to enable the logic flow (shown aside). The microcontroller is fed with the required input signals from card reader and seat belt controller. The card reader sends signals, each to individual pins of the microcontroller, and the signals include fingerprint matching information, license expiry status, license suitability status and license blocked status, all in the form of bits. The microcontroller then branches out to any one of the logical paths and delivers the output at one of its pins, which is used by the ignition control unit. The flow logic also includes checking of expiry of the license. If the license expires in 10 days, it prompts the user to renew the license, once the license expires, the ignition does not happen. When the user holds a learner's license, it accepts the license after the fingerprint matches, then it prompts the user to insert a valid license and once again the checking process continues. The valid license is to be present in the vehicle until the vehicle is switched off. If the license is taken out before ignition is OFF, the vehicle automatically comes to OFF, and this ensures that the license is not used in another vehicle to switch it ON. We have implemented the proposed prototype using PIC 16F877 microcontroller. PIC microcontroller can also be used if the system is going to be more sophisticated and makes use of interrupts to control the switching ON and OFF of the ignition system. PIC 16F877 from Microchip [4] is a powerful yet easy-to-program (only 35 single word instructions) CMOS

FLASH-based 8-bit microcontroller packs PIC16F877 features 256 bytes of EEPROM data memory, self programming, an ICD, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 additional timers, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface or the 2-wire Inter-Integrated Circuit bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliance and consumer applications. All the necessary support components are included, together with a Power and Programming LED for easy status indication. Plus a reset switch for program execution and a RS232 connection for data transfer from a standard RS232 port, available on most computers. The

PIC16F877 Controller is the ideal solution for use as a standard controller in many applications. The small compact size combined with easy programs and make it ideal for use in machinery and control systems, such as alarms, card readers, real-time monitoring applications and much more. The input to the PIC microcontroller is the result of the fingerprint matching algorithm through port pins RC6 and RC7. The port B is configured as output port is connected to the LCD to display the result of the fingerprint matching. This port can be directly connected to the ignition control or as LCD display to the user to indicate the current status of the fingerprint based ignition system so that the user can take the necessary action. This makes the proposed system user friendly. The table 1 below enumerates the various situations that might occur and their corresponding actions and Fig 4 shows the flowchart of this algorithm.

Possible inputs to system	Expected output from system
When valid license inserted	Wait for fingerprint input
Valid Licenses, Correct Fingerprint	YES for ignition
Valid license and incorrect fingerprint	Rejects and requests for input again

Table 1: Input and Output for the System

D. Ignition Control

The ignition system of an internal-combustion engine is an important part of the overall engine system that provides for the timely burning of the fuel mixture within the engine. The ignition system is usually switched on/off through a lock switch, operated with a key or code patch. A wire from the battery in the vehicle connects to the kick starter and other wires connect the kick starter to the key system. When the car key in the ignition system is turned once, two wires coming from the kick starter to the key system are bridged. This causes the engine and some other parts of the vehicle to be put in a READY or ON state. Turning the key again makes a third wire to temporarily join the already bridged wires, causing voltage to flow from the battery to the necessary parts vehicle so as to enable the vehicle move. The ignition control is brought about by placing a relay between the battery and the ignition key unit of the vehicle, as shown in Fig-5. The control of the relay is by a signal from the microcontroller. This signal is activated when the logic flow presented earlier satisfies. The relay on successful turn on, gives a feedback to the microcontroller. A solenoid valve attached to the fuel pipe of the engine opens when this feedback is obtained. If feedback was not received, then it is understood that the relay was manipulated and so the solenoid does not open thus preventing the engine from starting.

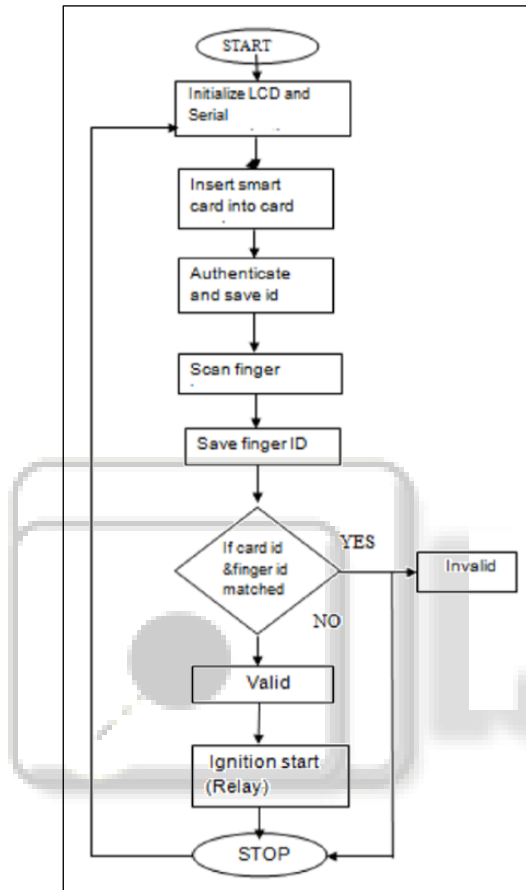
E. Fingerprint Module

Biometrics is automated method of recognizing a person based on a behavioral characteristic. Among the features measured are face, Finger print, handwriting, iris, retinal, vein, and voice. Biometric data are completely different and distinct from personal information.

Biometric templates cannot be reverse-engineered to recreate personal information and they cannot be stolen and used to access personal information. Using a unique and physical attribute of our body, such a finger print or iris

identify and verify that you are who you claim to be, is the best and easiest solution in the market today. That is the simple truth and power of Biometrics Technology today. Although biometric technology has been around for years, modern advances in this emerging technology, coupled with big reductions in cost, now make bio-metrics readily available and a fordable to consumers, small business owner, larger corporations and public sector agencies alike.

V. FLOW CHART



VI. RESULT

The reason for developing this model is to increase the security level and the robustness of the vehicles from day-to-day threaten. Once the door has been unlocked it focus on the startup of the engine by checking the authenticity of the verified user by the means of fingerprint. The user touches the fingerprint sensor and it authenticate 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 person. So it result in the accurate result for verifying the owner of the vehicle who can use only access their own vehicle.

VII. CONCLUSION

It saves the fingerprint of a particular person. While issuing the license, the specific person's fingerprint is to be saved in the database. Vehicles such as cars, bikes etc. should have a

fingerprint reader and have accomplished to read data of the particular person's license details. In this system every automobile should have fingerprint reader device. A person, who wants to drive the vehicle, should swipe his/her finger (License) in the vehicle. If the fingerprint image stored on the smart card and swiped in the device matches, he/she can proceed for ignition, otherwise the ignition system will not work. Moreover, the seat belt detector verifies and then ignites .The user to wear the seat belt before driving the car. This increases the security of the vehicles and also ensures safe driving by preventing accidents. In case the ignition system of a car is started with the influence of valid licensed person. There is a chance to change the driver of the vehicle

REFERENCES

- [1] Amit Saxena, "IGNITION BASED ON FINGERPRINT RECOGNITION" Published in International Journal of Scientific Research and Management Studies (IJSRMS) Volume 2 Issue1.
- [2] Prashant Kumar R. "TWO WHEELER VEHICLE SECURITY SYSTEM" International Journal of Engineering Sciences & Emerging Technologies, Dec. 2013 Volume 6, Issue 3.
- [3] Bhumi Bhatt, "Smart Vehicle Security System Using GSM & GPS" International Journal of Engineering and Computer Science Volume 4 Issue 6 June 2015.
- [4] K. A. Amusa "DESIGN OF SMS-ENABLED CAR SECURITY SYSTEM" Transnational Journal of Science and Technology, Volume 2 November 2012.
- [5] Roopam Arora "START-UP THE ENGINE USING FINGERPRINTING" International Journal of Computer Engineering and Applications, Volume IX, Issue X, Oct. 15.