Vehicle Ignition Using Biometric Data

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Abstract – The main objective of this paper is to study the biometric vehicle ignition. Keys need to be carried and misplacing keys or losing them will cause a serious issue. Here we 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 finger to start the car, no need to carry any key. The system only allows authorized users to start the vehicle. Users can first register into the system by scanning fingerprints. 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 we use atmega 32 microcontroller. The fingerprint sensor is connected to the microcontroller and, we 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.

Index Terms – Fingerprint, Atmega microcontroller.

1. INTRODUCTION

Because of increasing number of theft cases of the Automobile there is a need to enhance the security level of the vehicles. Traditional and commonly used key locks available in the vehicles are easily unlocked by the professional thieves. With the help of master key it becomes very easy to unlock the lock of the vehicles by the thieves. This creates the demand of such type of lock which is new and provides an additional security level. The new and modern lock must be unique i.e. it must be only unlocked by special and specific key. This type of feature is available in the biometrics locks i.e. the lock which can only be locked and unlocked by the human body features. Biometrics can include: face recognition, voice recognition, fingerprint recognition, eye (iris) recognition. Leaving that conventional method behind came in the concept of igniting the vehicles using key. And now, Keys are being replaced by Push start buttons. This paper was started with the sole purpose of eliminating keys as conventional method of starting the vehicle. With the introduction of Biometrics in the 18th century, security advancement in technology has gone up to various levels. In the 18th century it was used to verify the employees working for the British Empire. Since then Biometrics has taken its toll. Biometrics is formed from the Greek words 'Bio' and 'Metrics' where 'Bio' means 'life' and 'Metrics' means 'to measure'. Finger print of a person is read by a special type of sensor. Finger print sensor can be interfaced with a microcontroller. Through keypad we can, also identify the user by selecting corresponding option through keypad by the specific operational password.

2. FINGERPRINT MODULE

This paper we use a fingerprint module to read once identity to start the equipment. For this we use a ARDUINO microcontroller to enable the ignition system if the matching between scanned data and the already existing data is correct. Comparison is done inside the fingerprint module itself and its output is given to microcontroller. Result is displayed in a LCD display whether the user is authorized or not. R305 background highlight optical fingerprint verification module is the latest release of Mi axis Biometrics Co., Ltd. It consists of optical fingerprint sensor, high performance DSP processor and Flash. It boasts of function such as fingerprint login, fingerprint verification, fingerprint deletion, fingerprint upload, fingerprint download, etc. This can be used as a memory storage element to store the data of the finger print.

2.1. FINGERPRINT ALGORITHM

Mi axis owns fingerprint verification algorithm with self-independent IP and gains several national invention patents. Mi axis algorithm has the below three generations per the realization theory. 1) Minutiae-based Fingerprint Matching Algorithm. 2) Ridge-based Fingerprint Matching Algorithm. 3) Image-based Fingerprint Matching Algorithm. Three algorithms have their respective advantages and meet the different needs of applications. Mi axis algorithm has the following characteristics:

1) Intellectualized Intelligent image processing as human thinking way, faithfully deliver the original fingerprint image characteristics, effectively sort the characteristics and ensure its differentiability, stability and independency.

2) Small Volume Code length of Mi axis algorithm is less than 48KB, data buffer less than 16KB, and the memory demand is less than 64KB, it is the most reduced fingerprint verification algorithm in the world.

3) Rapid Speed Mi axis algorithm just needs 60 MIPS. To process and verify a 64KB fingerprint image, it can affect the fingerprint verification easily on all normal processor platforms.

4) High Portable Ability Mi axis algorithm adopts standard C Language which is easily porting in different platform. At present, Mi axis algorithm has been widely used in DSP etc. embedded platform, and Windows, UNIX, LINUX etc. operation system. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern. These include patterns, which are aggregate characteristics of ridges, and minutia points, which are unique features found within the patterns. It is also` necessary to know the structure and properties of human skin in order to successfully employ some of the imaging technologies. Fingerprint matching, among all the biometric techniques, fingerprint-based identification is the oldest method which has been successfully used in numerous applications. Everyone is known to have unique, immutable fingerprints. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint can be determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur at either a ridge bifurcation or a ridge ending.

2.2. FINGERPRINT MATCHING TECHNIQUES

Fingerprint matching techniques can be placed into two categories: minute-based and correlation based. Minutiae based techniques first find minutiae points and then map their relative placement on the finger. However, there are some difficulties when using this approach. It is difficult to extract the minutiae points accurately when the fingerprint is of low quality. Also, this method does not consider the global pattern of ridges and furrows. The correlation-based method can overcome some of the difficulties of the minutiae-based approach. However, it has some of its own shortcomings. Correlation-based techniques require the precise location of a registration point and are affected by image translation and rotation.

2.3. FINGERPRINT SENSOR

It is a 4-pin device which is an optical biometric fingerprint reader which can be used for various applications such as access control, safety deposit locks, banks, and car locks etc. The model used in this paper is the R305 fingerprint scanner module. The reason being it is one of the cheapest fingerprint reader available in the market. One of the main features is that it consumes very less power, and it gives the similar performance as to the expensive ones. The fingerprint sensor is used to read the fingerprint of the already registered user/users. It can also be used to add/delete new/existing fingerprints. Its four pins are Tx-In, Rx-Out, GND and +5V. Tx-In and RxOut pins are used for Input and Output purpose. The GND and the +5V are used for power supply and grounding purpose. It is very easy to implement, being a simple connecter. When the user places his finger on the sensor for the first time, a 3-Dimensional image of the fingerprint is captured. It is then

stored on the memory of the controller using various algorithms. Internally, it just converts it pieces of code which the microcontroller stores it in its memory and verifies it. Along with the fingerprint sensor three buttons are also used among which one of them is used for sensing the fingerprints. The other two are used whenever a fingerprint is too added or deleted. It scans the edges of the fingers and stores it in the memory of the controller. In case of deleting the fingerprint, we should first place the fingerprint that needs to be deleted, and on pressing the delete button we must scan that same fingerprint again. This deletes the fingerprint from the memory of controller.

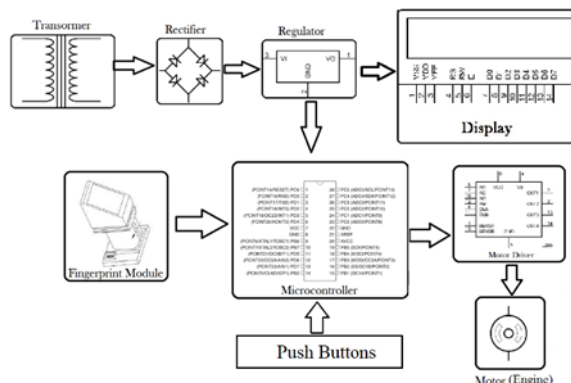FIGURE 1 FINGERPRINT SENSOR

3. SYSTEM IMPLEMENTATION

FIGURE 2 SYSTEM SETUP

Fingerprint Identification enhances the security of a vehicle and makes it possible only for some selected people to start the vehicle. Not every person with the key will be able to start the bike. There will be matching of the person's data with the stored one and only in the case of match the bike will start otherwise not. Thus, by implementing this relatively cheap and easily available system on a vehicle one can ensure much greater security and exclusivity than that offered by a

conventional lock and key. Fingerprint identification enhances the security of a vehicle and makes it possible only for some selected people to start the car. By implementing this relatively cheap and easily available system on a car one can ensure much greater security and exclusivity than that offered by a conventional lock and key. In actual case a success would initiate a trigger in the spark plug. But due to limitation in initiating a spark plug and due to safety reason, a prototype has been developed here. The output can be seen using an LED.

4. CONCLUSION

The main motive of implementing the fingerprint sensor for the two wheelers is to provide the security for vehicles. It enhances the level of security for vehicles. As the unique finger impression is a promising biometric design for recognizing it is used in case of both security and usability. This technology easily reduces the theft cases.

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