Smart Automobile Security

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Abstract

Maintaining manual driving license system is very difficult task for the government agencies to monitor as the number of vehicle users are increasing day by day, so for agility plus perfection we need something advance than conventional way of maintenance. Finger print authentication scheme is a non-imitable biometric authentication scheme. By using this biometric authentication; we can prevent the non-license from driving. So we will avoid accidents. The proposed system consists of a smart card capable of storing the finger print of a particular person. While issuing the license, the specific person's finger print is to be stored in the card. The same automobile should have facility of finger print reader. A person, who wishes to drive, must match his finger print with the smart card otherwise the car will not ignite. Car theft security module also provided using GSM. The groups of finger print images were previously stored in the database, when the new finger print is introduced the GSM will send a message to the authority. The car will ignite, if it gets a positive reply from the authority otherwise the car gets locked. Further, door detector and Seat belt detector are provided to the authentication module. The whole system is built on technology of embedded system which makes more safe, reliable and easy to use.

Keywords: Authentication, Fingerprint, License, GSM, Sensors

I. INTRODUCTION

Nowadays, automobile thefts and accidents are increasing at an alarming rate all over the world. Thus to prevent vehicles from being pilfered, most of the vehicle owners have begun using the theft protection systems. Currently available anti-theft systems are very costly. Hence we introduce a smart and an economical system to prevent accidents as well as vehicle theft. Main feature is the keyless entry. Here the fingerprint module is attached to the car door. When the fingerprint module is interfaced to the microcontroller, we will be using it in user mode. In this mode we will be validating the scanned images with the saved images. When coming to our application the images of the citizens will be saved in the module with an exclusive id. The Citizens have to scan their image on demand by RTO, which is then verified with the image at hand in the fingerprint module and their documentation will be appraised. By using this controller we will be controlling the examining process. After the checking has been completed the result is stored in the microcontroller. Whenever a stranger tries to use the car a message with the license details of the stranger will be send to the owner by the GSM module. This requires uses regulated 5V-500mA power supply. The 7805 voltage regulator, which is a three terminal voltage regulator can be used for voltage control. The full wave rectifier called bridge rectifier is used to rectify ac output of secondary 230/12V step down transformer. Firstly, the car door should be well closed and it is checked by the door detector. Secondly, the seat belt should be engaged and is checked by the seat belt detector. Thirdly, the person should blow over the alcohol sensor to show that the person has not consumed any of the alcoholic beverages. The car will not ignite if any one of the authentications become unsuccessful and will not proceed the next step. Every time a person wants to drive the car a request will be send to the RTO to check his license validity. If the RTO gives a positive reply then only the door will open. The RTO will be having a database which contains the fingerprint images as well as the details of the person. The RTO do not accept the license if it is has any one of the following issues:

1) If the license validity is terminated.
2) If the license card is banned.
3) If the license card is temporarily cancelled.

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II. BLOCK DIAGRAM

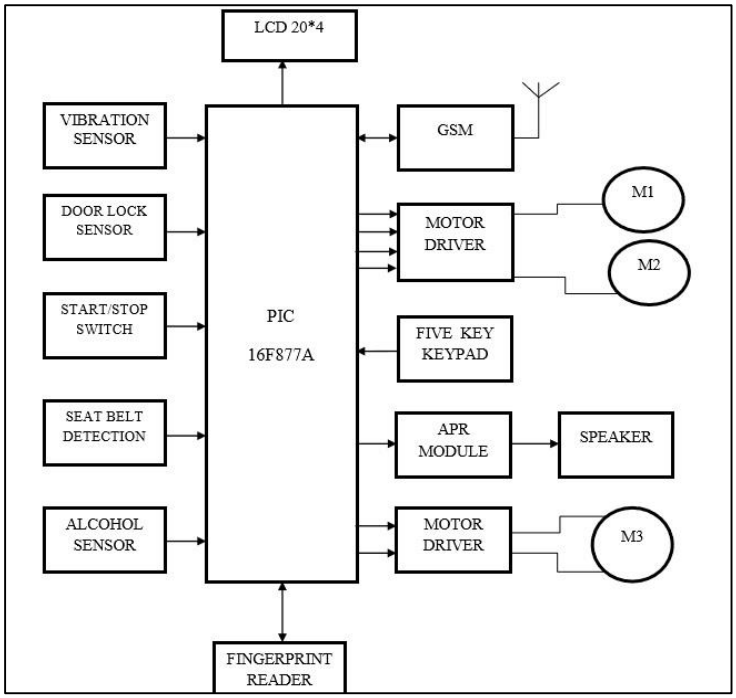

Fig. 1:

III. PROPOSED SYSTEM

The following system uses fingerprint as a biometric key and also it adds more feature for driving safely, car theft security, Alcohol sensor, seat belt detector and door lock detector using GSM. The proposed work consists of two modules namely (i) Car starting module, (ii) Car security unit. Each module can be described with its function as follows.

A. Car ignition module:

In this module, Fingerprint reader, Alcohol sensor, Door detector, Seat belt detector, vibration sensor is used. The system is programmed with some verification levels. To ignite the car, the person must pass the authentication stages. The car fails to start, if the person didn't satisfy any one of the authentication levels. To open the car the person must match his fingerprint with the stored images or else must obtain permission from the owner as well as the RTO. To run the car the person must close the door properly and then the person will sit on the seat and put the seat belt and then person will blow over the alcohol sensor to ensure that the person has not consumed alcoholic beverages. The car will start only after the passing of all authentication levels. The ignition will stop, when the user disconnects the seat belt after the car ignites. Whenever an accident occurs the vibration sensor detects it and the car stops automatically and a message will be send to the owner, the nearby hospital and the police station.

B. Fingerprint Reader:

The fingerprint reader that can be used here is "U 4000B" sensor for getting the Fingerprint image and to store that in the database. It is an outstanding fingerprint input device can be widely applied in social security, public security, appearance, fingerprint encryption, and other applications. U 4000B miniature fingerprint scanner to spontaneously read the fingerprint copy, by means of USB interface to transfer digital fingerprint images to the computer-controlled technology to support the Bio key SDK development tools. Require authentication for laptop computers or other pc devices, it is the ideal device.

C. Controller:

The controller used here is the PIC microcontroller. The PIC microcontroller is mostly used for many experiments and it is very comfortable to use. The PIC microcontroller only have 35 instructions hence programming for PIC controller is very easy. It has an inbuilt ADC along with a heat resistant. It has a high performance RISC. It consumes very low power of 2- 5 volts. It has a high interrupt capacity and high working speed. So, in this system we are using this controller. The authentication process is carried out by the controller. The gadget actions of the connected devices are controlled by the controller. Also the controller is used as a comparator to check the matching of the fingerprint of the person. The controller will not accept the request, if the license validity is expired. Moreover, it do not allow the entry if the license is temporarily banned for any of the reasons. If the license date is going to expire, it will provide the warning signal to the user about the expired date of the license card.

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D. Car door detector:

For door lock detector IR sensor is used. When the car door is in open condition the sensor will not get any connection. When the door is closed, then the sensor gets some connection with the device. When the person tries to start the car, the microcontroller will check for the result from the IR sensor in the door detector. The LED will glow, when the door is not locked properly otherwise, it allows the car to start. The APR module gives the voice alert.

E. Seat belt detector:

For the seat belt detection IR sensors are used. The IR sensor is fixed at the end of the seat belt. Whenever the seat belts are engaged, the LED will not glow. If the seat belts are not engaged, then the LED will glow and the APR module gives the corresponding voice alert.

F. Alcohol sensor:

The alcohol sensor being used here is MQ303A.This sensor has sharp sensitivity, fast detection range. This sensor is specially used for detecting the alcoholic gases. In this system, the IC LM 358 is used as a comparator for detecting the alcohol contents present the blown air. Usually the non-inverting terminal is higher than the inverting terminal so that the input is given to the transistor as a 0 volt and then the transistor will give a one as an input to inverter to pass the authentication level. If any alcoholic gas is detected, the inverting terminal is high and the transistor will give a 5volt to the inverter and the inverter assumes it as one and it will fails the authentication. Thus the alcoholic content present in the blown air is detected.

G. Vibration sensor

The vibration sensor used here is piezoelectric sensor. It detects accidents and forced entry to the vehicle. Sensors based on the piezoelectric effect can function from transverse, longitudinal, or shear forces, and are not sensitive to electric fields and electromagnetic radiation. Also the response is very linear over wide range of temperatures, making it an ideal sensor for harsh environments.

H. DC Motors

In addition to an axle, a nylon end cap and two battery leads, the steel can form the body of the motor. The axle will spin when the battery leads of the motor are hooked up to a flashlight battery. To make it spin in the opposite direction the leads are reversed. The other two views of the similar motor are as follows. The nylon end cap is held in rest by two tabs that are part of the steel can. The end cap can be made free by bending the tabs back and end cap can be removed. Inside the end cap are the motor's brushes. As the motor spins these brushes transfer power from the battery to the commutator. It is used for the automatic opening of the door after the completion of the verification of the fingerprint

I. GSM Modem

Global system for mobile communication, in short, "GSM", is a globally accepted standard for digital cellular communication. To create a common European mobile telephone standard, a standardization group was established in 1982 named GSM. Its goal was to formulate specifications for a pan-European mobile cellular radio system operating at 900MHz. A GSM modem is a wireless modem that will work with a GSM wireless network. A wireless modem behaves like a dial-up modem. The key difference between them is that a dial-up modem makes use of a fixed telephone line to send and receive data while a wireless modem sends and receives data through radio waves. Here the GSM modem is used to send the messages to the owner and the RTO.

J. Advantages of our proposed Method:

1) Since fingerprints consists of bunch sebaceous glands, for each individual, the fingerprint varies
2) They do not change naturally.
3) The factors such as dependability and constancy are higher in fingerprint method compared to the iris scan, voice and face recognition methods.
4) Fingerprint recognition equipment has low cost compared to other biometric systems.
5) Very high accuracy.
6) It is one of the most developed biometrics.
7) Very easy to use.
8) The biometric template consumes less storage space, reducing the size of the database memory required.
9) The fingerprint recognition used in this system is normalized.
10) No need to carry license while travelling.
11) It avoids geminating or imitating the license.
12) It is a more economical and effective method.

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IV. CONCLUSION

Automated fingerprint recognition systems have been successfully deployed around the globe for both law-enforcement and civilian applications. Also applications that make use of fingerprint- matching continue to emerge. The fingerprint being the leading biometric trait, as a result many identity management and access control applications relies on fingerprint recognition. This is because of the proven performance, the existence of large legacy databases, and the availability of compact and low priced fingerprint readers. Further, fingerprint evidence is acceptable in courts of law to convict criminals. In this paper we have projected the technique based on "Minutiae- based" algorithm for efficient and more secured because of these features Universality, Inimitability, Permanence, Collectability, Acceptability, Circumvention and Performance when compared to the existing system. From this paper, we conclude that fingerprint is a safe biometric authentication and can be used for security purposes. While using this system, no one can drive devoid of license and also no one can use another's license. Also the system will alerts the user about the validity period of the license. This makes a person aware of license renewal. This is included to avoid the usual case of forgetting about the license renewal.

V. FUTURE SCOPE

The following features can also be included in our project to make it more efficient. First is the face recognition feature using which we can improve security by a face recognizer to identify and verify the face of the person who wishes to drive. Second, we can also include GPS technology so that whenever a theft attempt takes place, the location of the automobile can be also sent to the owner. This feature again increases the security of the vehicle. We can also provide provisions for sending the theft details to the nearby police station. We can also provide a feature using which we can prevent a person from driving a vehicle for which he has no license. Therefore the person can drive only that vehicle for which he has license.

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