ISSN (Online): 2455-7838
SJIF Impact Factor (2017): 5.705

EPRA International Journal of

Research & Development

(IJRD)

Monthly Peer Reviewed & Indexed International Online Journal

Volume: 3, Issue:11,November 2018

Published By :
EPRA Journals

SJIF Impact Factor: 5.705 Volume: 3 | Issue: 11 | November | 2018 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)

SPONTANEOUS IGNITION RECOGNITION USING BIOMETRICS AUTHENTICATION

D. Malathi[1]
[1] P.G Student, Department of CSE, Sri Muthukumaran Institute of Technology, Chikkarayapuram, Chennai, Tamil Nadu-600069, India

A.Mathangopi[2]
[2]Assit.Prof. Department of CSE, Sri Muthukumaran Institute of Technology, Chikkarayapuram, Chennai, Tamil Nadu-600069, India

V. Pandarinathan[3]
[3]Assit.Prof. Department of CSE, Sri Muthukumaran Institute of Technology, Chikkarayapuram, Chennai, Tamil Nadu-600069, India

Dr.D.Rajinigirinath[4]
[4] HOD, Department of CSE, Sri Muthukumaran Institute of Technology, Chikkarayapuram, Chennai, Tamil Nadu-600069, India

ABSTRACT

To ensure safe driving and to avoid accidents, a new system is proposed. Advance automobile security and locking system particularly for bikes, which could be controlled through smart phone as well as ordinary non android phones. 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. As fingerprint of every person is unique thus it can be used in various security options. In this paper we are focusing on the use of finger print recognition to start or ignite the motorcycle against the use of conventional methods of key locks. A person, who wishes to drive the vehicle, should insert the card (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 and a new feature is included in addition to the engine immobilizer and alarm i.e. alerting owner by SMS when mismatch to user to control the system remotely by SMS. 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. This increases the security of vehicles and also ensures safe driving by preventing accidents.

KEYWORDS: *Safe Driving, Fingerprint, fingerprint reader, Android mobile, Ignition system, Smart Card.*

I. INTRODUCTION

Rapid Globalization, sustained development and economic empowerment of Indian society has flooded Indian market with different luxury and transportation vehicles. These vehicles (CAR, Bike etc.) have today become inseparable part of our life not only for luxury but also for business. But at the same time vehicle theft has become a major problem for society in general and low enforcement agencies in particular.

With the help of transistor circuit a proper current to DC motor is provided. Motor operating current is approximate 200 mA. So it is not possible to drive the motor directly, so one PNP and one NPN transistor is also used to drive the motor. The same circuit is used for the Buzzer circuit also. Keypad is connected to port p1 and port p3 pins directly. All the switches are connected to controller with common ground. When a switch is pressed then that particular pin becomes zero. The motor starts only when the correct code is entered. If the password entered is wrong for three consecutive times then the buzzer turns on and system is locked. Keypad is active again only when the system receives a password from the user via GSM modem.

An in built system [2] in an automobile which prevents such cases has therefore become vital. This paper aims to introduce a hardware architecture which detects the fingerprint and takes a robust decision to turn on or off the ignition system based on the validity. Section II describes the Literature Review, Section III describes the Smart card, Block Diagram and its description and Section IV describes the fingerprint matching Algorithm followed by results in Section V and conclusion, Section VI.

II. LITERATURE REVIEW

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. SMS service for controlling and as a alarming device, With the help of the SMS the alert message can be received by the owner about the ignition of the bike and also with the help of SMS service the owner can lock the vehicle completely. RKS (Remote Keyless System) is also used for locking the vehicle from a distance the RKS system in this project uses the SIM number as the master key of the vehicle. Side stand alert is also used in the project it alarms the user about the down position of the sides stand after the ignition of the vehicle for avoiding any casualty to the driver. ATMEGA-328 microcontroller is used in the project. Programming code is written in the Arduino IDE (Integrated Development Environment) v 5.2.

The hardware module was tested on different models of two wheeler vehicles. The module is made in such a way to optimize the cost because increasing the cost of the module can directly increase the cost of the vehicle. The overall power consumption of the whole module should be less because the vehicle for placing the whole module thus the module was place inside the seat of the vehicle.

III. SMART CARD

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 zeroes. 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 a match.

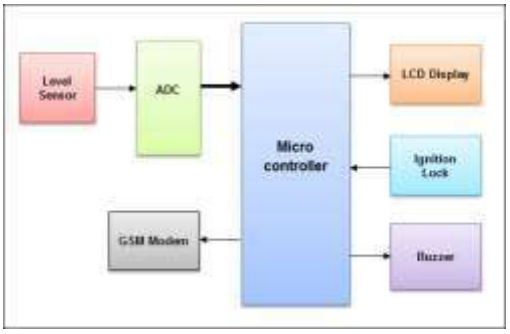

Fig1. Block Diagram.

A. Liquid level sensor: The function of liquid level is to detect the variation in fuel level and it gives variable output voltage as per the variations in level. This liquid level sensor can be used for any type of liquid. So it can be used for petrol as well as diesel or in some cases it can be used for water level detection as well.

B. ADC: ADC is analogy to digital converter. Output of level sensor is in analog form and the 8051 microcontroller is not able to read the analog voltage signal, so we have used analog to digital converter. ADC reads the analog input voltage and gives digital output data which is corresponding to the analog data

received. The output of ADC is 8bit format which is compatible to the microcontroller.

C. Microcontroller: Various functions of microcontroller are: i) To read the data from ADC which is the data received from level sensor. ii) To calculate the variation in liquid level. iii) To display various information in LCD display. iv) To turn on buzzer if the liquid level crosses threshold value. v) To send SMS when there is change in liquid level.

D. LCD display: It is known as Liquid Crystal Display. It displays "Petrol theft is in progress", "Sending SMS", "SMS send successfully". It also displays variation in petrol level. LCD is mainly important for testing the project, however in actual use LCD is optional.

E. Buzzer or siren: A buzzer is turned on whenever petrol theft is going on or petrol is stolen. Buzzer will be turned on as soon as there is decrease in petrol level without ignition key. Loud noise of buzzer will draw attention of persons in the surrounding so they can come to know that something wrong is happening with the bike. This can save further fuel theft.

F. GSM modem: GSM modem is used to send messages to the owner of the car or bike. We have to insert a GSM sim card into this GSM modem. Microcontroller sends the commands for sending SMS to the GSM modem. These commands are sent through serial communication port. This technology is used because many times we go out somewhere and we park bike on the road or in the parking area so we are not near the car or the bike. Whenever petrol theft is going on user will get SMS and user can rush to the bike or car to check the safety of bike.

IV. FINGERPRINT MATCHING ALGORITHM

Fingerprint identification is one of the most popular and reliable personal biometric identification methods. This paper describes an on-line fingerprint identification system consisting of image acquisition, edge detection, thinning, feature extractor and classifier. The preprocessing part includes steps to acquire binarized and skeletonized ridges, which are needed for feature point extraction. Feature points (minutia) such as endpoints, bifurcations, and core point are then extracted, followed by false minutia elimination. Human fingerprints are rich in details called minutiae, which can be used as identification marks for fingerprint verification. The algorithm that was implemented for finger print matching in this research work is discussed below. Anil Jain et al [3] proposed a hybrid matching algorithm for matching. Our algorithm is described in detail below.

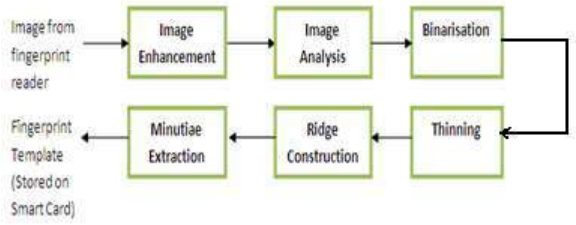

Fig 2. Fingerprint Template Generation.

Step 1: Histogram Equalization

Histogram equalization is to expand the pixel value distribution of an image so as to increase the perceptional information. The original histogram of a fingerprint image has the bimodal type the histogram after the histogram equalization occupies all the range from 0 to 255 and the visualization effect is enhanced.

Step 2: Fourier Transform

Because the image in the Fourier domain is decomposed into its sinusoidal components, it is easy to examine or process certain frequencies of the image, thus influencing the geometric structure in the spatial domain.

Step 3: Binarization

A locally adaptive binarization method is performed to binarize the fingerprint image. Such a named method comes from the mechanism of transforming a pixel value to 1 if the value is larger than the mean intensity value of the current block (16x16) to which the pixel belongs.

Step 4: Direction

Field orientation and filtered field orientation map computation, which consists of the calculation of the dominant direction of ridges and valleys in each local region.

Step 5: Region of Interest (ROI)

Two Morphological operations called 'OPEN' and 'CLOSE' are adopted. The 'OPEN' operation can expand images and remove peaks introduced by background noise. The 'CLOSE' operation can shrink images and eliminate small cavities.

Step 6: Thinning

The built-in Morphological thinning function in MATLAB is used for ridge thinning. The thinned ridge map is then filtered by other three Morphological operations to remove some H breaks, isolated points and spikes.

Step 7: Matching

A bounding box is placed around each template minutia. If the minutia to be matched is within the rectangle box and the direction discrepancy between them is very small, then the two minutia pair is regarded as a matched minutia pair. Each minutia in the template image either has no matched minutia or has only one corresponding minutia. The number of matched minutia pair is calculated as percentage of matching.

V. RESULTS

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.

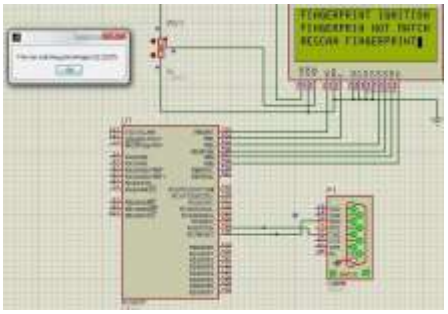

Fig 3: Fingerprint mismatch

VI. CONCLUSION

Fingerprint identification enhances the security of a vehicle and makes it possible only for some selected people to start the vehicle. The expected result by implementing this model on the motorcycle is that only the authorized person will be able to ignite the motorcycle. 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. The thief would have to do a great deal of homework to steal the bike, and it is unlikely that they have the fingerprint technology needed to fake your fingerprint.

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