Anti-Theft Vehicle Security System

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Abstract— This paper proposes an Anti-theft vehicle security system which aims to allow access to the car only if the person's fingerprint matches with that stored in the system [1]. The comparison will take place in Matlab and result will be shown on the LCD. In case through illegal means the car is accessed then car's fuel tank will be locked through Relay circuit so that whenever the tank gets empty, unauthorized person will no longer be able to refuel the tank [5].

I. INTRODUCTION

Antitheft Vehicle Security System allows the user to avoid the car's theft by ensuring that vehicle is ignited only by providing proper fingerprints. It also monitors their vehicle and their routes and arrival.

A vehicle tracking system will provide effective, real time vehicle location, mapping and reporting. This information also leads to higher profits through better fleet management [2]. The objective of this system is to reduce the cost of the tracking system using the latest technologies and making it available to the common people. If someone is stealing your vehicle or if you want to protect your vehicle from thieves, a vehicle-tracking device can be of help.

II. SYSTEM OVERVIEW

A. *Basic definition:*

Few common terms that have been used in project are

1) Biometry: - The technique of studying physical characteristics of a person such as finger prints, hand geometry, eye structure or voice pattern is known as biometry [4].
2) Fingerprint: - The unique biological characteristic possessed by each human being, captured in the form of image that can be used to differentiate one person from other.
3) Fingerprint Authentication: - Refers to the automated method of verifying the match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify an individual and verify their identity
4) Fingerprint identification: - The process of capturing the image of fingerprint of an individual and matching it with the one stored in database in order to grant or deny the access is known as fingerprint identification.
5) Fingerprint sensor or Fingerprint reader: - A biometric sensor, fingerprint sensor to be specific, also known as the fingerprint reader, is a fingerprint image capture device, the very front end of the biometric fingerprint identification/verification module [3]. The fingerprint sensor captures the fingerprint images, matches the uniqueness of each print read by the sensor and compares it to the one stored in its module or local system database.

B. *Introduction to proposed system:*

The Overview of system is as follows

Our project is developed to provide security for a Vehicle. In this project the fingerprint sensor sense the thumb impression of the corresponding person and that image will be compared with registered image, if the both images are unique, then the finger print device allows that person to start that vehicle.

We are making the prototype of such a vehicle tracking system using the well-known GSM technology. Our vehicle tracking system can track a vehicle by sending a simple SMS using a GSM Module (or any mobile terminal that supports GSM). We can also control the vehicle by decelerating it if it is found to be in a suspicious or dangerous condition.

Such a system can be implemented by a company manufacturing vehicle or security agencies responsible for theft. Our main aim is to make the vehicle owners secure about their vehicles.

C. *Design overview:*

The Block diagram of Anti-theft vehicle security shown in Figure 1.

Block used is as follows

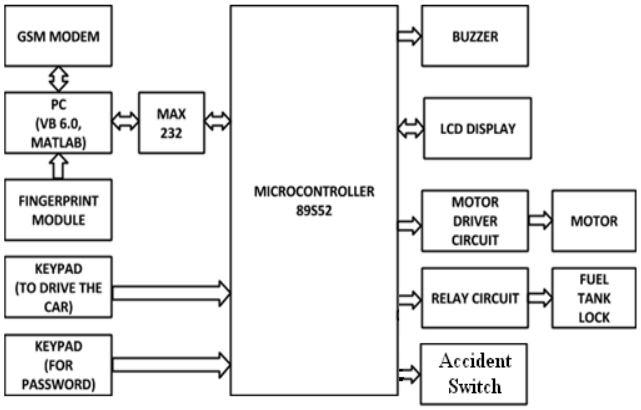


Fig. 1: Block Diagram of Anti-Theft Vehicle Security

1) Fingerprint Module: R305 Fingerprint Module is a serial fingerprint scanner which can be directly connected to the PC's com port. R305 Fingerprint Sensor can easily be connected to any controller via MAX232 IC. This Fingerprint scanner is capable of storing and comparing the fingerprint and accordingly giving the desired output.
2) LCD Display: Various display device such as seven segment display [5]. LCD display, etc. can be interfaced

with microcontroller to read the output directly. In our project we use a two line LCD display with 16 characters each.

3) Relay Circuit: The Relay driver circuit consists of the "transistor relay driver". Using this circuit one relay can be driven in one direction at a time. So as per the data provided to the Relay driver circuit, the relay will switch on/off. The devices are connected to the NO NC contacts of relay [5]. The relay contacts will in turn act as a switch will turn ON/OFF the devices.

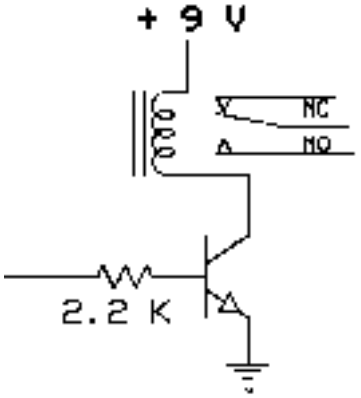


Fig. 2: Relay Circuit

4) Power Supply: Power supply contains the bridge rectifier, regulator and filter capacitor. It provides the 9v supply and we require only 5v. We use IC7809 for regulator. So that regulator is used to limit the power supply.
5) Motor Driver Circuit: In this we use the motor driver IC L293.
6) Keypad: This is used to drive the car and another keypad is used for entering a password while guest user is use the car.
7) MAX 232: The fingerprint module interface and the GSM module are connected to the microcontroller using MAX232Circuit [5]. This performs the role of communication and conversion of input.

D. Process flow

1) The aim of the project was to develop a fingerprint authentication system that was fast, accurate, reliable, and efficient and resource friendly. The developed system integrates feature extraction, minutiae matching, classification and live scanning modules to achieve the objectives.
2) Real Finger Print image is enter through scanner and compare it in Matlab in pc and send data accordingly to microcontroller to display the result on LCD display about status of input image.
3) If the user is authorized then he can drive car through keypad and if he is not authorize user then cannot get the access to the car and display result on LCD screen accordingly.
4) If the user is guest and he need to access car then he has to enter password which provided by owner through keypad password and the comparison of password is take place in pc and accordingly he can access car.
5) If accident is done take place then SMS is to send to specified number via GSM module.

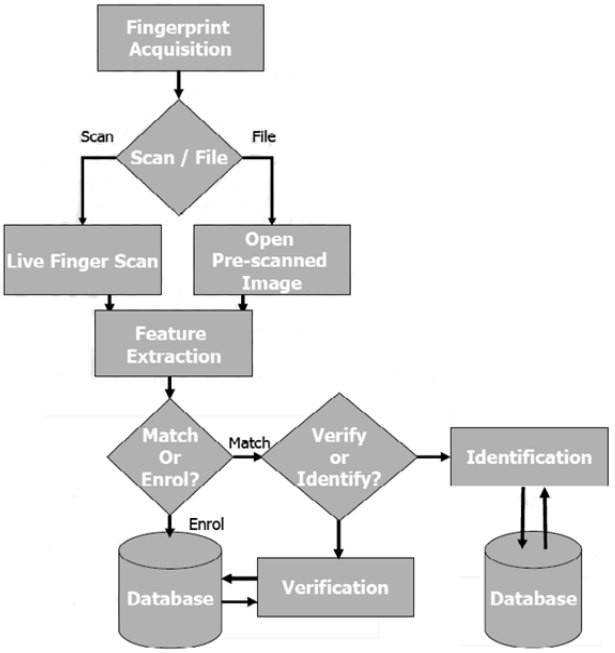


Fig. 3: Fingerprint Scanning

6) For long drive route driver need to activate switch which allow buzzer to activate after predefined time interval and if response provided by driver then no need to send SMS or else SMS is need to send to predefined number.
7) Owner can track his vehicle through GSM and if car has been stolen or it is not in the desired location then lock the fuel tank by sending SMS and activate relay circuit.

III. METHODOLOGY

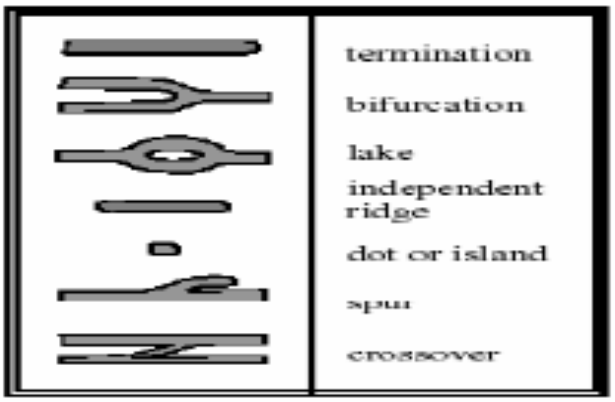


Fig. 4: Some different types of minutiae

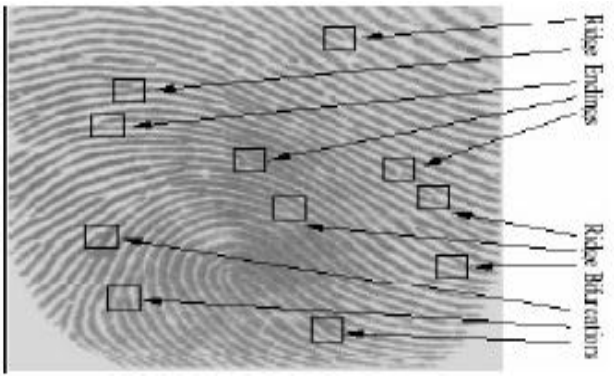


Fig. 5: Ridge bifurcation & ending

A. Minutiae Based Approach in Fingerprint Recognition

Most automatic systems for fingerprint comparison are based on minutiae matching Minutiae are local discontinuities in the fingerprint pattern [1]. A total of 150 different minutiae types have been identified.In practice only ridge ending and ridge bifurcation minutiae types are used in fingerprint recognition. Some of the different types of minutiae are shown in figures 4 and 5

Fingerprint recognition systems based on minutiae

Consist mainly of three stages: Image acquisition/pre-processing, locating the minutiae, and comparing the minutiae list of both fingerprints, often solved as a constrained graph matching problem. This process has many stumbling blocks. Each of the processing steps requires careful fine-tuning of parameters and handling of ambiguous cases. Thus, the whole process of comparing two fingerprints may become rather time-consuming (Anton, 2002; Koichi et al, 2005).

Typical fingerprint recognition methods employ feature-based matching, where minutiae mostly ridge ending and ridge bifurcation are extracted from the registered fingerprint image and the input fingerprint image, and the number of corresponding minutiae pairs between the two images issued to recognize a valid fingerprint image. Minutiae-based matching is highly robust against nonlinear fingerprint distortion, but shows only limited capability for recognizing poor-quality fingerprint images due to unexpected fingertip conditions (e.g., dry fingertips, rough fingertips, allergic-skin fingertips) as well as weak impression of fingerprints.

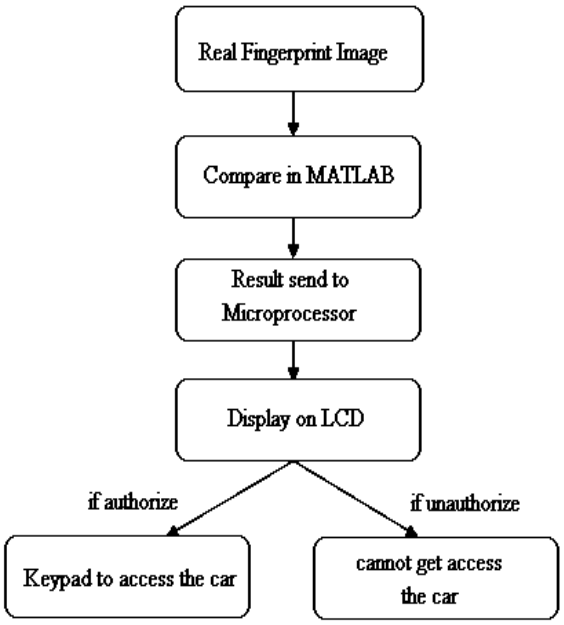
IV. FEATURES

- We can provide high level authentication to the car user.
- Vehicle will start only after fingerprint verification.
- Emergency switch which can be turned ON and OFF using a predefined user password.
- This will help for tremendous fall in theft of vehicles
- Highly accurate
- Low in cost
- User friendly
- Easy to install and run
- Owner will know location of vehicle at his/her fingertips.
- Avoid any illegal acts within the car.

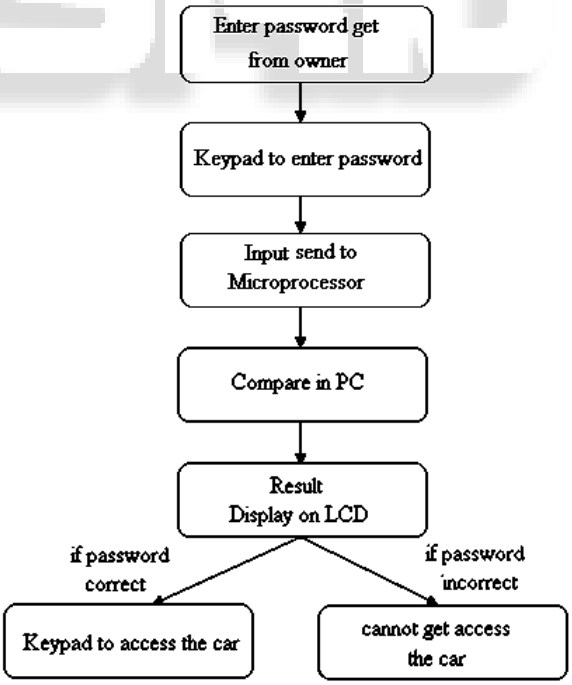
V. WORKFLOW

When a person places his finger on the module, it scans his fingerprint and if he is the first user the module assigns him as master. If another user wants to use this module then he will be regarded as slave [6]. If a person wants to start the vehicle he has to scan his fingerprint and if the scanned image matches with the one stored in fingerprint module memory then the module give a high signal on its fourth pin, i.e. the module indicates a success. Otherwise a high signal will be present on the fifth pin of fingerprint module, i.e. it indicates a failure (user does not exist). When a high on fourth pin is observed, it will cause microcontroller to activate the ignition circuit. When a high on fifth pin is observed, that is a failure so microcontroller will not activate the ignition circuit [8]. When a success is observed, a LCD display will show that the matching is correct and if it is failure then incorrect matching will be observed on the LCD display.

A. For Authorized User



B. For Guest User



VI. LIMITATIONS

1) In the design we are using the Relay switches, thecoil of the switch may be failed.
2) In case of two circuits are failed, the motor vehiclewill never be started

VII. CONCLUSION

Antitheft Vehicle Security System is the total protection to vehicle and fleet management solution. By using the GPS and GSM technology we can protect and monitor car, truck, bike (or movable asset). We are using GSM technology because the extensive availability of GSM network in India and its roaming facility ensure that vehicle can be tracked even on the national highways and in many remote areas. The user or operator can monitor the vehicle in any dangerous condition and thus can perform various tasks including turning off the vehicle and inform to the police station. The impact of doing this project is that we will learn a lot from this project and will carry on this project in future in order to make this system standalone so that it can be deployed with integration with GSM operator/carrier. The company that uses this system will achieve higher level of accuracy and satisfaction.

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