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Smart Security System for Vehicles

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Abstract - *At present, the usage of vehicle has become a basic necessity for everyone. Besides, fortifying the vehicle against theft is also very important. In this paper, we are proposing a solution for these issues by using fingerprint anti-theft system for vehicle safety. A fingerprint of every person is unique, even identical twins don't have the same fingerprint. Because of this fingerprint recognition technique, we can annihilate fear of losing keys or misplacing keys. A fingerprint recognition technique allows accessing only those fingerprints that are stored in the library. In case of vehicle theft we use GPS technology for identifying the vehicle. In this paper we are also focusing on accident detection and location of accident.*

Key Words: **Fingerprint Scanner, Raspberry pi3 B+, GPS, Accelerometer, DC motor.**

1. INTRODUCTION

Biometrics is an automated recognition of individuals based on their physical and behavioral characteristics. There are different types of biometrics which are classified on their physiological and behavioral characteristics. Examples using physiological characteristics are fingerprint, face, DNA, iris, hand. Examples of behavioral characteristics are voice, signature and key strokes. Fingerprint biometric is one of the popular, ubiquitous, reliable, economical and efficient biometric technologies. Due to its versatility, fingerprint biometric is applicable. Fingerprint is popular because of its universality, uniqueness, permanence, acceptability, performance .The main aim of this paper is to provide security to the vehicle from theft, to track the vehicle in case if the whole vehicle is theft and to have accident alertness to the respective person. Table 1 shows the statistics of vehicle thefts worldwide.

1.1 Block Diagram

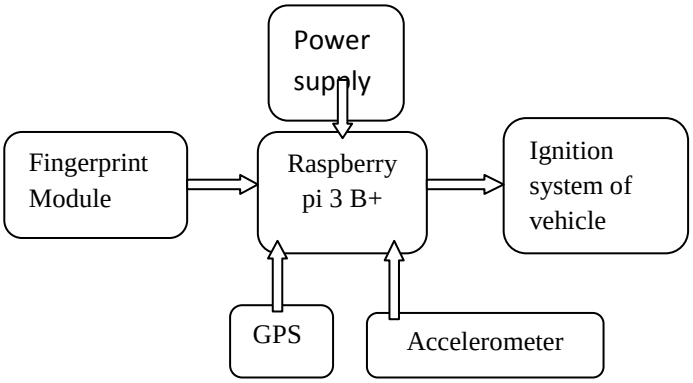


Fig 1.Block Diagram of System

1.2 Working of System

When the user enters the finger on the scanner, the system captures the image and will generate a template. That generated template is verified with the scanned authenticated users. If it is matched, then the vehicle starts. Then the system will start accident detection. If the accelerometers pre-programmed angle is greater than threshold angle value, then it will stop the vehicle. If any accident occurred, it may be minor or major. When accident occurred the timer will start automatically . If within that time tilted angle becomes zero, then the system considers it as a small accident. If within that timer tilted angle does not changes , then the message is sent to registered number .If the fingerprints are not matched, then system will automatically send the theft alert message with location using GPS to the owner of the vehicle by using SMS. The overall flowchart of proposed system is shown in figure.

1.3 FLOW CHART

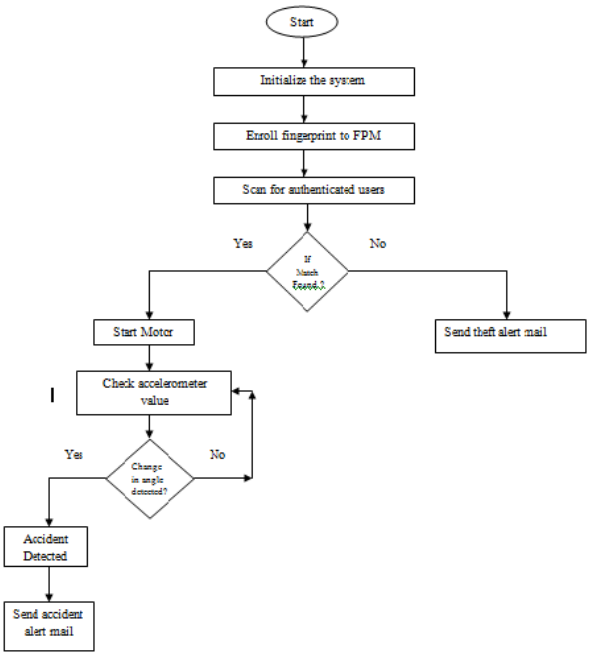


Fig 2.Flow Chart Of System

2. IMPLEMENTATION METHODOLOGY

2.1 Hardware Description

A. Raspberry pi 3 B+

It is the heart of the system, central unit of the system. It controls all the functions of input output devices. It is a 40 PDIP package
Specifications: Processor : Broadcom BCM2837B0, Cortex-A53
64-bit SoC @ 1.4GHz
Memory :1GB LPDDR2 SDRAM Connectivity : 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, Gigabit Ethernet over USB 2.0
4 × USB 2.0 ports.
Access : Extended 40-pin GPIO header
SD card : Micro SD format for loading operating system data storage.
Input power : 5V/2.5A DC
Operating temperature: 0–50°C

B.Fingerprint Module

It includes two parts fingerprint matching and fingerprint enrollment, when enrolling user needs to enter two times. the system will process the two time finger image & generate template and store it. When matching user enters finger through optical sensor & system will generate template of it. And compare it with specific template designed in the module. Fingerprint processing consists of three steps: Enrollment, Verification and Identification.

In Enrollment, when the user keeps the finger on the scanner, the system will capture the image. From that image, the system will extract the feature. Using the feature, the system will generate the template.

In Verification, the user enters the finger through sensor and will generate a template of the finger. This template is Verified with the template generated in enrollment process by matching. If it is matched, it will store in the Database. In Identification, the system will generate a template, when the user keeps the finger and that template is compared with the stored templates by 1: N matching. If it is matched, then the subject is identified else not identified.

Power: 3.6 v to 6v, 100mA
Storage capacity: 256.

C. GPS

GPS circuit designed for broad spectrum of OEM system application. The GPS smart antenna will track up to 32 satellites at a time while providing fast time to first fix. one second navigation update and low power consumption The 4 Pins are 5V,TXD,RXD and GND. Yes, there is no setting required, just plug in to the power (5v), your raw data (NMEA0183) is ready at TX pin. This is a standalone 5V GPS Module and requires no external components. GPS (Global Positioning System) is a satellite based navigation system, consisting of 24 satellites located into orbit.
The system provides essential information to military, civil and commercial users around the world and is freely Accessible to anyone through GPS receiver. GPS works in any weather circumstances at almost anywhere in the world. Normally there are no subscription fees or system charges to utilize the GPS. The bandwidth of GPS receiver antenna is 10MHz minimum .GPS is used to detect the vehicle location and provide information to responsible person through mail.

D. ACCELEROMETER

An ADXL335 is small thin low power complete 3 axis accelerometer with signal conditioned voltage output the product measure acceleration with minimum 3g. It can measure static acceleration with of gravity in tilt sensing application and dynamic acceleration resulting from motion, shock or vibration In these devices, piezoelectric, piezoresistive and capacitive techniques are commonly used to convert the mechanical motion into an electrical signal. An accelerometer is a sensor that measures the physical acceleration experienced by an object due to inertial forces or due to mechanical excitation. In aerospace applications accelerometers are used along with gyroscopes for navigation guidance and flight control. Conceptually, an accelerometer behaves as a damped mass on a spring. When the accelerometer experiences acceleration, the mass is displaced and the displacement is then measured to give the acceleration.

In these devices, piezoelectric, piezoresistive and capacitive techniques are commonly used to convert the mechanical motion into an electrical signal. Piezoelectric accelerometers rely on piezoceramics (e.g. lead zirconate titanate) or single crystals (e.g. quartz, tourmaline). They are unmatched in terms of their upper frequency range, low packaged weight and high temperature range.

Piezoresistive accelerometers are preferred in high shock applications. Capacitive accelerometers performance is superior in low frequency range and they can be operated in servo mode to achieve high stability and linearity.

2.2 Software Design

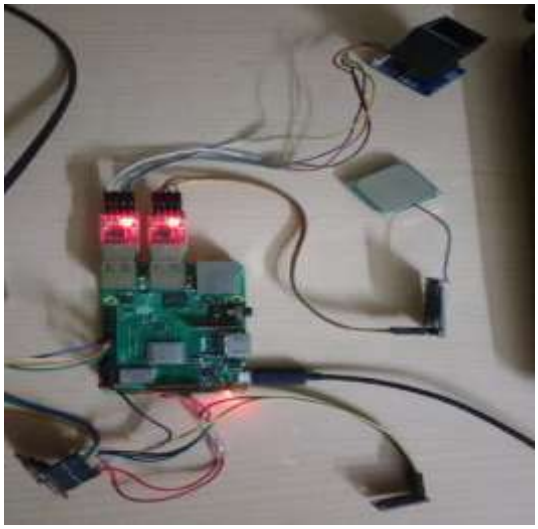
The software used for designing the proposed system is Geany IDE (Integrated Development Environment).

Geany is small and lightweight IDE.it was developed to provide a small and fast IDE which has only few dependencies from other packages. Another goal was to be independent as possible from a special desktop environment like KDE or GNOME-geany only requires the GTK to run time libraries.

3. CONCLUSIONS

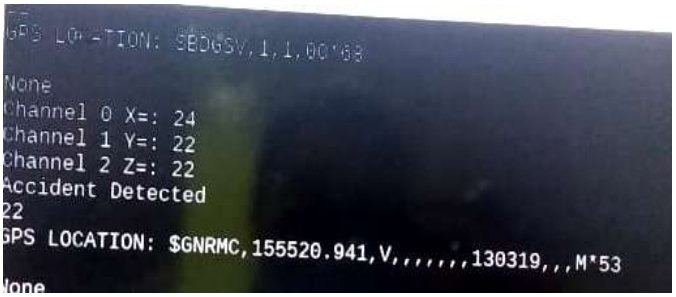
Security is the pivotal for any system. Thus Fingerprint identification enhances the security of the vehicle and makes it possible for only authorized user. The proposed system includes the accident detection which detects and provides the location of occurred accident. This system improves safety features in vehicles, hence proving to be an effective development in automobile industry.

1. Project



2.Enrollment and Authentication of fingerprint.

2.Accident Detection and GPS Location



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