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Biometric Based Two-Wheeler Security System using GPS and GSM Technology

Prathaban. A[1], Keerthi Bhooshan. S[2], Vijayaraj. G[3], Dinesh. S[4], Jeevanantham. J[5]

UG Scholar, Department of Instrumentation and Control Engineering,

Sri Manakula Vinayagar Engineering College, Puducherry[1,2,3,4]

Assistant Professor, Department of Instrumentation and Control Engineering,

Sri Manakula Vinayagar Engineering College, Puducherry[5]

Abstract: In the fast-moving world there are lots of bikes theft occurring in day to day life. This bike theft occur even when we park them. With utmost security even in the presence. There are many techniques which have been used and implemented to prevent this technique which some have had a little impact while some of them had none and have some major confronts in vehicle designing and are tedious process. In some cases even though the victim register the complaint to the nearby police station they don't take any effort to find and locate that as it also takes long time to locate the place of the vehicle that was stolen the system we are developing will make their job easier as its help them in doing so. People will be more secure and stress free over their vehicle. The technology which we implementing is sensors the automobile will have fingerprint sensor installed in which it helps to safeguard the vehicle in terms of theft every automobile driver has to authenticate with their respective fingerprint in order to drive the automobile accessing with the fingerprint reads the details of a particular driver with previous stored data and all necessary details. Thus, if the sensor placed detects the false fingerprint then the automobile will be immobilized in order to avoid this situation we have come up with the idea of storing 3-4 trustworthy people fingerprint in addition to this in order to know the where about the vehicle we are used GSM and GPS technique which will send information about the vehicle to the whatever number is stored in the device. We can also directly send message to the police station for immediate action does by implementing this technology we can prevent the possible theft of vehicle with much ease and at lower cost.

Keywords: Fingerprint Sensor, Prevention of Theft, Gsm, Automobiles, Gps, Arduino Uno Atmega 328

I. INTRODUCTION

The technology stack which we are implementing is Sensors. The automobile will have fingerprint sensor installed which will help in safe guarding the vehicle in terms of theft. Every automobile driver has to authenticate with their respective fingerprints in order to drive the automobile. Accessing with the fingerprint reads the details of that particular driver with previous stored data and all the necessary details. Thus if the sensor placed detects the false fingerprint then the automobile will be immobilized. In order to avoid these situations in emergency situations we have come up with the idea of storing up to 3-4 trustworthy people's finger print. In addition to this, in order to know the whereabouts of the vehicle we have implemented the use gsm and gprs techniques which will send the information about the vehicle to whatever the number we store in that device. We can also send the message directly to the police station for immediate action. Thus by implementing this technology we can prevent the possible theft of vehicle with much ease and at lower cost. It can be implemented in a short time as well.
In this paper existing scenarios and proposed structural design are explored, describing the varied modules intimately and therefore the corresponding working methodology. The entire security system is executed as a prototype model .

II. EXISTING SYSTEM

Various anti-theft systems are developed over the few decades. An Engine Control Unit (ECU) is connected to the Info-Security circuit card and sensors inside the vehicle bus. The bus communicates with other vehicles with wireless communication interfaces. The shortcoming of this technique is that the info timeliness and network delays to apprehend reliable secure car communications. The highly developed system uses the worldwide Positioning System to trace the position of the vehicle and its existing location. GPS uses global navigation satellite system. The position in sequence provided by GPS system are often visualized using Google earth. the most complication of using GPS is that the signal can become degraded and receiver system won't provide location if view of the sky is severely limited. it's also inclined by other factors like rainfall, fog and snowfall. Radio Frequency Identification (RFID) is employed in Intelligent

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Computerized Anti-Theft System [ICAT]. RFID cards are wont to provide secured access. The restriction here is that keyless RFID cards are often easily stolen. additionally, key may malfunction on contact with metallic object. Some systems use Auto cop mechanism which may be a video surveillance solution which will be fitted into the vehicle.

III. PROPOSED SYSTEM

Fingerprint Recognition System:
Biometrics is that the method of identifying human by their own unique characteristics. There are various biometric patterns which include face recognition, iris scanner, fingerprint, dna scanner, retina scanner, palm print, ear, voice, signature, hand shape, typing rhythm and gait. But there is no single biometric techniques has been proven to be perfectly reliable or secure. For illustration, palm prints are usually frayed; Voice, signature, hand shapes and iris images are easily forged; thanks to various lightening conditions and face-lifts, face recognition will end in poor accuracy. In addition, iris and face recognition are vulnerable to spoofing attacks. The Fingerprint biometrics is that the gifted biometric pattern for private detection in terms of security and reliability. It is difficult to forge or steal. It is accepted worldwide. Live fingerprint readers supported optical, thermal and ultrasonic approach are used.

The two commonly used fingerprint recognition techniques are minutiae-based matching and pattern matching. In pattern matching technique, only the similarity between the two images are compared for the recognition. Minutiae matching relies on minutiae points i.e. location and direction of each point. The fingerprint recognition system contains mainly a picture capturing module, feature extraction module and pattern matching module. The representation of these modules is given,

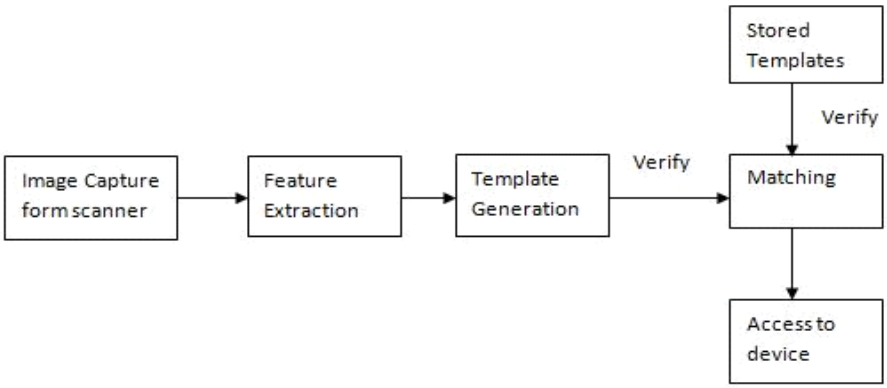

Fig 1– Working of Biometric System

The fingerprint recognition system used is predicated on ultrasonic sensors which avoids fake authentication. The optical sensors just capture the pictures on the surface of the scanner and hence it are often fooled easily. Whereas, Ultrasonic sensors captures the minutiae from epidermal layer of the skin and it is efficient for liveness detection. The system expected to possess very low FRR (False Rejection Rate) of 0.1% and much (False Acceptance Rate) of 0.01% respectively.

IV. RELATED WORK

A. Hardware components

1) Arduino Atmega (328P): It is an open source computer hardware and software company, project, and user community that designs and manufactures single board microcontroller and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The Atmel 8-bit AVR RISC based Microcontroller Computer 32KB 1SP Flash Memory with read-while-write capabilities, 1KB EEPTOM, 2KB SRAM, 23 general purpose register, 3 flexible Timer/Counter with compare modes, Internal and External interrupts, serial programmable USART, a byte oriented 2-wire serial interrupts. SPI serial port, 6 channel 10 bit A/D converter programmable watch dog timer with internal oscillator and five software selective power saving modes. The device operates between 1.8-5.5V. The security system mechanism contains two approaches. like, if the battery supply is ON and system is active. When an unauthorized person tries to show on the vehicle, then alert message are going to be sent to the authenticated user in system and vehicle are going to be moved to OFF condition. the next mode is where, when the battery supply is cut off during theft attempt, the authorized person will be going to authenticated and will be given access using gps and engine control unit which is embedded within the atmega 328.

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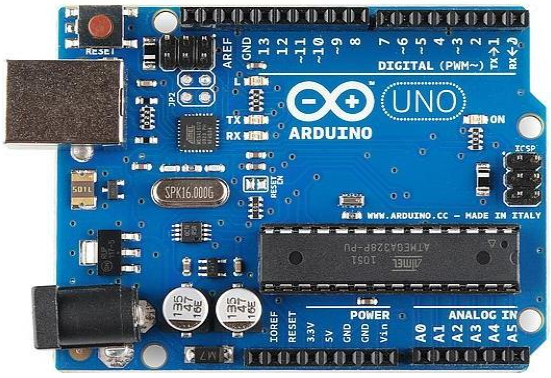

Fig 2. Atmega 328P

The main component (BRAIN) of this technique is atmega 382 microcontroller. it's liable for all monitoring and generating the inputs and outputs respectively. The output of the system are going to be displayed on LCD of SMS arrival status and configuration etc. Totally five trials are going to be given to the user and if the scan matches access are going to be given to the owner. Else if intruder is accessing the system and three trials are failed then alert message are going to be sent to the owner's vehicle. On receiving the SMS from owner using GSM technology, the alarming system are going to be activated. just in case of network error on the owner position, the second alert message could also be sent to nearby police headquarters.
The serial communication is provided by RS232 cable. It interfaces the programming to the prototype model. The interfacing between microcontroller and GSM is thru UART (Universal Asynchronous Receiver Transmitter) communication which is serial communication protocol.

2) Human-Machine Communication Module: Human machine communication represents the worldwide System for Mobile (GSM) that acts as an intermediate between owner and system. GSM is that the worldwide accepted standard for digital cellular communication. GSM modems are most often wont to provide mobile internet connectivity and lots of are used for sending and receiving Short Message Service (SMS). A wireless link is provided between the owner's cell phone and between arduino by GSM (Global System for mobile) module. It is similar to dial-up modem. The main dissimilarity between them is that in dial-up modem transmission and reception of knowledge is thru fixed telephone line whereas wireless modem uses radio waves. PIC uses AT (Attention) commands to control modems. GSM modem maintain set of standard AT commands.

- Reading, writing and deleting SMS messages
- Sending SMS messages.
- Monitoring the signal strength.
- Reading, writing and searching phone book entries
- System Design

An anti-theft vehicular system has the following components. The hardware and software design is explained during this session

3) Liquid Crystal Display (LCD): LCD represents display of numeric and alphanumeric characters in matrix and segmental displays. LCD requires 3 control lines and eight I/O lines for the info bus.

4) Motor: The prototype model uses DC motors. DC motors are a part of the electrical motors using DC power as energy source. These devices transform electricity into energy. the essential principle of DC motors is same as electric motors generally, the magnetic interaction between the rotor and therefore the stator which will generate spin. which is used to indicate that authentication is granted to run the vehicle.

5) Global positioning system: The GPS is a satellite-based radio navigation system owned by the indian government and operated by isro, called the navic satellite. It is one of the Global Navigation Satellite Systems (GNSS) that provides geolocation and time information to a GPS receiver anywhere on or near the Earth.Here the GPS is used to send the latitude and longitude position of the vehice to the owner by the help of GSM module. when the attempts fails for more than five times. While engine is in off condition but if GPS location changes significantly, alert SMS are going to be sent to theauthorized person. Hence it provides security even when there's no battery supply to the engine unit. The ECU is powered by the vehicle battery itself.

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B. Software Components:

1) Arduino software: Arduino is an open-source electronics platform supported easy-to-use hardware and software. Arduino boards are ready to read inputs - light on a sensor, a finger on a button, or a Twitter message - and switch it into an output - activating a programmed process, turning on an lights. You can tell your board what to try to by sending a group of instructions to the microcontroller on the board. To do so you employ the Arduino programing language, and therefore the Arduino Software (IDE), supported Processing. a microcontroller on the board that is actually programmed and accepts the information in the form of code. the main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded within the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where former is employed for writing the specified code and later is employed for compiling and uploading the code into the given Arduino Module.

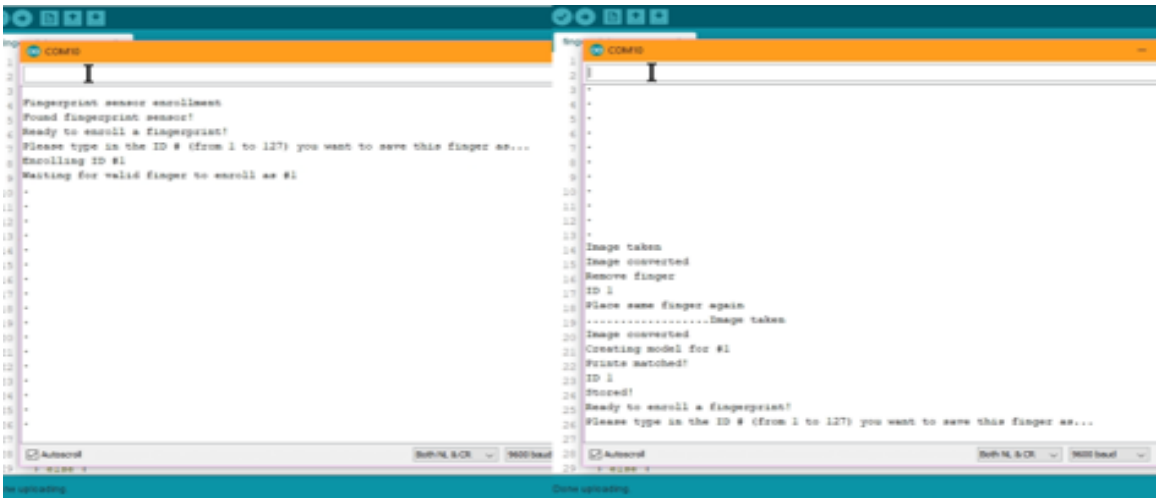

Fig 3: Coding for storing the fingerprint

The code is uploaded in the Arduino 1.8.10 software application and the Arduino MCU board were configured. By using the fp sensor and arduino the fingerprints are scanned as an image and it is stored. We can able to add upto five fingerprints. Once the image is captured the board is ready to do the further process of security.

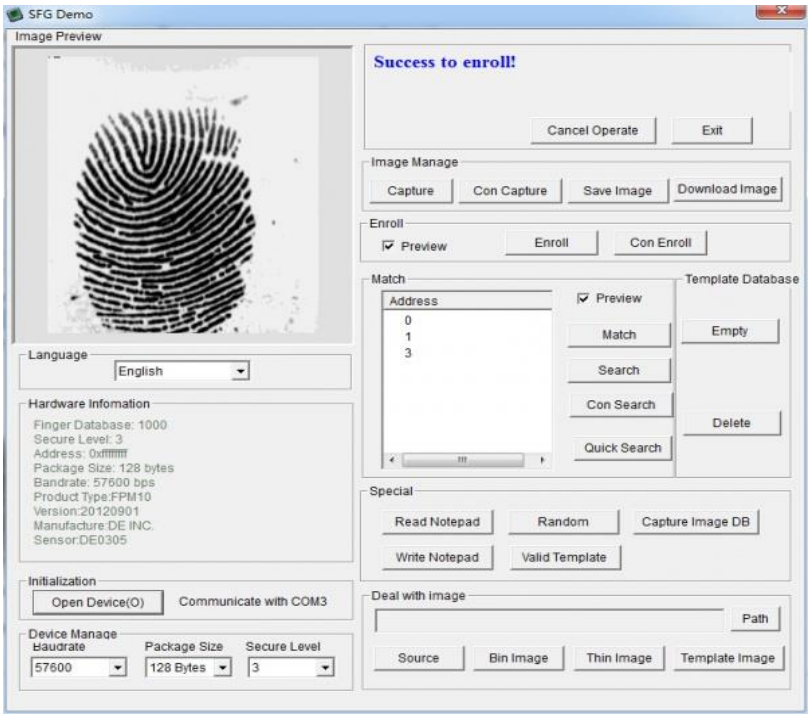

Fig4: Fingerprint sensor scanner with arduino.

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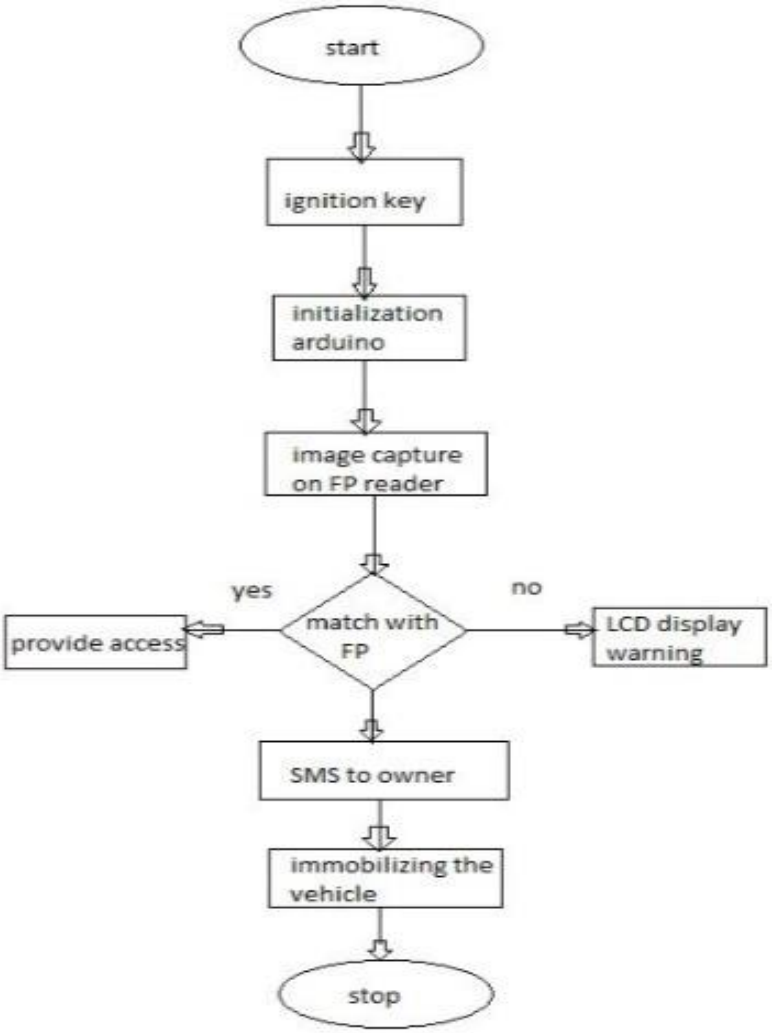

Fig.5: Working mechanism of fingerprint.

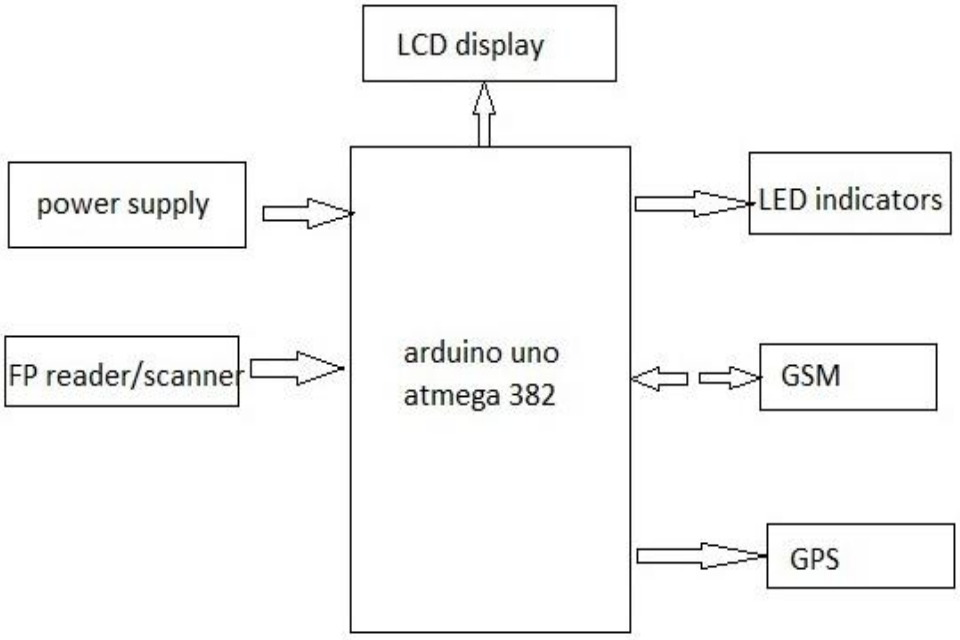

Fig (6) block diagram of security system

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V. CONCLUSION

Security is prime criteria altogether quite applications. This project is aimed toward improving the extent of security for vehicles. As the fingerprint may be a promising biometric pattern for identifying an individual in terms of both security and simple use.

This is a singular method of conniving and assembling a lowcost, packed in theft system for an automobile which is very reliable.

The work presented demonstrates the initial phase of an embedded car which will be visible in near future. Customized vehicles won't only provide a more interesting drive but also safer one.

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