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ADVANCED SECURITY SYSTEMS IN AUTOMOBILES

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Abstract: Engineers of this present growing, competitive world are daily on their tracks in making things easy, fast, precise, and powerful. Besides all these steps and leaps to make things enhanced, there is a huge need to keep things safe and secured. That is, above all that things are enhanced to work more and more efficiently, they have to be made secured. In present, the conventional systems which are used for the security of automobiles are having many flaws. So, our project is all about making an advanced security system which can be installed to any of the automobiles, say cars, bikes, trucks, etc., to achieve accuracy and reliability in security system, we can employ electronics circuits. In this project we are adapting advanced biometric system like Fingerprint sensor and DTMF module controller for enabling the control from all over the world. Because of these we ensure the security features of the automobile is impenetrable so far.

Keywords: security of automobiles, advanced security system, Fingerprint sensor, DTMF,**Introduction:** Currently in automobiles the ignition of an automobile is controlled by using a car key which acts as a switch to enable the battery supply to the ignition system but these system can easily be overridden and so we need a system which has a higher robust nature with flexibility. In that case we can go for a microcontroller based system, which enables high security of the automobiles with a seamless performance. Here, in our project we are using microcontroller systems with various sensors and modules to meets these requirements. In our project the microcontroller board which we are using is Arduino Uno. The two different modules (sensors) which are used in our project are DTMF Module and Fingerprint sensor.

Arduino:

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

Hardware:

Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available. The official policy document on use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. Most boards include a 5 V linear regulator and a 16 MHz crystal oscillator or ceramic resonator.

Software:

A program for Arduino may be written in any programming language for a compiler that produces binary machine code for the target processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio. The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java. It originated from the IDE for the languages Processing and Wiring. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple one-click mechanisms to compile and

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upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus.

A program written with the IDE for Arduino is called a sketch. Sketches are saved on the development computer as text files with the file extension .ino. Arduino Software (IDE) pre-1.0 saved sketches with the extension pde. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Fingerprint sensor:

Fingerprint scanners are security systems of biometrics. They are now used in police stations, security industries and most recently, on computers. Everyone has marks on their fingers. They cannot be removed or changed. These marks have a pattern and this pattern is called the fingerprint. Every fingerprint is special, and different from any other in the world. Because there are countless combinations, fingerprints have become an ideal means of identification.

There are basically two requirements for using the optical fingerprint sensor. First is you'll need to enroll fingerprints - that means assigning ID #'s to each print so you can query them later. Once you've enrolled all your prints, you can easily 'search' the sensor, asking it to identify which ID (if any) is currently being photographed. You can enroll using the windows software (easiest and neat because it shows you the photograph of the print) or with the Arduino sketch (good for when you don't have a windows machine handy or for on-the-road enrolling).

By placing the finger on a surface, the three dimensional finger is being mapped onto a two dimensional plane. As a result distortions occur. The skin on the finger will stretch when pressed against the surface. This stretching causes slight changes in the distances between features on the fingerprint. In most cases, different levels of pressure will be used each time the individual's finger is scanned. This results in slightly different images as well. The non-uniform contact occurs due to minor inconsistencies in the surface of the finger. For a fingerprint-scanning device to capture the whole fingerprint, it is necessary for the whole print to be in contact with the scanning surface.

DTMF:

DTMF stands for Dual Tone Multi Frequency. DTMF is a basis for voice communications control and is widely used worldwide in modern telephony to dial numbers. A DTMF signal is consisted of the sum of two sinusoidal frequencies (high group and low group), frequencies with smooth repetitive oscillations. Those frequencies were chosen to prevent any harmonics from being incorrectly detected by receivers as some other DTMF frequency. The frequency of each dial number is shown in figure. The transmitter of a DTMF signal simultaneously sends one frequency from the high-group and one frequency from the low-group.

For example, sending 1209 Hz and 770 Hz indicates that the "4" digit number was being sent. The signal generated by a DTMF encoder is a direct algebraic summation (in real-time) of the amplitudes of two sines or cosines waves with different frequencies. At transmitter, the maximum signal strength of a pair of tones must not exceeding +1 dBm, and the minimum signal strength is -10.5 dBm for the low- group frequencies, while for the high-group frequencies is -8.5 dBm.

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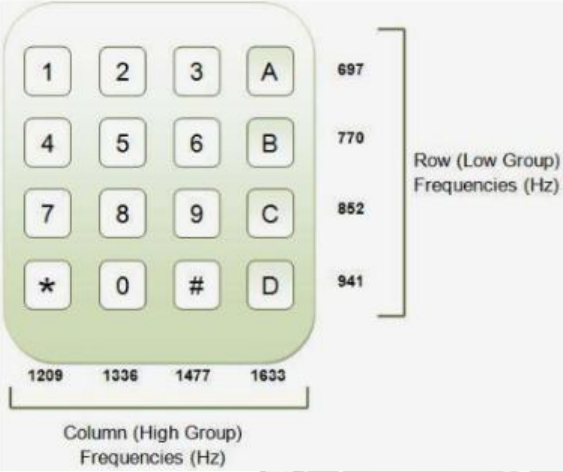

Fig 1.4 DTMF pad shows the low and high group frequencies.

DTMF module as can be seen in is used as one of the main parts of this device. This module contains a sound sensor which is suitable for DTMF tone as it was programmed by Arduino. This DTMF module, with scale dimension of 37 mm x 37 mm x 9 mm has three main specifications, namely:

•Microphone integrated for testing with LED that shows the audio signal strength,

•Audio socket for application,

•Potentiometer on board to regulate the receiving volume.

Relay:

Relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

Fig.1.5 Relay

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

Magnetic latching relays require one pulse of coil power to move their contacts in one direction, and another, redirected pulse to move them back. Repeated pulses from the same input have no effect. Magnetic latching relays are useful in applications where interrupted power should not be able to transition the contacts.

Magnetic latching relays can have either single or dual coils. On a single coil device, the relay will operate in one direction when power is applied with one polarity, and will reset when the polarity is reversed. On a dual coil device, when polarized voltage is applied to the reset coil the contacts will transition. Ac controlled magnetic latch relays have single coils that

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employ steering diodes to differentiate between operate and reset commands.

Literature Survey: ***Herry Azhari Rangkuti and Joni Welman Simatupang [1]*** - *"Security Lock with DTMF Polyphonic Tone Sensor"***-** In this paper, the security lock with DTMF polyphonic tone sensor using Arduino software programming has been proposed and implemented. ***Ajinkya Kawale [2]*** - *"Fingerprint based locking system"***-** This report focuses on the use of fingerprints to unlock locks, as opposed to the established method of using keys. The main aim of this project is develop a secure locking sys- tem based on fingerprint scanning. In this project, microcontroller accompanied with an interface circuit has been used for opening and closing lock based on finger print which is stored in microcontroller itself so that only authorized person will access the security lock.

A. Aditya Shankar, P.R.K.Sastry, A. L.Vishnu Ram, A.Vamsidhar [3] - *"Finger Print Based Door Locking System"* **–** This paper presents a fingerprint based door opening system which provides security which can be used for many banks, institutes and various organizations etc..,. There are other methods of verifying authentication through password, RFID but this method is most efficient and reliable. To provide perfect security to the bank lockers and to make the work easier, this project is taking help of two different technologies viz. EMBEDDED SYSTEMS and BIOMETRICS. ***Ibrahim, S.A, Tijjani, A.M [4] – "****Design and Implementation of A Dual Tone Multi-Frequency (DTMF) Based Gsm Controlled Car Security****"* **–** This paper focused on developing an enhancement of the vehicle antitheft security systems via a Phone call. It is designed to improve vehicle security and accessibility since it can be used to monitor and control other devices in the vehicle. The system will manipulate a mobile phone to send commands in form of DTMF signals to the vehicle. It utilizes an embedded system design with Dual Tone Multi Frequency (DTMF) and a GSM to monitor and safeguard a car. Upon activation, it automatically demobilizes the car by disconnecting the ignition key supply from the car battery.

Working

Fingerprint sensor:

The fingerprint sensing unit of the system has to be first enrolled with the fingerprints of the car users and is loaded with verification program. Now, when anyone tries to access the car by using their fingerprint, the unit will compare the image taken in this finger to the saved image and if it matches the unit will send a signal to the relay which will activate the ignition system. If the fingerprint sensed is not matching with the pre-set fingerprint the Arduino will not send a signal for activation to the relay circuit which in turn keeps the ignition system kept off. The indications for both the activation and de-activation of the ignition system is given by 2 LEDs, red and green for ON and OFF of the ignition system respectively.

DTMF module:

The DTMF module has quite simple working. The owner of the car has to call the mobile which is placed with the DTMF module unit and have to press the number which is assigned for activating the ignition system of car. The DTMF sensor will sense the input and if the number is correct it will send a signal to relay unit which in turn activates the ignition system. If the DTMF signals received is not matching with the pre-set of the Arduino will not send a signal for activation to the relay circuit which in turn keeps the ignition system kept off. The indications for both the activation and de-activation of the ignition system is given by 2 LEDs, red and green for ON and OFF of the ignition system respectively.

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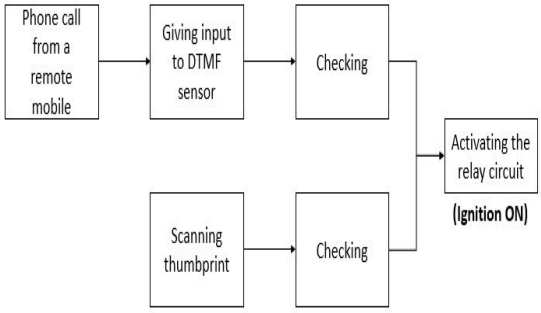
Schematic working diagram:



Scope and future development:

This project is having an outstanding scope in all automotive industries as it comprises of several advantages such as,

- Great ability of anti-theft.
- Easy user interface.
- Simple but Secured.
- Cost of per unit in mass production will be very low.
- Various improvising features such as reliability and durability.

Any of the normal automobile security system can be upgraded to advanced security system very easily as the installation of this system is much easier. Using this system we can control the ignition system of car from any part of this world. So, if our friend needs to access our car, we can easily give him permission to access our car. It's very responsive as it works on a micro-controller unit.

This project idea can be directly proposed as an add-on in all automotive industries, as many of the automobiles manufactured these days possess normal security in ignition systems. This add-on in any car as a mass production is going to only take a very small sum in selling price of that respective automobile. This project has a good feasibility as it is very simple and secured, many people across the globe will definitely is in search of a simple but secured way of safeguarding their properties. So, in that case this project serve as a pioneer.

As a future development a better GUI can be integrated with this project like that of an LCD display for activating, the various units of this system. Password with more characters can be implemented.

Conclusion: By using advanced security system the limits over the present security systems can be overcome. As the system is very simple, authentic and safe it will hold a good place if it is released in market. As the system which we are using is completely digital, it has high accuracy and is robust. The development of these type of systems will be a game change in the automobile field and that to in security systems. In future, various sensors and actuators might be used in order to enhance the feel of safe mobility.

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[4] Ibrahim, S.A, Tijjani, A.M – ***"Design and Implementation of A Dual Tone Multi-Frequency (DTMF) Based Gsm Controlled Car Security"*** (International Journal of Engineering Inventions, e-ISSN: 2278-7461, p-ISSN: 2319-6491, Volume 4, Issue 12 [August 2015] PP: 31-37)