

Vehicle Starting System using Fingerprint & Accident Detection using IOT

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Abstract: *The main purpose of this project is protecting vehicle from theft. Now a day's vehicle theft is increasing rapidly. People have started to use the theft control system installed in their vehicles. The commercially available anti-theft vehicular system is very expensive & this project is developed as low cost vehicle theft control scheme using a microcontroller & with usage of GPS & GSM technology. Also the accident detection feature in this system will send emergency alert message to police, family & ambulance along with exact location, in case the vehicle is met with an accident. Our system is linked to Google map to locate exact position of vehicles. In this paper a security for vehicle ignition system by fingerprint technology is implemented. Using this paper the access to a car can be controlled using finger prints. For this an embedded finger print module is used in which the finger prints of the owner and his other authorized users will be fed into the embedded module. This finger print module is further connected to a microcontroller that controls the connection to the ignition of the car. Hence the car can only be started using a proper finger print match. Else the vehicle will not be started and sends an SMS to owner. The project will also include GSM module connected to the controller.*

Keywords: Arduino IDE, Sensors, Automation, GSM-GPS module, Accident Detection, Fingerprint Sensor

I. INTRODUCTION

Recently vehicle tracking system is getting vast popularity because of the rising number of the stolen vehicles. Vehicle theft is happening on parking on sometimes driving in unsecured places. This project explores how to avoid this kind of stealing & provide more security to the vehicles. The implemented system contain single board embedded system which is equipped with Global system for mobile communication (GSM) & Global Positioning System (GPS) along with a microcontroller installed in the vehicle. The use of GSM & GPS technologies allows the system to track the vehicle & provide the most up-to-date information about on-going trips. Moreover, fingerprint sensor is done in the implemented system to ensure the driving of correct person. The implemented system is very simple with greater security for vehicle anti-theft protection & low cost technique compared to other. If the vehicle is met with an accident, an immediate alarm is sent to the family, ambulance & police with the current location of the vehicle. This technique helps in taking fast steps toward an attempt to steal the vehicle. The design is robust & simple.

The main objective of the project is to prevent security from theft, so we proposed a new system. An important and reliable human identification method is fingerprint method is fingerprint identification. Fingerprint identification is one of the most popular and reliable personal biometric identification methods. Increasing number of theft cases of the vehicles, there is a need to increase the security level of the vehicles. Traditional and commonly used key available in the vehicles are well known to the thieves and thus it can be easily unlocked by the professional thieves. With the help of master key it becomes very easy to unlock the lock of the vehicles by the thieves. This creates the demand of such type of lock which is new and provides an additional security levels. As embedded system complexity and computing power continue to grow, they are starting to control more and more of the safety aspects of the overall system. These safety measures may be in the form of software as well as hardware control. Mechanical safety backups are normally activated when the computer system loses control in order to safely shut down system operation. Software safety and reliability is a bigger issue. Software doesn't normally "break" in the sense of hardware. However software may be

so complex that a set of unexpected circumstances can cause software failures leading to unsafe situations. Discussion of this topic is outside the scope of this book, but the challenges for embedded designers include designing reliable software and building cheap, available systems using unreliable components. The main challenge for embedded system designers is to obtain low-cost reliability with minimal redundancy.

II. LITERATURE SURVEY

Previously, Vehicle theft has become a matter of concern these days. In most of the cases the vehicle which is stolen is not traceable by the owner of the vehicle and also any Accident occurrence. So there is a demand for better security systems. This project presents a novel security system which makes use of GPS and GSM technologies. The Global Positioning System is a satellite based communication system. The GPS satellites transmit signals at L1 and L2 frequencies containing the ephemeris data, navigation data, codes etc which are used to determine the location of the vehicle in three-dimensional coordinates i.e., latitude, longitude, and altitude along with the precise time. The signals from GPS satellites are available free of cost which enable the GPS receivers to determine the location, the time, along with the velocity. As the usage of vehicles is increasing rapidly with the growing population the number of vehicle thefts are also increasing day by day. And also the number of deaths due to the accidents in the remote areas is also increasing. As accidents are one of the major causes of deaths the road safety has also become a challenging task. According to reports thousands of vehicles are being stolen every year and recovering of the vehicle had also become a tough job as most of the stolen vehicle parts are separated and sometimes, they are sold to other persons as second-hand vehicles. According to road accident report lakhs of accidents took place in the country every year. And hundreds of people are losing their lives every day due to the accidents as there are not getting help at the right time. This project is used to provide solution for the vehicle theft situations and also to prevent the loss of lives due to accidents in the remote areas. When the user sends the predefined message to the modem, the modem receives the message and intimates the same to the microcontroller. The microcontroller retrieves this message from the modem by issuing certain AT and T commands to the modem. Thus, after receiving the message from the modem, the microcontroller automatically locks the vehicle. This will be done perfectly without the involvement of any human. The locking of the vehicle is shown by the relay in this project. The smart card consists of finger print of the authorized driver. If this smart card is inserted into the vehicles security system only then the driver's authenticity will be verified by the system and will be allowed to drive the vehicle. In the prototype developed we used a relay and a motor to replace the conventional ignition system. The seat belt safety system incorporated with proximity sensor. So the output from the IR module will be read by and ignition will be given access through relay. Thus a multilevel safety system will help in authorized use of vehicle. Life is precious and short, and a large number of lives are lost due to accidents every day. There is a need to have accident detection system, location and information sharing system in place to save victims. [H. M. Sheriff[1], M. A. She did [2] and S. A. Senbel[3]] designed a "Real time traffic accident detection system using wireless sensor network" using Wireless Sensor Network and Radio-Frequency Identification technologies. In this they have explained the hardware prototype setup, the algorithms used, configuration of the setup advantages and the limitations of the entire system. The sensor in the vehicle is used to detect the accident happened. The sensor then the control to microcontroller. The microcontroller is used to send the alert message to respective members. They track the location where the accident has occurred using GPS[4] and directs the alert message to the respective authorities using GSM[5]

III. PROPOSED SYSTEM

In the design of this fingerprint-based vehicle starting system, signals are generated by the Arduino to appropriate module circuit. The whole system is aimed to be constructed in a plastic casing to enhance heat evacuation and working efficiency of the system. The Arduino reads the state of the input buttons which could be either a 1 or a 0. The signal Arduino gets from the input button tells what to work on at that time. This project is aimed to replace the push-button in vehicle ignition and create a more reliable and secured way of starting the ignition with fingerprint pattern only. The Arduino environment has been designed to be easy to use for beginners who have no software or electronics experience. With Arduino, you can build objects that can respond to and/or control light, sound, touch, and movement. Arduino has been used to create an amazing variety of things, including musical instruments, robots, light sculptures, games,

interactive furniture, and even interactive clothing. Arduino is used in many educational programs around the world, particularly by designers and artists who want to easily create prototypes but do not need a deep understanding of the technical details behind their creations. Because it is designed to be used by nontechnical people, the software includes plenty of example code to demonstrate how to use the control board's various facilities.

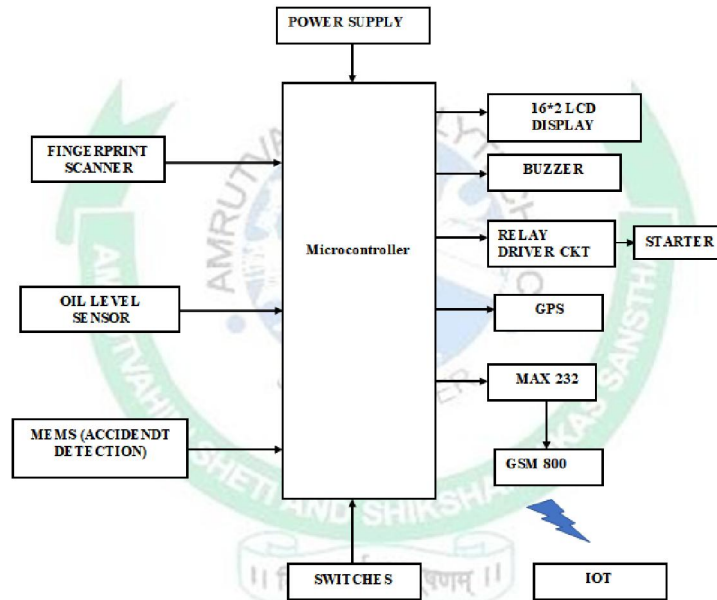


Fig.1. Block Diagram

3.1 Arduino Uno Microcontroller

It is an Arduino is one of the platform used for this project. It is a software feature which enables experienced programming designers to utilize the Arduino code to converge with the current programming language libraries can be broadened and changed. It is an awesome tool for individuals with all ability levels. Both physical programmable circuit board and programming is in Arduino. It continues running on PC which is utilized to compose and exchange PC code to the physical. Arduino has capacity such as interacting with light on a sensor, a finger on a button, running a motor, switching on an LED and distributing something online. In addition, Arduino doesn't need a separate piece of hardware, to load a new code onto the board since it can utilize it with a USB cable. The most utilized ones are Arduino Uno and ArduinoMega. Arduino IDE is utilized to program an Arduino and it utilizes a straightforward version of C++. This makes the program to be learnt less demanding. Rajan et al. proposed the product which is good with a wide range of working frameworks like Windows, Linux, and Macintosh and so on indistinct vague unclear vague



Fig.2. Arduino IDE

3.2 Finger Print Sensor

A fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern. The captured image is called a live scan. This live scan is digitally processed to create a biometric template which is stored and used for matching. Optical fingerprint imaging involves capturing digital image of the print using visible light. This type of sensor is, in essence, a specialized camera. The top layer of the sensor, where the finger is placed, is known as the touch surface. Beneath this layer is a light-emitting phosphor layer which illuminates the surface of the finger. The light reflected from the finger passes through the phosphor layer to an array of solid-state pixels which captures a visual image of the fingerprint. A scratched or dirty touch surface can cause a bad image of the fingerprint. A disadvantage of this type of sensor is the fact that the imaging capabilities are affected by the quality of skin on the finger. For instance, a dirty or marked finger is difficult to image properly



Fig. 3. Finger print Sensor

3.3 MEMS Sensor

ADXL345 from Analog Devices is a triple-axis accelerometer with digital I2C and SPI interface. We added an on-board 3.3V regulator and logic-level shifting circuitry, making it a perfect choice for interfacing with any 3V or 5V microcontroller such as the pic. The sensor has three axes of measurements, X Y Z, and pins that can be used either as I2C or SPI digital interfacing. You can set the sensitivity level to either +2g, +4g, +8g or +16g. The lower range gives more resolution for slow movements, the higher range is good for high speed tracking. The ADXL345 is the latest and greatest from Analog Devices, known for their exceptional quality MEMS devices. The VCC takes up to 5V in and regulates it to 3.3V with an output pin.



Fig.4. MEMS Sensor

3.4 GSM Module (SIM800)

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manager of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open an connection to that GSM Module (SIM800)

It can be used to make calls; send text messages and emails in case it is an Internet based SIM card. The GSM Module uses a dual band 900/ 1800 MHz GSM modem. It works on 4 V DC regulated power supply that is controlled by the microcontroller. Apart from that it is a plug and play device which means no drivers are required for this module to be installed. The purpose for this Hardware's usage is to send a message to the registered mobile number, when someone tries to access the vehicle illegally.



Fig. 5. GSM Module

3.5 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

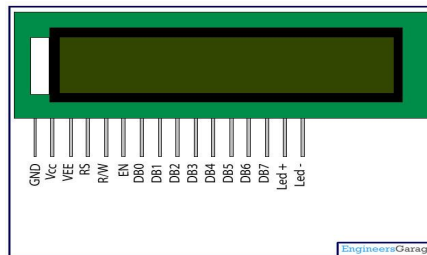


Fig. 6. LCD Display

3.6 GPS Module

GPS KIT is a highly flexible plug and play with Rs232 Output. RS-232 through DB 9 pin connector. Use AC – DC Power Adaptor with following ratings: DC Voltage: 12V /1A. The GPS user segment consists of your GPS receiver. The receiver collects and processes signals from the GPS satellites that are in view and then uses that information to determine and displays location. GPS receiver does not transmit any information back to the satellites.



Fig. 7. GPS Module

3.7 DC Motor

A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation. DC motors use magnetic fields that occur from the electrical currents generated, which powers the movement of a rotor fixed within the output shaft. The output torque and speed depends upon both the electrical input and the design of the motor. The term 'DC motor' is used to refer to any rotary electrical machine that converts direct current electrical energy into mechanical energy. DC motor can vary in size and power from small motors in toys and appliances to large

mechanisms that power vehicles, pull elevators and hoists, and drive steel rolling mills. DC motors include two key components: a stator and an armature. The stator is the stationary part of a motor, while the armature rotates. In a DC motor, the stator provides a rotating magnetic field that drives the armature to rotate.

IV. CONCLUSION

This work is a well operating prototype of a fingerprint based vehicle starting system. The system intelligent agents were able to communicate well and appropriate output is given under user input. The system requests for user's finger, process it and give appropriate output based on if the finger is stored in the fingerprint module or not. The system is also able to enrol new user's finger at request but prompt for passcode before it could be done. Passcode editing can also be done on request in the system.

Hence, fingerprint technology improves the security of an automobile making it possible for the car to be used by only authorized users. Therefore implementing this system on vehicles makes the achievement of our car security system comes in a cheap and easily available form. The output is viewed with the use of an LED. Biometric recognition systems present security and convenience than conventional methods of personal recognition.

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