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Design of a mobile based application for Smart Car Lock System

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ABSTRACT

Opening the car lock with the help of mobile based application is one of the great and important features that are missing from most of the cars sold globally. Although some cars support the remote starting functionality, dealers usually limit such feature to cars sold in certain regions such as the INDIA, US, etc. or to high-end models only. Additionally, manufacturers use short-range remote controllers, which limit the benefits of using the system. This idea will help bring this important feature to almost all cars, either old or new, and will add many important features such as GPS tracking in the system, all without compromising the safety and security aspects. The information is passed onto the central processing system which is in the form of the digital signals, the microcontroller unit reads the signal and sends it to the Global Positioning System (GPS) module and using the triangulation method, GPS module feeds the exact location in the form of latitude and longitude to the user's mobile. By reading the signals received by the mobile, one can trace the exact location of car. This project involves hardware and software parts construction and the integration of both parts to create the system. We succeed in achieving the objective and in fact, add another feature to the system which will initiates a call to the owner after sending the SMS. In the end of this project, we will document all the hardware and software development and provide a simulation model of the system. An interfacing mobile app is also connected to the microcontroller, which is in turn, connected to the system. Once, the vehicle is being stolen, the information is being used by the vehicle owner for further processing.

Keywords : Embedded System ,Global Positioning System(GPS), Global System for Mobile Communication(GSM) .

I. INTRODUCTION

These day's vehicle theft cases are higher than ever, give your vehicle an excellent protection with the only reliable anti-theft device. Vehicle central locking system ensures the best guarantee to protect your vehicle from different kinds of theft cases. It is a vehicle security device that offers excellent protection to your vehicle. A vehicle with central locking security system helps the user to lock and unlock the doors of car at the press of a button. Mainly two types of central locking systems are used in Auto industry - Automatic central locking system and Manual central locking system that ensures smoother and secured operation. Again this system could not prove to provide complete security and accessibility of the vehicle in case of theft. So a more developed system makes use of an embedded system based on GSM technology. The designed & developed system is installed in the vehicle. The main concept in this design is introducing the mobile communications into the embedded system. In its simple construction irrespective of the systems available in market has three different types of theft detection sensors namely, rider sensor, vibration sensor and battery removal sensor.

This mechanism solves a real world problem and hence reduces the dependency on the keys to open the car lock. Whenever we left the car keys inside the car, there is no other options to unlock the car. So we need to call the car service center or arrange a local mechanic to unlock the car which is costly or it takes a lot of time. Sometimes the lock gets damaged due to rusting, old age car etc. We have added so many other functionalities to our system which are ability to unlock the car door using mobile phone, locating the car location accurately from anywhere and the app notifies a text message if someone tries to open the car. Moreover, the system must not interfere or disable the regular operation of locking and unlocking the car doors using the key.

II. LITERATURE SURVEY

Door lock security systems are classified based on technology used as

Password Based Systems

The programmable electronic code lock device [1] is programmed in such a way that it will operates only with the correct entry of predefined digits. It is also called an integrated combinational type lock. The programmable code lock is shown in Fig 1 as below.

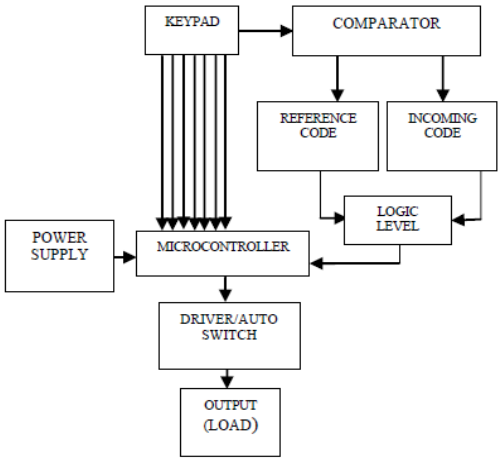

Fig 1: Programmable Electronic Code Lock

Electronics safe is its example. Based on the programmable electronic code lock, the reprogrammable digital door locks [2] were invented in that the password can change any time as it stored in PROM. For operating the device, GSM module can be used. When any person use the app, the information will be received by the system. And the door will opens only if the unlock button is from specified user.

GSM Based Systems

In many door lock security systems, GSM is used for communication purpose. The purpose of a work cultivated by utilization of a circuits like a GSM module which gets activated by a controller for sending comand to proprietor and for sending corresponding services. For detecting obstacles, the system requires various sensors. It gathers data from the sensors and settles on a choice. With the help of GSM module, sends details to a respective number. A recently created model for security of door easily controlled like remote control operations by a GSM hand set acts as the transmitter and the other GSM phone set with the DTMF associated with the motor attached to door with the use of DTMF decoder, a stepper motor and microcontroller unit.

Smart Card Based System

A model entryway security framework is intended to permit an authorized person for getting a safe (without need of any key) entryway where valid card of smart RFID is necessary for ensuring the pass of the door. Total control activity is performed by the microcontroller.

RFID Based Systems

These types of security systems used for digital door lock are utilizing inactive RFID tags (passive). With the help of this, it ensures that only valid person can

get entry. Such systems are working in real time basic for opening the door in which user have to place the tag in contact with RFID detector, then the entryway gets opens and in the central server the registration data is stored with necessary data of the users. Attendance and person tracking is possible by using such type of system. RFID Based Gate Access Security System which points out authorized peoples and permits just them was effectively. This system ought to have the capacity to minimize the trained or specialized human error during secured door access.

Latest RFID based door lock security system are based on arduino platform with audio acknowledgement at the point when card put close to the RFID module, it peruses the card data and it matches with the data stored in the program memory and shows authorize/unauthorized entry. Arduino is also used by many other applications for example A specific Arduino ATMEL processor can be used for sensing and recognition of person , another example like ECG Parameter Identification and Monitoring as they have open source platform.

Door Phone Based System

The earlier system, a specific system in which identification of a visitant is done for the most part by direct communication with the set of the housing estate concerned [22]. A dialling up to the sets over the hands-free telephone is created by the framework at the entryway. Visitors enter inside through the gate by controlling the gate with the help of the telephone set. The latest system is based on video door phone surveillance which is used to identify the visitors, developed by Chau-Huang Wei et. al. [23]. The work utilized a novel powerline communication chip for build up a digital networked video door phone. Moreover, they exchanged audio and visual information and upgraded the passageway guarding capacities

Bluetooth Based Systems

Bluetooth based system is a bit like sarvy house innovations that utilizes Bluetooth function available in smart devices [24]. The framework using Bluetooth turns out to be more simple and productive for proper utilization. Such systems are generally based on Arduino platform. The hardware of such framework is the combo of android smart phone and Bluetooth module. Arduino microcontroller here is acting as a controller and solenoid can be acting as output of locking system.

COMPONENTS USED

Name of components	Description of the component
1 Microcontroller	A microcontroller is a computer present in a single integrated circuit which is dedicated to perform one task and execute one specific application.
2 Bluetooth Module	Bluetooth is defined as being a short-range radio technology (or wireless technology) aimed at simplifying communications among Internet devices and between devices and the Internet
3 GSM Modem	A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.
4 GPS Module	Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth
5 Driver	A driver provides a software interface to hardware devices, enabling operating systems and other computer programs to access hardware functions without needing to know precise details about the hardware being used.

Problem Statement

- Whenever we left the car keys in the car ,there is no other options to unlock the car.
- So we need to call the car service centre or arrange a local mechanic to unlock the car which is costly or it takes lot of time.
- Sometimes the lock gets damaged due to rusting , old age car , etc.

SOLUTION: So, we design a mobile based applications through which we can lock and unlock the car doors and hence there by reducing the dependency on car keys. Thus, the paper helps to solve a real world problem.

Fig 1 : Final concept for the system

Steps to execute/run/implement the system

1. Install Android Studio and install all respective packages.
2. Set the desired SDK and API version as per the requirement of the project and the device on which the application is going to run.
3. After the designing of the application, the application is to be installed in the device from which the connection is to be made.
4. The user is to fill in all his details and the application is connected directly to the Arduino device which is already coded and installed with the car locking system.
5. Once the connection is made, the locking system is set to active or non active state on the basis of the input.
6. The toggle button is set.
7. The car lock can now be open with the help of the mobile application on which it is installed as per the will.

III. RESULTS AND DISCUSSION

In early system, automatic door locks was based on IR sensors remote system but now we have upgraded the project to mobile based application system in which we can access the door locks through mobile applications over the GPS module. The Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth. With the use of this technology, we can lock/unlock car doors within our rooms depending upon the range of GPRS module. Hence, there is no physical presence of remote/persons required to detect by the sensors to unlock the doors which were used in earlier models. Moreover, we also reducing the dependency on car keys to lock/unlock car doors.

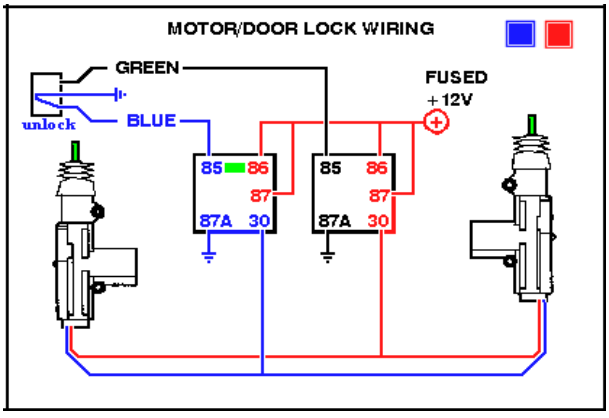

Fig 2 : Lock circuit (representation of driver connection with the motor and connected to the 12V power supply)

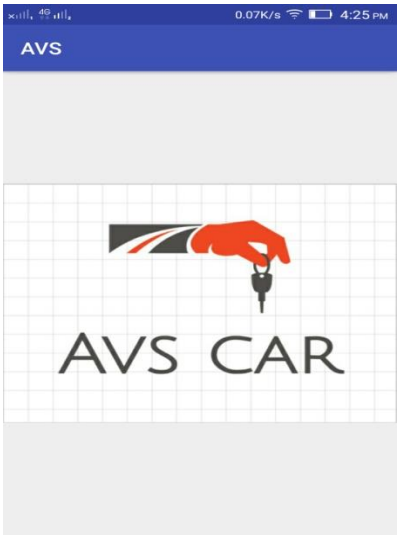

Fig 3

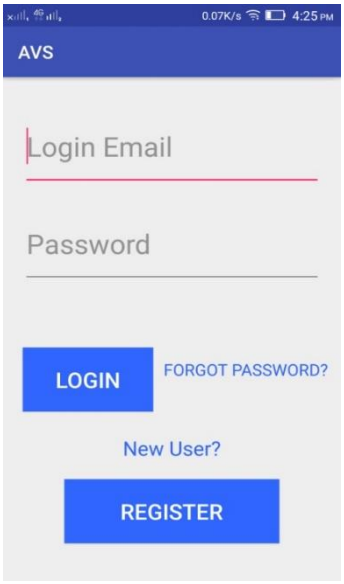

Fig 4: User login details

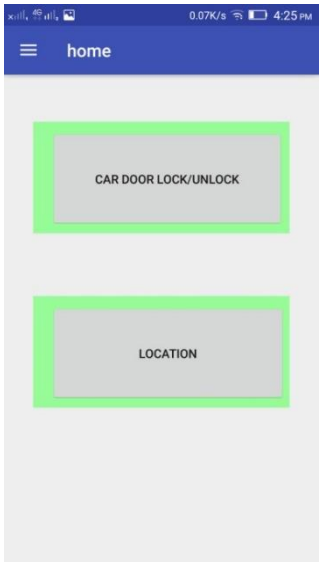

Fig 5: App home page

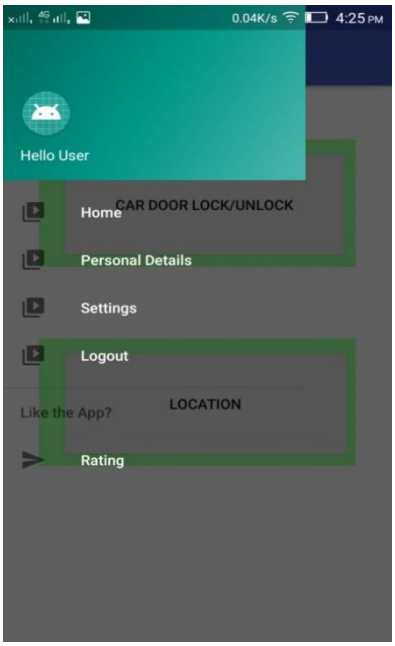

Fig 6 : App settings and other functionalities

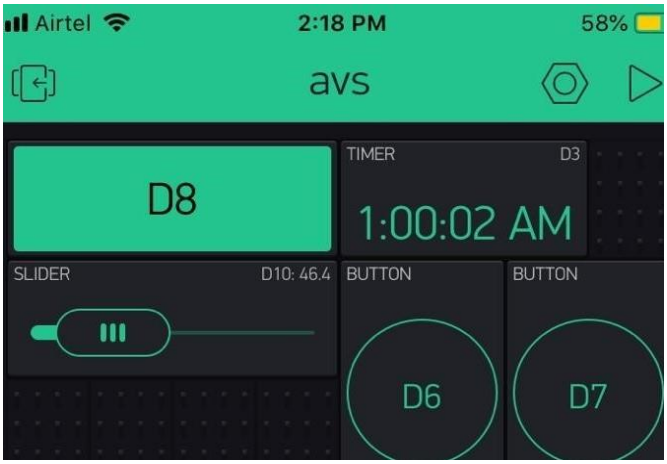

Fig 7: App button interface.

IV.CONCLUSION

We all are into the field of software development from a long time, but this paper had the special taste of integrating hardware and software to come up with a complete and useful product. It also solves a real world problem. The paper added to our knowledge in several areas including hardware components integration, communication, electrical circuits design, android software development as well

as microcontroller software designing. In today's technologically advanced world, autonomous systems are gaining rapid popularity so the advancement in latest technology is continuously and rapidly made on different latest automatic door lock security systems. The need for an advanced door lock security systems using new technologies is increases day by day as security become a very important or serious issue for everybody. Due to the recent trends in various methods of security for home, buildings, companies‟ vehicles etc, there is no need to worry about this security any longer, as automatic security systems are here to deal with it. Although all the basic requirements were met, we plan to continue the development of the paper by adding more features that enhance user experience to make cars smarter.

V. RECOMMENDATION

As technology is growing day by day, autonomous systems and IOT (internet of things) comes in more power. So,we would like to recommend that to use such systems in more efficient way and to provide better user experience such that they provide solutions to complex real world problems in more effective and in economical way.

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