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Authenticated Access Control For Vehicle Ignition Control System Using Smartcard And Fingerprint Technology

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***Abstract*—The number of unlicensed drivers is rising along with the daily rate of vehicle theft, which puts a heavy burden on luxury car manufacturers and owners to install anti theft devices that keep their vehicles from being stolen. This thesis built a vehicle security system. The Arduino, driver's license card (DL), fingerprint module (FP), RFID reader (RFID), and Global System for Mobile Communication modem (GSM) are all part of this system.The system's whole brain used to be the Arduino. It can add fingerprints of reliable individuals and allowed driver's licenses to the Arduino program burn. When a driver enters their license into an RFID reader, the data in the program is compared. If the driver's license (DL) is approved, the system is activated, allowing them to operate the vehicle. If not, the owner of the vehicle receives a Short Message Service (SMS) via GSM modem, blocking the ignition system.. Additionally, DL holders receive an SMS reminding them to renew their license before it expires. In addition, the system has extra safety measures like an alcohol sensor that can identify alcohol present around the car. The owner of the car receives alerts immediately if alcohol is detected.In case of alcohol detection, alerts are promptly sent to the vehicle owner**

Keywords*—*RFID reader, FP module, vehicle, GSM, anti theft system, ignition system, and alcohol sensor are all examples of electronic driver's licenses.

1. INTRODUCTION

In the fast-paced world of today, making sure cars are safe and secure is of utmost importance. Property and personal safety are seriously at danger from vehicle theft and unlawful access. Advanced access control systems have developed into essential tools for fleet management and car owners to meet these difficulties. Through the use of cutting-edge technologies such GSM communication, alcohol detection sensors, RFID RC522, fingerprint module R307, and GSM communication, the proposed project seeks to establish a comprehensive two-level vehicle access control system.

The project aims to offer a strong and adaptable solution for improving vehicle security and management by combining these elements into a unified system. Strict verification of driver and vehicle access is made possible by the two-level authentication system, which guarantees that only people with permission are allowed admission. This reduces the possibility of theft or illegal usage and makes it possible to monitor and regulate vehicle access effectively.

Additionally, the system's functionality is further improved by the addition of other features like ignition control and alcohol detection, which encourage driver safety and legal compliance. Vehicle owners can receive real-time information regarding possible security breaches and access attempts through GSM connection. This allows for quick response and intervention when needed. In conclusion, the suggested vehicle access control system is a proactive and all-encompassing approach to vehicle security, providing vehicle owners with peace of mind and guaranteeing the integrity and safety of their assets in a setting that is becoming more and more unpredictable.

2. RELATED WORK

In this research it designs security system to protect vehicle from theft using AVR microcontroller. Built database and store numbers of images and with the help of face recognition when someone tries to enter the car his image compare with the images already stored if match occur means authorized user and access granted to car, if not match the access of the car is block and tell the owner via GSM module in the form of MMS include the image of untrustworthy person. Also in emergency case the system include password when the face unrecognizable. In addition to secure the user the system provides accident detection by using strain gauge sensors at four side of car [1].

Various researches have been done to protect vehicles from theft, some of these researches is design system to protect cars from theft with low cost, if some person attempts to steal the automobile the microcontroller send warning message to the owner of car. When motor of car work the vibration sensors measure the velocity and send this measurement to microcontroller then it send intimation message to the owner of the car and with the help of GPS module we can detect the location of the vehicle over the time [2].

In other paper it designs system that the PIC16F877A microcontroller stored valid smart card unique RFID numbers. When scanned the right smart card the microcontroller send signal to electromagnetic relay to close

and will allow the user to start the vehicle. If scanned invalid smart card the system allows the user to try three times and if failed the microcontroller commands the GSM module to call the owner's

of the vehicle and the phone number is stored implemental in microcontroller [3].

In this proposed system it used ARM 7 processor based LPC2148 controller. The system consist of smart card capable of store fingerprint of certain people that is used to authentication of vehicles, those vehicle it will be include card reader to read the card data. When person try to drive the car it will be in the first insert the card in the card reader and place the finger in the fingerprint module if the scanned fingerprint match the FP in the license card the system ignition else the ignition will be in off position. For more security and safety the system consist of IR sensor to detect the position of seatbelts also include alcoholic sensor to detect the level of alcohol, if person drunk more than allowed level the vehicle stop and the reason and percentage of alcohol display in LCD [4].

In this paper it design security system based on face recognition, in the beginning the images of authorized persons is stored in database of the system. When person try to enters the car the camera capture the person and compare with the images already stored , if match occur the system will be ignition, if not the image of unauthorized person send via MMS/SMS to the owner of the car with the current location detected by GPS modem. For face recognition operation it used a principal component analysis (PCA) algorithm. It used field programmable gate array (FPGA) for controlled the process of detect the current location through GPS and GSM module [5].

3. Methodology

As shown in Fig.l.The whole structure of the proposedsystem.

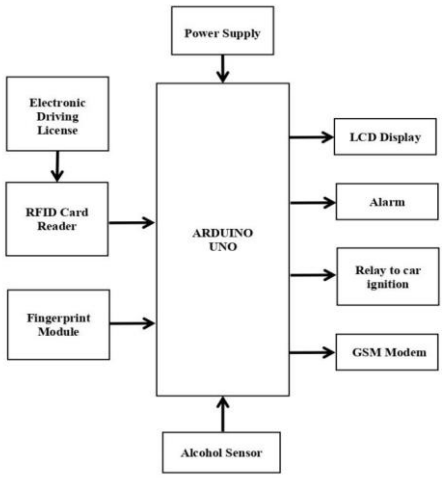

Fig.1. Proposed System Block Diagram

3.1. RFID RC522 Module

A type of automatic identification known as radio frequency identification employs radio waves to exchange information between a system of integrated circuits, tags, readers, and software in order to identify objects. Unique numbers that identify items, people, and information are stored on microchips that may be automatically read in order to achieve identification. In Fig. 2, the RC522 module is displayed.

Fig.2: RFID RC522 Module

Tags

For this project, a smart driver's license was utilized as a card (tag) to be attached to the object that needed to be identified. The tag contained ID, name, age, fingerprint, image, and other information that would be saved and subsequently sent to the reader. Any RFID reader needs to have one or more antennas because the reader uses radio frequency (RF) to connect with tags. A network interface of some kind, such as the serial (UART) port for RS232 or RS485 communications and the RJ45 jack for 10BaseT or 100BaseT Ethernet cables, is also required for readers because they need to communicate with other devices or servers. Some readers even have built-in Bluetooth or wireless Ethernet capabilities. In order to execute the communication protocols and manage the transmitter, every reader needs to own a microcontroller .

3.2. Finger print sensor R307

Fig.3: Finger print sensor R307

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A stable performance, simple structure, fingerprint entry, image processing, fingerprint matching, search, template storage, and other functions are included in the R307 Fingerprint Module, which also includes an optical fingerprint sensor, high-speed DSP processor, high-performance fingerprint alignment algorithm, and high-capacity FLASH chips.There are two interfaces on the R307 fingerprint module: TTL UART and USB2.0. The USB2.0 interface can be connected to a computer, while the RS232 interface is a TTL level.

The baud rate is 57600 by default, but it can be altered by referring to a communication protocol. Additionally, direct connections can be made to microcontrollers such as ARM, DSP, and other serial devices via a connection (3.3V–5V). Level conversion, level conversion notice, and embodiments like a MAX232 circuit must be connected to the computer. Use DC3.3V if the fingerprint module board is marked with 3.3V and has two shorted contacts.

3.3. SIM 800L GSM Module

A GSM module from Simcom, the SIM800L allows any microcontroller to have GSM capability. This means that it can connect to a mobile network to make and receive calls, send and receive text messages, and access the internet via GPRS, TCP, or IP. The board also has the benefit of being globally usable due to its utilization of current mobile frequenciesto transmission via a channel that contains three separate streams of user data inside each time slot, GSM automates and encrypts the data. It is also the most widely used 2G digital cell phone standard worldwide. It controls how cellphones communicate with the tower system located on land.

Fig 4 SIM800L GSM Module

3.4. Alcohol Sensor

The MQ-3 alcohol sensor uses semiconductor gas sensing as its operating mechanism. When alcohol fumes are present, a tin dioxide (SnO2) detecting element in it causes a change in electrical conductivity. The resistivity of the SnO2 surface is altered by alcohol molecules' interactions with it. After that, an electrical signal corresponding to the amount of alcohol in the air is created from this change. After processing this signal, the sensor's circuitry outputs a voltage or digital signal that other electronic devices, such as microcontrollers, can understand. This is helpful in applications like breathalyzers, alcohol detection systems, and safety equipment since it enables the detection and measurement of alcohol levels in a variety of situations.

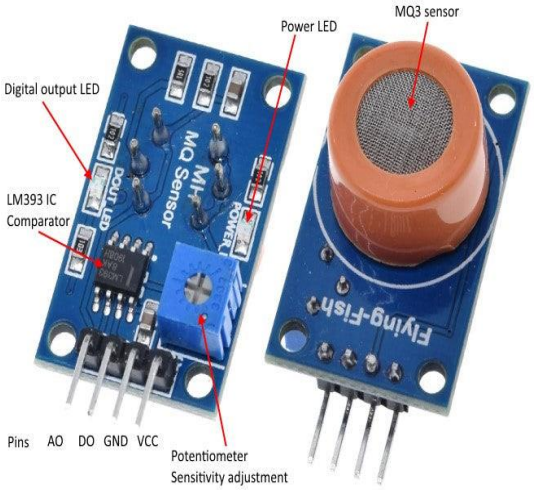

Fig 5Alcohol Sensor

3.5. Simulation scenario

All of the system's components are initialized before it waits for human input.Users can utilize the RFID RC522 module to present their RFID card or the R307 fingerprint module to scan their fingerprint when they get close to the car. The user's credentials are checked by the microcontroller against the authorized list that is kept in memory.The relay module is activated to turn on the DC motor, permitting entry to the car, if the user is approved. If not approved, the GSM module is used to send notifications and prevent access.

The area where alcohol is present. Through the GSM module, notifications are forwarded to the owner and authorities if alcohol is found.Additionally, the system offers a user interface that enables users to remotely manage access rights, check access records, and get notifications.

This interface can be accessed by an LCD display or a mobile application or web-based platform. The technology stays in place and keeps an eye out for signs of alcohol use and attempted entry, guaranteeing the security and well-being of the car's occupants. GSM connection guarantees that car owners receive real-time notifications of approved or unauthorized access attempts, allowing for fast action and intervention when required. This proactive approach to car security encourages driver safety and legal compliance in addition to discouraging theft and illegal entry.

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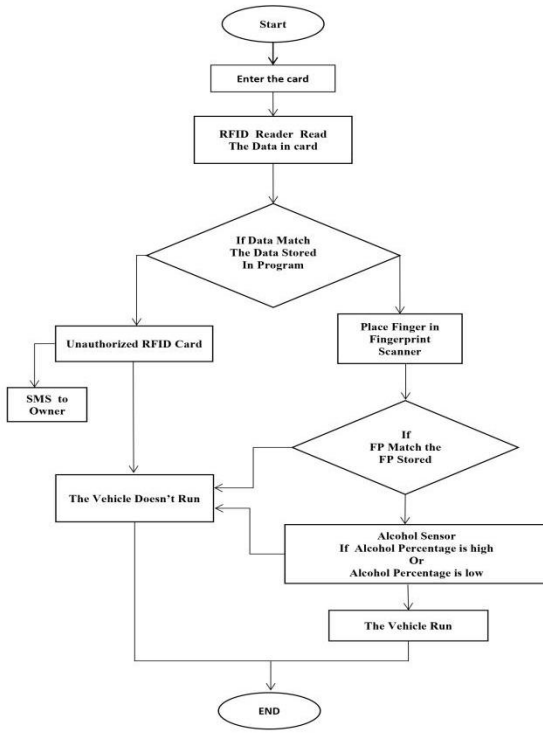

Fig 6 Flowchart Proposed System

4. Results & Discussion

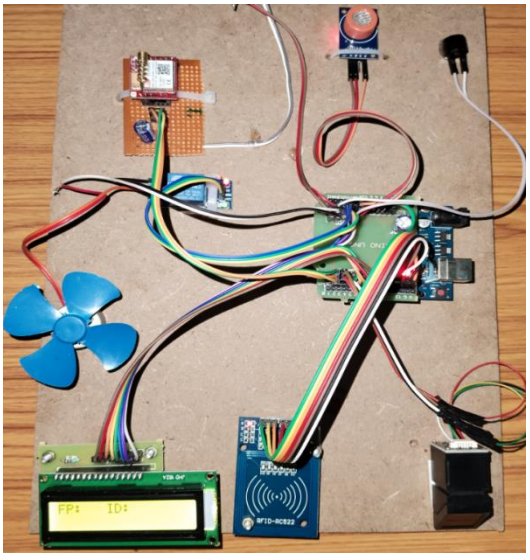

Fig 7System Hard ware

When a person enters their driver's license into the RFID reader, it is compared to data already in the program. If the driver's license is authorized, the person can then place their finger in the fingerprint scanner to authenticate; if not, the system will be activated and they will be able to operate the vehicle. If not, Short Message Services via GSM modem are sent to the vehicle's owner, blocking the ignition system.We can regulate the ignition and determine the alcohol content by utilizing an alcohol sensor.in order to lower the risk of accidents.

Fig 8Driving license and fingerprint details shown on LCD display

The LCD in the prototype shows a person's information and status in Figure 8 above when they input their driver's license and finger print.

Fig 9Checking alcohol and access granted

Figure 9 above illustrates how to check the alcohol concentration.The car is started and an access granted message appears on the LCD display if the alcohol content is less than fifty percent.

Fig 10 Checking alcohol

Figure 10 above illustrates how to check the alcohol concentration.The car won't start and will show a check-alcohol message on the LCD display if the alcohol content is higher than 50%.

Fig 11Displaying Driver Alcoholic

Figure 11 above illustrates how to check the alcohol concentration.The car will not start and will show a driver's alcohol notice on the LCD display if the alcohol content is higher than fifty percent.

Fig 12Displaying Access Rejected

As seen in figure 12 above, the car will not start and will display an access denied message on the LCD display if the driver's license and fingerprint do not match the data that has been recorded.These are the various output message displays for the user interface on the LCD display; by employing these outputs, the prototype may be readily modified.

5. Conclusion & Future scope

In summary, a major improvement in vehicle security and driver safety is represented by the suggested two-level vehicle access control system. Through the integration of sophisticated authentication mechanisms, proactive security features, and real-time monitoring capabilities, the system provides strong defense against theft, unauthorized access, and incidents linked to alcohol consumption. Comprehensive protection for cars and their occupants is ensured by the multilevel security system, which includes GSM notifications, alcohol detection, RFID and fingerprint verification, and more. In general, the vehicle access control system provides a flexible and all-inclusive way to improve car security, encourage driver safety, and guarantee regulatory compliance.

The technology helps create safer roadways, more secure communities, and increased peace of mind for both car owners and users by tackling the problems of theft, unauthorized access, and alcohol-related occurrences. The future of mobility and transportation will be greatly influenced by the incorporation of cutting-edge security features into vehicle access control systems as technology develops further.

The current module can be interfaced with a GPS module to determine the location of the car and a camera to take a picture of the individual using a mobile application. The project's future scope calls for constant innovation and adaptation to new technologies, legal regulations, and user needs in order to guarantee its applicability and efficacy in the quickly changing field of automotive security and authentication systems.

References

1. Rajatabh Agarwal, Boominathan P," Vehicle Security System Using IoT Application", IRJET, Volume 05, Issue 04, Apr-2018.
2. A. Z. Loko, A. I. Bugaje, Usman Abdullahi," Microcontroller Based Smart Card Car Security System", International Journal of Engineering Trends and Technology, Volume 29, NO 3 November 2015.
3. Priti K Powale, G. N, Zade," Real time car antitheft system with accident detection using AVR microcontroller", international journal of advance research in computer science and management studies, Volume 2, Issue 1, January 2014.
4. Mr. Raj Rai, Prof. Dinesh Katole, Miss. Nayan Rai," Survey paper on vehicle theft detection through face recognition system", international journal of emerging trends & technology in computer science (IJETICS), Volume 3, Issue 1, January - February 2014.
5. CSaikrishna Prasad, U. Sravan Kumar M.Tech, Dr.M.Narsing Yad av M.S., PhD (U.S.A), " Advanced Authentication and Security system In Vehicles", IJESMR,January 2016.

Biography

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