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Smart Vehicle Sensor System

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Abstract: ***Over recent years production of the vehicle around the world has increased rapidly, vehicle theft has become a shared concern for all citizens. Security and safety have always become a necessity. However, present anti-theft systems lack the tracking and monitoring function. The Wi-Fi module enabled cost-effective solution has been made to protect the vehicles. This paper attempts to utilize two physically disjoint units in conjunction with each other, to provide a fool-proof mechanism against vehicle theft. A prototype has been made using Arduino and Wi-Fi module. Android smartphones are used to design for the user interface that allows access of the vehicle to an intended person only.***
Keywords: Ignition System, security, safety, authentication

I. INTRODUCTION

The SMART VEHICLE SENSOR SYSTEM contains Wi-Fi module that can send/receive information from/to the system using the user's mobile. The device collects data/information from the sensor or the component and based on the data it alerts the driver against any mishap to occur. The designed system is the continuous authentication device that controls the vehicle functionality. Once the driver starts the vehicle by the control for ignition from his phone the system senses that data sent from the phone and cooperates for the vehicle functionality. Thus, the driver's phone acts as the auxiliary key resulting in two levels of authentication. This vehicle can be controlled through the android application server to stop the vehicle in case the vehicle is hijacked with the auxiliary key also. Since the use of Android phones has shot up in the last few years, this technology is accessible to everyone. Some advantages of the device are detecting a GPS tracker on the vehicle at the time of the theft. Designing a system that uses sensors like GPS sensors to track the vehicles. To have an authentic user to the individual systems by providing a KEY to the system generated.

II. PROBLEM DEFINITION

A. The number of accidents is shooting upward daily along with the rising safety concerns while traveling.
B. Security of the vehicle is the greatest challenge we are facing these days.
C. More time consumption in vehicle identification and functionality. In case of an accident tracking the vehicle is very difficult and arranging a quick aid is a challenge.
D. Need to use existing technology for controlling vehicles.
E. Fleet owner-Freight forwarder consignee.

III. OBJECTIVE

A. To design and develop an embedded system that solves the problem of theft and hijack.
B. To effectively use an android application for requirements.
C. To have an authentic user for every individual system by providing a unique KEY to the system.
D. A prototype model for Intelligent Vehicle Monitoring using Cloud Computing is to be developed.
E. This project can be vastly used in the automobile industry. To makes the driving experience easier and safer. The driver can drive the vehicle without any potential risk/threat.
F. Regulating vehicles performance becomes much easier.
G. Immobilize the vehicle when authenticity is hindered.

IV. Motivation

Vehicle thefts and hijacking continue to skyrocket and according to the census, 125 vehicles are being stolen every day raising concerns for the safety of the vehicles. We have seen a lot of contributions by the vehicle drivers for the country's growth so we

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have come up with a possibility of building a device to support their daily life and this device assists while driving, make their driving experience better, and help them keep the vehicles safe from theft and hijacking.

V. METHODOLOGY

The approach to the problem was to design a system that can solve the problems that are existing in current security systems. The problem is managed using a designed system. The GPS sensor is used to locate the current position of the vehicle and to know the distance covered and the route taken by the vehicle which is then sent to the android device by Arduino.

An exclusive smartphone is required; preferably the driver's Smartphone acts as the auxiliary key to the vehicle. All Smartphones have integrated GPS and Wi-Fi module Technology.

An application is used that makes the embedded system connect to the Smartphone using integrated Wi-Fi. An authentic pairing between the Smartphone and the designed system. Then the continuous monitoring of the auxiliary key (Smartphone) is done in the Embedded system.

If the driver forgets to turn off the vehicle and leaves the key inside, having the phone with him, the vehicle is driven away from the driver's Smartphone during the theft. The system in the vehicle detects the termination of the signal between Smartphones and stops the engine by switching off the Fuel Ignition System.

The application used for controlling the system is a prototype code that can be integrated into security applications for future use. Automatic vehicle identification can increase security and prevent the loss of vehicles.

The Wi-Fi module acts as an intermediate of communication between the Android device and the system. Data is constantly exchanged between the system and the Android device through Wi-Fi.

The Ignition system block can both receive/ send data to the Wi-Fi module. Due to this capability, when the Android device is out of range of the Wi-Fi module the Ignition system automatically gets turned off. When it is in range the system gets turned on again.

The GPS on the other hand can only transmit data to the Wi-Fi module regarding its current position. The data transmitted by the GPS is real-time data and depending on the memory used by the user the time interval between the consecutive transmissions of the location changes. In our case, let's assume the transmission happens between 5-sec intervals. If the GPS is not transmitting the location within this time the system debugs and tries to fix the problem or alerts the user.

VI. RESULT

The proposed system is a microcontroller assisted unit called Ignition control mechanism (ICM), which is installed within vehicle to control the ignition mechanism. ICM is furnished with a serial Wi-Fi module receiver module, a microcontroller unit, electromagnetic relay switching units imbued to the vehicle's ignition system and central locking system.

Our model is equipped with a power source of its own, as it would remain operational even if the main battery power of the vehicle would be cut. The Wi-Fi module would receive encrypted authentication details sent by the application. This information is further compared for a match with the information already stored within ICM. Once there is a match, the microprocessor unit sends an "on" signal to the electromagnetic relay to complete the circuit. Once the circuit is complete, the ignition system would start the engine.

Traditional vehicle security systems depend on numerous sensors and are highly priced. In the event of the vehicle being stolen, no mechanism is available for tracking the vehicle. The main motive of this project is to keep the vehicle safe from any unauthorized access, using reckless, and user friendly, reliable and cost-effective mechanism. If the person is authorized, vehicle access is allowed otherwise the engine will be immobilized.

The security system prototype model is built using low-cost Arduino microcontroller board that controls all the procedures. On higher end theft attempts like cutting battery power supply, protection to the vehicle is provided by ICM designed with Arduino.

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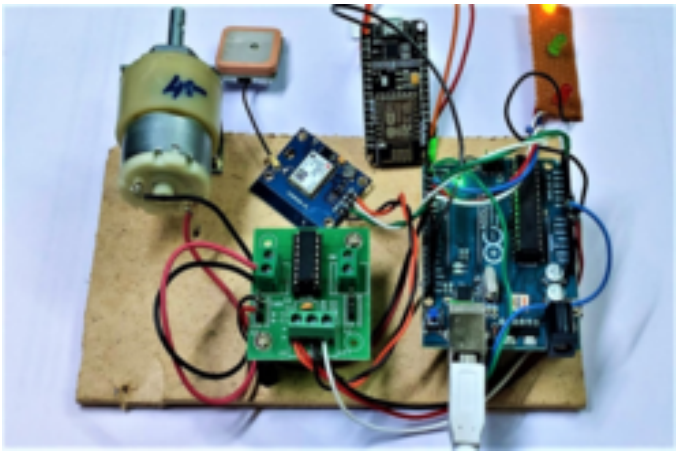


Fig. 1 Model of Smart Vehicle Sensor System

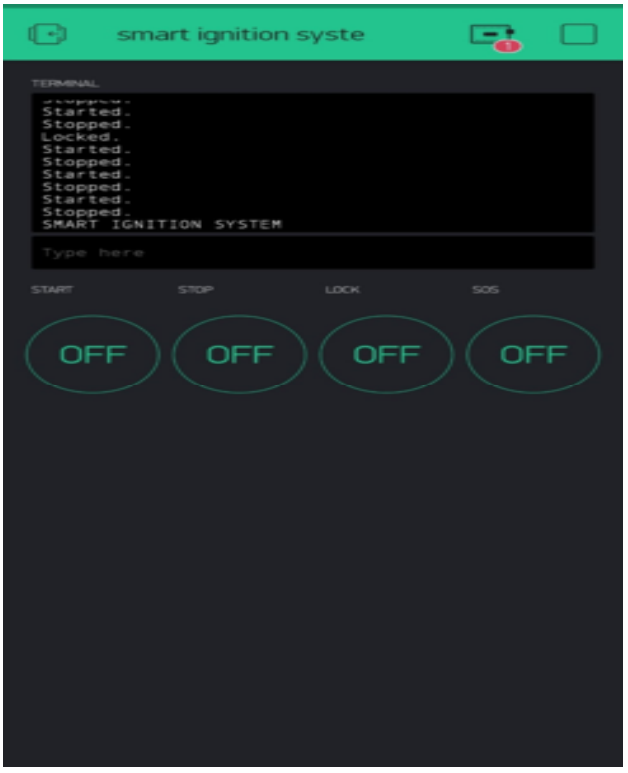


Fig. 2 Screenshot of our Application

VII. CONCLUSION

The proposed device can make driving a better experience and a lot safer than it is today. This device can prove that instant level recognition is achievable and can be put into practical use. We know that transportation has contributed to the country's growth so we have come up with the possibility of building a device to support the driver's assistance, make their driving experience better, and helps them keep the vehicles safe from theft and hijacking.

Some key features of this project:

A. Propose a new tracking information system using GPS.
B. All the data is transferred to the cloud server using a GPS-enabled device.
C. All the vehicles are equipped with GPS antennas to locate the place.
D. Two-way authentication makes the vehicle more secure.

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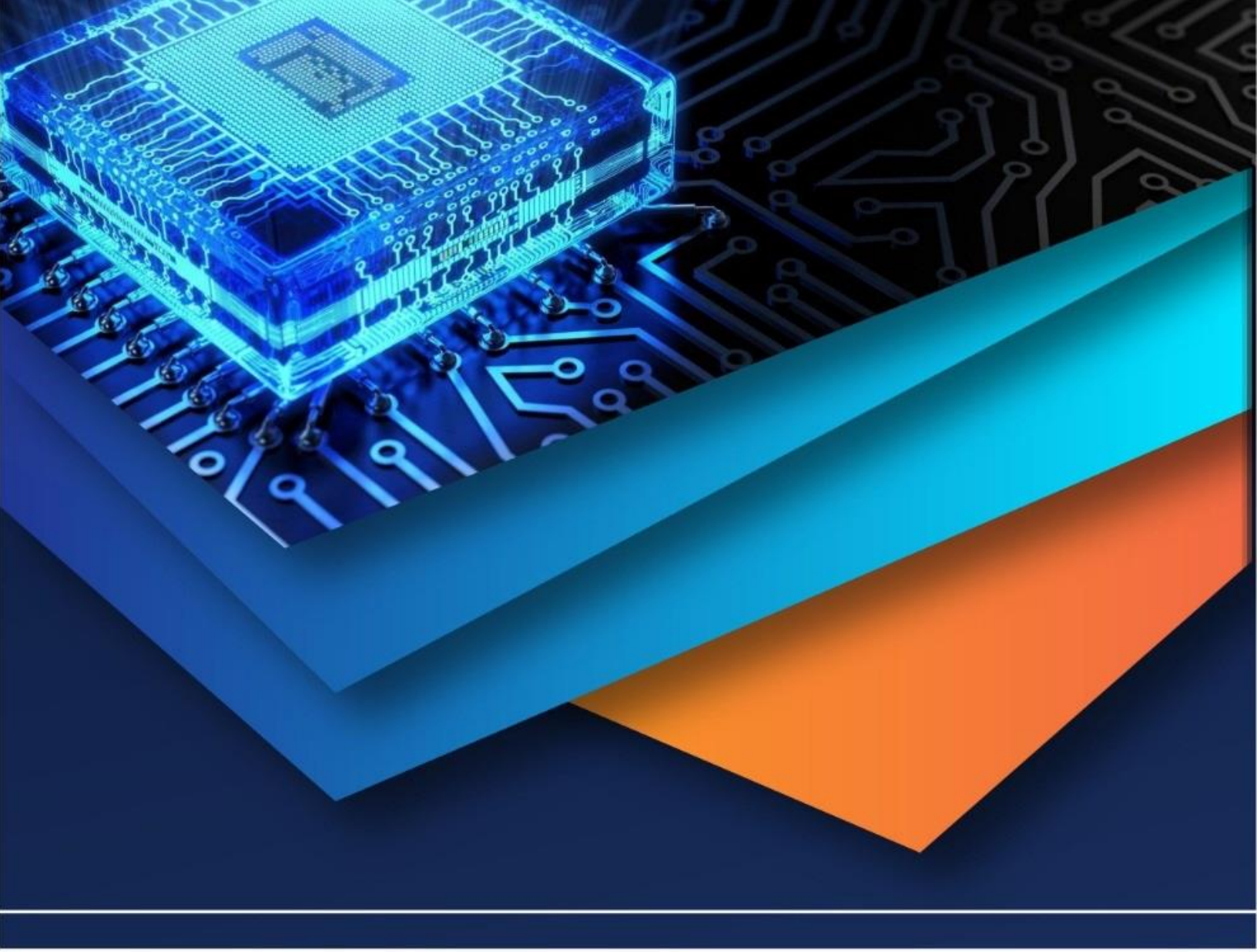
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