

Automobile Security System for Vehicles

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Abstract - In the field of automobiles, Vehicle- thefts have become a very common issue with high alarming rates. The automobile companies are unable to meet the standards and the security goals of the people the security systems companies provide show false alarming rates with high costs and are easily disabled. So, in this paper we have built a design and implementation of a security system which is cost effective and specially designed for all types of vehicles this technology is completely platform-independent which can be accessed through any mobile phones, laptops, tablets etc. It includes methodology like GPS and GSM Module inbuilt in a progressive web application where the owners have the complete control over their assets whether to give or reject the access of their vehicle by a firebase authentication along with a user id and password generated if access is given in order to access the web application which can be operated in multiple modes as user and admin so through that the people can look after their assets anywhere from the world.

Key Words: GSM Module, GPS Module, Arduino, Authentication, Progressive Web Application.

1. INTRODUCTION

Nowadays automobile thefts are growing at an alarming rate all over the world. Due to poor and old security systems, it is often very common and easy for thefts to happen. It has been observed that about \$6.4 billion have lost motor vehicles in 2019. The average dollar loss per theft was \$8,886. Automotive vehicles were stolen by an average of 219.9 per 100,000 people in 2019, down from 230.2 in 2018. In 2019, 721,885 of these vehicles were stolen, down 4.0 percent from 751,885 vehicles in 2018 [5].

Day by day with the increasing population there is need to increase the production of vehicles to satisfy the basic need of the people. Along with growth in productions there is also an advancement in technology.

In order to stop these thefts, we have taken a project to develop "Smart Security System for Vehicles". The motive of this project derives from the social responsibility towards society. Due to irresponsibility of the present security system, which is based on the Key lock system which can be easily unlocked with the new inventions and advancements in tools.

The new technologies have emerged in almost every field like industries, medical, telecommunication, and aeronautics

and now it has also entered in automobile industry. Apart from this, nowadays people are so busy with their hectic schedules that they don't even have enough time to safeguard their own assets and previously security features in vehicles are considered as a luxury feature that is not provided for everyone it was provided only for a high-end variants of vehicles if people need such feature they must have to pay some extra amount for the features to be added. But, in this paper we have discussed such a luxurious feature with least pricing easily affordable by everyone, which provides safe and secured features with a click of a button in a mobile phone.

2. OBJECTIVES

The main objective of our project is to safeguard our vehicle in contrast to thefts by including safety and security Measures [6].

- The designed system should make the vehicles more secure.
- The designed system should have remote-operated access that is completely handy.
- One can easily lock assets with the support of remote-operated device.
- One can simply locate the location of their vehicle.

The antitheft system discussing here involves certain modules that are used in this work are discussed below.

3. TECHNOLOGIES USED

1.1 GSM Module

Global System for Mobile Communication (GSM) is a digital cellular network used for transferring mobile voice and data services. Such a digital network is widely used by phone users in all the parts of the world [2]. GSM is digital and it compresses data, and then sends down a channel with two other user data streams, each in its own time. It works on either 900 megahertz (MHz) or 1,800 MHz frequency bands [2].

GSM, along with other technologies, is part of the emergence of wireless telecommunications comprising High-Speed Circuit-Switched Data, General Packet Radio Service, Enhanced Data GSM Environment and Universal Mobile Telecommunications Service predecessors, comprising the Advanced Mobile Service in the US and the Total Access

Communication System in the UK, are built with equivalent technology. Shortcomings of these programs have highlighted the need for effective mobile technology that can be used in other countries. Holding home network access settings can be switched to those with a dead-end a meter-sensitive area, greatly reducing navigation costs, while not experiencing a decrease in performance.

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1.2 GPS Module

Global Positioning System (GPS) is a device that is capable of getting information from GPS satellites and then calculates the device's geographical position. With suitable software, the device may show the position on a map, and it may offer directions [3]. Today GPS is available in cars, bikes, busses, cabs, and police vehicles etc. These GPS modules help to find the location of the vehicles. In this planned work, GPS module calculates the geographical position of the vehicle and sends the information to the owner with the help of satellite technology to identify the location of vehicle. GSM module. In this work neo, 6m GPS receiver prototype is used. For interfacing of Neo-6m GPS receiver, the UART protocol is used [2].

Today, GPS receivers are integrated into a wide range of commercial products, such as cars, smartphones, fitness watches, and GIS devices [2]. The GPS system includes 24 satellites stationed in space about 12,000 miles (19,300 km) above the ground. They circle the earth once every 12 hours at a speed of nearly 4,000 miles per hour (11,200 miles per hour). The satellites are evenly distributed so that the four satellites are accessible directly from anywhere in the world.

Each GPS satellite transmits a message that includes your current location, rotation, and precise time. The GPS receiver includes streaming from multiple satellites to calculate the exact location using a process called a triangle. Three satellites are required to locate the receiver, although communication with four satellites is ideal because it provides greater accuracy.

For a GPS device to work appropriately, it must first establish a connection to the required number of satellites. This process can take anywhere from a few seconds to a few minutes, dependent on the power of the recipient. For example, a car GPS unit will normally establish a GPS connection faster than a receiver on a clock or smartphone. Most GPS devices use some form of local time saving to speed up GPS acquisition. By memorizing its previous location, the GPS device can quickly determine which satellites will be available in the future when checking the GPS signal.

1.3 Progressive Web Application

A progressive web application (PWA) is a kind of application software delivered over the web, built using some of the common web technologies including HTML, CSS, and JavaScript. It is proposed to work on any platform that provides a standards-compliant browser, including desktop, mobile and tab like devices it is platform-independent. PWA topographies narrow the gap between user understanding in web-based and native applications. A progressive web application is a responsive kind of webpage or website, they do not require separate bundling or distribution. Developers can just publish the web application online, ensure that it meets baseline "install ability requirements", and as it is compatible with all devices users will be able to add the application to their home screen. Publishing the app to digital delivery systems like Apple App Store or Google Play is optional.

Since 2021, PWA features have been kept changing degrees by Google Chrome, Apple Safari, Firefox for Android, and Microsoft Edge. Conversion, or revenue.

1.4 Arduino Mega

Arduino is an open source hardware and software company, project and user community that builds and manufactures a single board. Arduino with board microcontroller depending on the course. It has 14 digital input / output pins (of which 6 can be used as PWM output), 6 analog inputs, 16MHz ceramic resonator, USB connection, jack on ICSP head, and a reset button. It contains everything needed to support a microcontroller; just connect it to a USB cable or enable an AC-to-DC adapter or battery to start. Arduino boards are available commercially from the official website or by authorized distributors [5]. Most Arduino enthusiasts, especially when they are just starting out, will choose to use Arduino's official integrated development site (IDE). Arduino IDE is open source software written in Java and will work on different platforms: Windows, Mac, and Linux. IDE lets you write code in a different location with syntax highlighting and other features that will make encoding easier, and then easily transfer your code to the device with a simple click of a button.

4. METHODOLOGY

Keeping in mind the security standards of people we have designed a technology where the best part of this technology is that this is completely platform independent it can be compatible to any type of devices like mobile phone, laptop and any other smart devices being an responsive web application it is completely dynamic where the changes can be made very easily and with Most of the recent systems use GSM and GPS but they were not so effective to contradict a developed advance security system that was made which is completely online runs on a server in multiple modes

User mode and Admin mode where the owner or admin has a complete security in handy where he can access the web application and he can send a request to the server for the current information of his assets, through the API's the information is taken from a real time database where the current hardware status is notified and the information is sent to API's it returns the current status and the live location details of their assets will be provided to admin and to sign up in the app, at first receive credentials from the user.

These attributes can be the user's email address and password. After that, you transfer this evidence to the Firebase Authentication SDK. Our background services will then verify those credentials and return response to the application.

After successful login, admin can access profile information, and can control and access to data stored on Firebase and if admin want to give access to any other person then the admin can create a user but the access will be given in user mode with user id and password for a person with the firebase authentication then the user will login into application in user mode the this will update the details in the database then the user will have access to the vehicle.

In user mode in which there will be restricted access only certain basic facilities will be provides but the main control and the complete actions or activities of the vehicle will be provided to the admin where they can restrict actions or lock the system if they notices any unreliable activity then this will update the details in database then user will have access to the vehicle.

If any try to snip the vehicle, being an application protective the device they can track the vehicle completely without any prior knowledge of the thief after that we can take all necessary action required asper the requirement with some features in the web application where the admin need to give access so, the chances of thefts are very low as the authentication is completely through web application vehicle so the admin have complete security of his assets in handy and if there is any change in location of vehicle then the owner is notified and can take all necessary actions required with those options provided in the application.

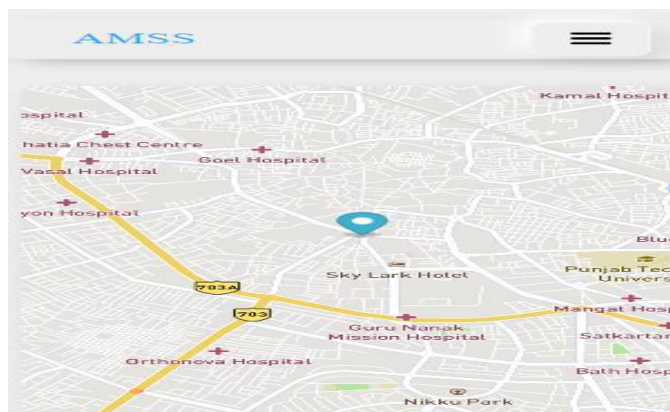


Fig -1: Progressive Web Application

Based on the figure above we have designed a technology to locate the vehicle by a responsive web application it is completely dynamic where the changes can be made very easily and with Most of the recent GSM and GPS applications.

5. BACKGROUND OF STUDY

The development of antitheft control systems was started long ago but those techniques were not effective enough to completely secure your assets.

Anjan TL [1] have made an attempt to make such a system with the GSM and GPS modules involved in it along with a password protected system by providing an keypad on the hardware but the system it was a failure as the owner is unaware if any other person try to enter the password in our paper the user gets all the information about the vehicle. B V D S Sekhar1 , Dr. G.P. Saradhi Varma2[3] In their research paper have mentioned a special cost effective security system with Bluetooth and GPS system where the doors are locked and unlocked by Bluetooth the main flaw of this system is that as being a Bluetooth operated it works only for a limited range or distance

This is rectified by a web application that is remotely operated.

Kanchana Katta [8] have made an effort to develop antitheft system using GSM and GPS module. This process sends vehicle location to owner when the vehicle is in motion. The disadvantage is that only after the vehicle is stolen then the owner will be notified about the theft the live location is shared with the admin.

From the papers above we have tried to minimize all the short comings in our paper with the Web application that can be accessed remotely and provides a complete security by keeping your assets safe and secure



Fig -2: Controls

6. FLOW CHART

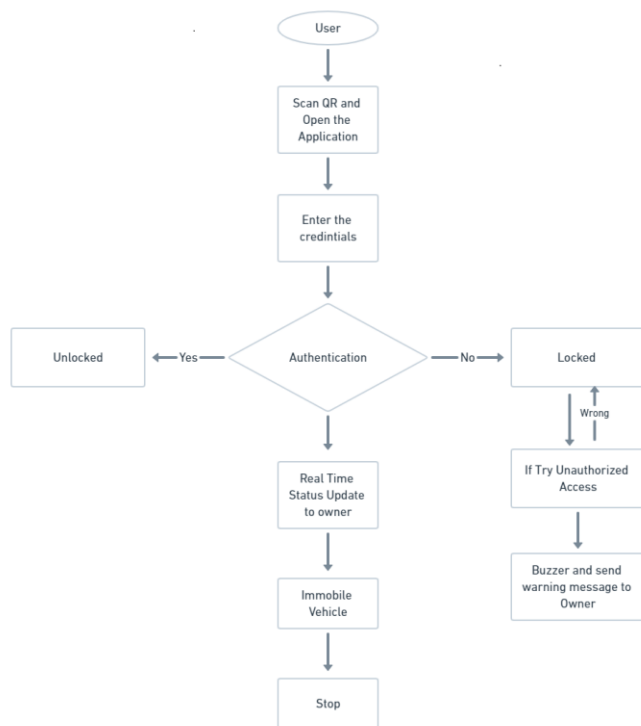


Fig -2: User

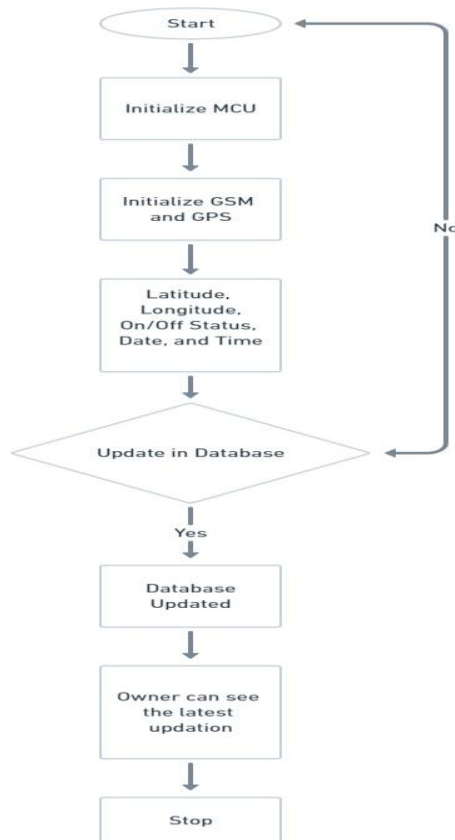


Fig -3: User

Based on the figure-3 above we have designed a technology to locate the vehicle by a responsive web application it is completely dynamic where the changes can be made very easily and with Most of the recent GSM and GPS applications.

7. CONCLUSION

With the necessity in safety and security of the vehicles in this paper we have discussed about a Responsive web application that runs completely online and cost effective with advanced security features in handy where the owner can look after his assets anywhere from the world. The functionalities of the application can locate the live location, having the ability to give approval or denial of access, then the Start or Lock- action will be taken accordingly. With This new technologies and unique methodologies we have tried to fulfil security goals of the people to some extent by means of Smart Security System for Vehicle.

8. FUTURE WORK

In the future we are thinking to improvise the application by adding a face recognition and fingerprint unlock system along with some smart security features like a personalised voice assistant. With these additional features we will set up a new bench mark in the field of security systems in automobiles.

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