Design and Implementation Vehicle Tracking System Using GSM and GPS

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***Abstract*: This paper presents a Vehicle Theft Alert and area ID arrangement utilizing GSM and GPS innovations. The point is to plan a framework that can trigger a SMS ready capacity that can make mindfulness for vehicle proprietors to assist them with checkmating unapproved faculty exercises on the vehicle and an area ID highlight utilizing GSM and GPS is additionally accessible to distinguish unapproved drivers and tos recover lost or taken vehicles. The framework utilizes a mystery button for verification of the driver. The mystery button is associated and modified so that when the motor is turned over, a forty seconds window is given to the driver to validate by squeezing the mystery button, except if the SMS alert is shipped off the proprietor's cell phone. Because of absence of vehicle security in the general public, the issue of vehicle robbery has expanded immensely, so the improvement of this framework will help tackle the issue of Auto burglary in the nation all in all. The ready framework is plan in a manner where a SMS is shipped off the cell phone of the proprietor which is enrolled on the framework as start happens. In this framework, GPS innovation is likewise used to get the continuous area following of the vehicle. The area can be seen by means of a web application produced for the framework. The decided directions of the vehicle can be utilized by security offices to follow and recover the specific vehicle. The usage of the introduced versatile application was finished utilizing JAVA programming language, while PHP and MySQL were utilized for the web application capacities. To accomplish such a framework, the significant segments utilized incorporate a GSM modem, GPS module, and a microcontroller (Arduino uno). The execution of this framework will no uncertainty be compelling in the general public, diminishing vehicle robbery wrongdoing and recovery paces of taken vehicles will increment in no uncertainty.**

***Keywords*: Location identification, Tracking System, microcontroller, Vehicle Theft alert.**

I. INTRODUCTION

The crime percentage is expanding step by step. This presents a startling environment for vehicle proprietors in the general public, prompting poor or elevated level of instability over properties and even lives in the nation. Regardless of the endeavors of security offices, not all the taken vehicles recorded are constantly distinguished, followed or recuperated. From research it is discovered that vehicle burglary happens in decrepit zones, however can really happen anyplace in any zone of a town. This is on the grounds that taking of properties, for example, vehicles, terrains, contraptions and other actual properties is exceptionally basic among individuals in a climate where there is absence of mindfulness for land owners. A vehicle burglary caution and area distinguishing proof framework utilizing GSM and GPS innovation is a framework that applies the highlights of these gadgets to report by means of SMS, the security status and the current area of a vehicle to the client or proprietor. This framework includes equipment and programming parts. The vital parts to consider in such a framework are the GPS tracker, GSM module (SIM900), microcontroller, and the cell phone. Different investigates have indicated the adequacy of cell phone for such frameworks in past works, because of the immense functionalities it gives for the framework the coordination of an application programming, created to control, the vehicle motor turn over and stop, entryway lock capacity of the vehicle, locking of the blending, fuel tank, alert trigger, etc. This will make vehicle robbery an errand that auto hoodlums will discover extra furious in effectively taking a vehicle. In circumstances where a vehicle is even taken effectively, to move the vehicle will be another unimaginable test since the client when alarmed of burglary has the capacity to turn the vehicle motor on and off freely. As indicated by Garba Suleiman "All these (the different expressed capacities gave by the framework) can deliver the hoodlum or unapproved client pointless with not many alternatives while attempting to take or utilize the vehicle".

The usage of such a framework has demonstrated to be powerful in different zones of property security, going from individual property security, dispatching organizations, to business vehicles and armada the board over the globe. Despite the fact that there are a few situations where this framework may come less compelling than anticipated. This happens where there is helpless organization inclusion or awful climate conditions to give solid GSM signals, GPS signal interference and helpless force gracefully to the framework can likewise be a difficulty. Likewise, research has indicated that a large portion of the current frameworks come

up short on the usefulness of revealing taken, followed or recuperated vehicles which most on occasion prompts delays in looking for vehicle or vehicle not getting to the genuine proprietor at the ideal time when found. Because of these difficulties in see, this exploration proposes to expand the functionalities, which will show the status of recorded missing vehicles, on the off chance that they have been recuperated from burglary and to the proprietor or not on the web application, and the utilization of the vehicle battery as an optional wellspring of intensity for the framework introduced in the vehicle, likewise the utilization of value GPS and GSM recieving wires to help amplify the signs got by these gadgets to guarantee a quality vehicle robbery and area recognizable proof framework.

II. THEORETICAL BACKGROUND

An Arduino uno microcontroller was utilized for this examination to facilitate all the exercises of the framework. With the highlights of this microcontroller, the framework was planned so that it works in two different ways, the validation and afterward the following. The validation was finished associating a catch to the pin 8 of the Arduino, where the board was intended to allow a forty second window for the squeezing of this catch to learn approval. The following is the stage when the framework begins sending directions to the proprietor's cell phone, through the GPS tracker coordinated in the framework. The framework is constructed utilizing JAVA programming language, while PHP and MySQL were utilized for the web application capacities. JAVA codes are delivered obvious through the android studio to the clients to the objective gadget known as an Android cell phone.

2.1 The Approach and Technology

The approach in this research provides a more cost-effective vehicle theft alert and location identification system. The system prescribes the use of the GSM, GPS and the web technologies to deliver the proposed system.

1. *The power supply block:* The power supply block supply power to the whole system. It supplies directly to the microcontroller, GPS module, GSM modem.
2. *The GPS module:* The GPS module is there to pick the coordinates of the vehicle from satellite. The command to do so shall come from the microcontroller by means of the program written.
3. *The GSM module:* The GSM module is used to transmit the coordinates collected by the GPS module.
4. *The microcontroller:* The microcontroller controls the communication between the GSM, GPS, and the secret button for authorization action. The microcontroller acts as the brain of this system.

The idea for this paper is to implement a system where; when the vehicle is started, a time window of about forty seconds is given for the owner or user to authenticate usage by pressing a secret button, to show that he/she is the owner of the vehicle, or has authorization to the vehicle in cases of employed driver. If authentication fails, the theft alert SMS is sent to owners' mobile phone to give him/her awareness of the vehicle status and location. This is the basic function of the alert section in this system.

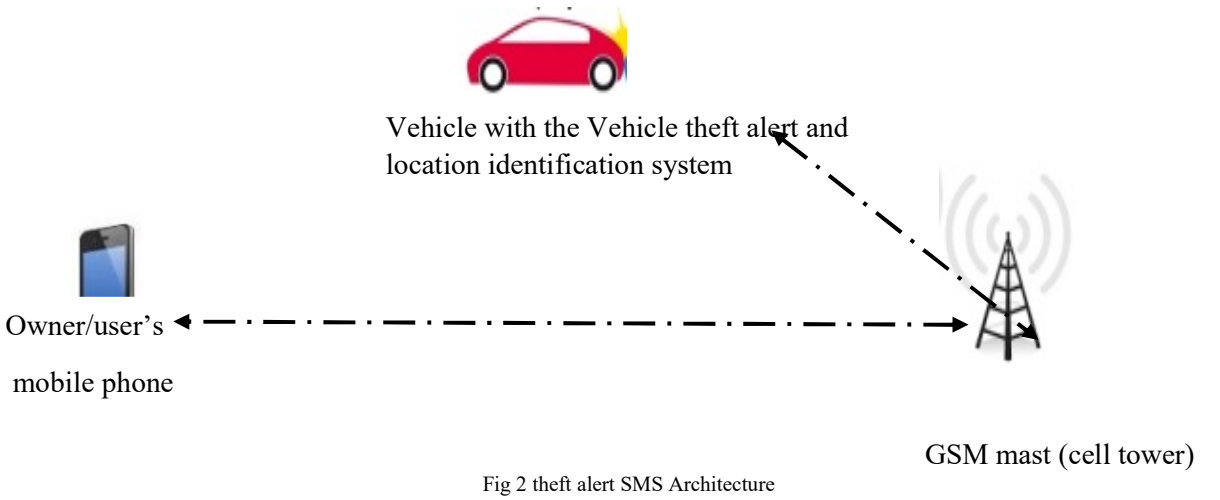

Fig 2 theft alert SMS Architecture

The fig 2 above shows the flow or working of the Alert system, where the GSM module in the vehicle installed unit sends the alert SMS to the owner's mobile phone by utilizing mast around that vicinity. The mast enables the Short Message Service (SMS) sending from one mobile phone to another or from mobile phone to web application.

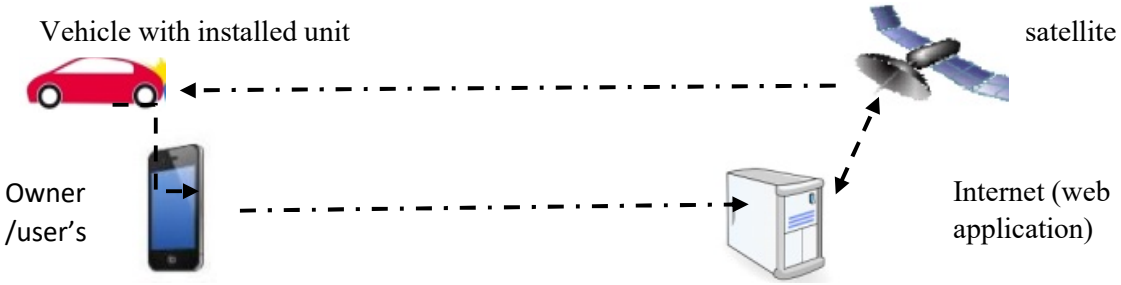

Fig 3 Location identification architecture

The fig 3 above describes the communication established in achieving the location identification feature or function in the system. The GPS (global positioning system) receiver/module in the system collects signals known as coordinates including longitude, latitude, altitude etc. from the satellites, which translates to the location of the vehicle. When information about coordinates have been sent to the owner, he/she can view in real-time, the location of the vehicle through the web application where google maps service is integrated. In other words, the vehicle owner's mobile phone is the medium through which the web application is accessed for the vehicle location information or data.

2.2 Review of Related Work

As indicated by [1] the creator composed on leasing the board framework. A rental Store the executives System allows a home office to regulate various Stores. The home office and Stores are associated by a virtual private organization. Each Store number of handling gadgets that gives UIs to Store work force. Each handling gadget incorporates Software to trade information with the home office. This work is identified with my work dependent on the zone of calculation and evasion of mistake during estimations. This work is not quite the same as my work since it centers around the return global positioning framework all in all, which doesn't focus exclusively on vehicle rental. I gained from this work that expansion of organizations engaged with leasing business can help utilize more specialists, along these lines decreasing joblessness.

In [2], Studies computerized vehicle return framework wherein status data of a leased vehicle is naturally followed during the rental time frame and is communicated to a chose objective PC after driving the vehicle into a bring zone back. Electronic vehicle checking hardware is attached to existing parts inside the vehicle to monitor the status of the vehicle during the rental time frame. The status data incorporates, miles driven, fuel level, get time, drop off time, mileage on the vehicle, and so on The status data is utilized by the objective PC to create a bill for the leased vehicle's the mechanized vehicle recruiting framework improved the manual method of leasing vehicles, which he accomplished it by making the framework electronic.

As indicated by [3], Proposed a vehicle following application. The information gathered from GPS beneficiary is shipped off the web worker through GPRS cell organization. At the point when the clients need to screen their vehicles, a solicitation is sent from an application to the web worker, that will cycle these solicitation and reacts back to the mentioning application. Since the application is worker subordinate, in this way worker disappointment will cause major issues. In vehicle GPS beacon (VTD)

As indicated by [4], a client must make an impression on a sim-card introduced on VTD equipment. The client will get an answer from the VTD regarding arranges i.e., scope and longitudes. The client taps on got arranges to see the area of a vehicle on google maps. In VTD, the nonappearance of easy to understand application makes it wrong for some clients.

As per [5], customer programming based android stage is created. The entire framework comprises of four sections for example vehicle terminal, checking worker, advanced mobile phone application and a GPRS network. GPRS network is utilized to communicate information to the state data, for example, area and speed and afterward sends this data to the worker through GPRS. The advanced cell application is utilized to get to the worker and to show the area of the vehicle on a guide. A large portion of the current plans for vehicle following depend on a focal web worker. The clients send demand message to the worker to follow the area of a vehicle. The worker at that point answers with the necessary data to the client in the wake of getting the GPS facilitates from the vehicle. The disadvantage of this plan is a utilization of focal worker which is a solitary purpose of disappointment. On the off chance that the worker quits working, the entire framework will fall. Also, if a solitary client is intrigued to follow his vehicle, the use of focal worker is named as misuse of assets.

In [6], green wave framework was talked about, which was utilized to give leeway to any crisis vehicle by turning all the red lights to green on the way of the crisis vehicle, consequently giving a total green wave to the ideal vehicle. A 'green wave' is the synchronization of the green period of traffic lights. With a 'green wave' arrangement, a vehicle going through a green sign will keep on getting green signs as it goes not far off.

In [7], proposed a RFID and GPS based programmed path freedom framework for emergency vehicle. The focal point of this work is to decrease the deferral in appearance of the emergency vehicle to the clinic via consequently clearing the path, in which, emergency vehicle is voyaging, before it arrives at the traffic light. This can be accomplished by turning the traffic light, in the way of the rescue vehicle, to green when the emergency vehicle is at a specific good ways

from the traffic intersection. The utilization of RFID recognizes the crisis and non-crisis cases, hence forestalling pointless gridlock. The correspondence between the emergency vehicle and traffic light post is done through the handsets and GPS. The framework is completely computerized and requires no human intercession at the traffic intersections. The impediment of this framework is it needs all the data about the beginning stage, end purpose of the movement. It may not work, if the emergency vehicle needs to take another course for certain reasons or if the beginning stage isn't known ahead of time. Traffic is a basic issue of transportation framework in above all the urban communities of Countries.

As indicated by [8], a keen and basic calculation is introduced in this paper for vehicles tag acknowledgment framework. Rely upon design correlation; this calculation can be applied for continuous identification of tags for gathering information for reviewing or for some application explicit purposes. The framework has been planned utilizing C++ and the trial results have been appeared for acknowledgment of Alberta tags. Extraction of Characters lastly acknowledgment of each character to frame a string to coordinate with the enlisted License plate numbers.

In [9], the venture Heuristics for tag restriction and equipment execution of Automatic License Plate Recognition (ALPR) framework manages discovery and acknowledgment of tag from a caught front perspective on any vehicle. The work complies with all the means in an ALPR framework like pre-preparing, division, and tag limitation, Image should be caught first and the picture ought not be obscured so framework ought to have the option to do fundamental handling on picture for number ID. At that point the tag should be removed from the entire picture. Division is performed on extricated picture. Through Segmentation the removed picture is separated into numerous sections for additional handling. Commotion should be eliminated from the picture for legitimate number recognizable proof. The last period of Automatic Number Plate Recognition (ANPR) is Number recognizable proof. In the Stanley Milgram (2014) Experiment, the invalid speculation was that the character decided if an individual would hurt someone else, while the examination theory was that the job, directions and requests were substantially more significant in deciding if individuals would hurt others.

III. ANALYSIS OF THE PROPOSED SYSTEM

The proposed system enable an easy tracking of owner vehicle that is stolen without them being physically present through the alert agent sending SMS alert of a theft and the location.

The system trigger an SMS alert function that can create awareness for vehicle owners to help them checkmate unauthorized personnel activities on the vehicle and a location identification feature using GSM and GPS is also available to identify unauthorized drivers and to retrieve lost or stolen vehicles. The system makes use of a secret button for authentication of the driver. The secret button is connected and programmed in such a way that when the engine is started, a forty seconds window is given to the driver to authenticate by pressing the secret button, unless the SMS alert is sent to the owner's mobile phone.

3.1 Design of the Proposed System

The software design aspect of this research tackles' the programming aspect of developing the system. The program language used is the Arduino assembly language, C/C++ language. Whereas the web application for the system was written in java programming language, php and MySQL was used for the database creation and management.

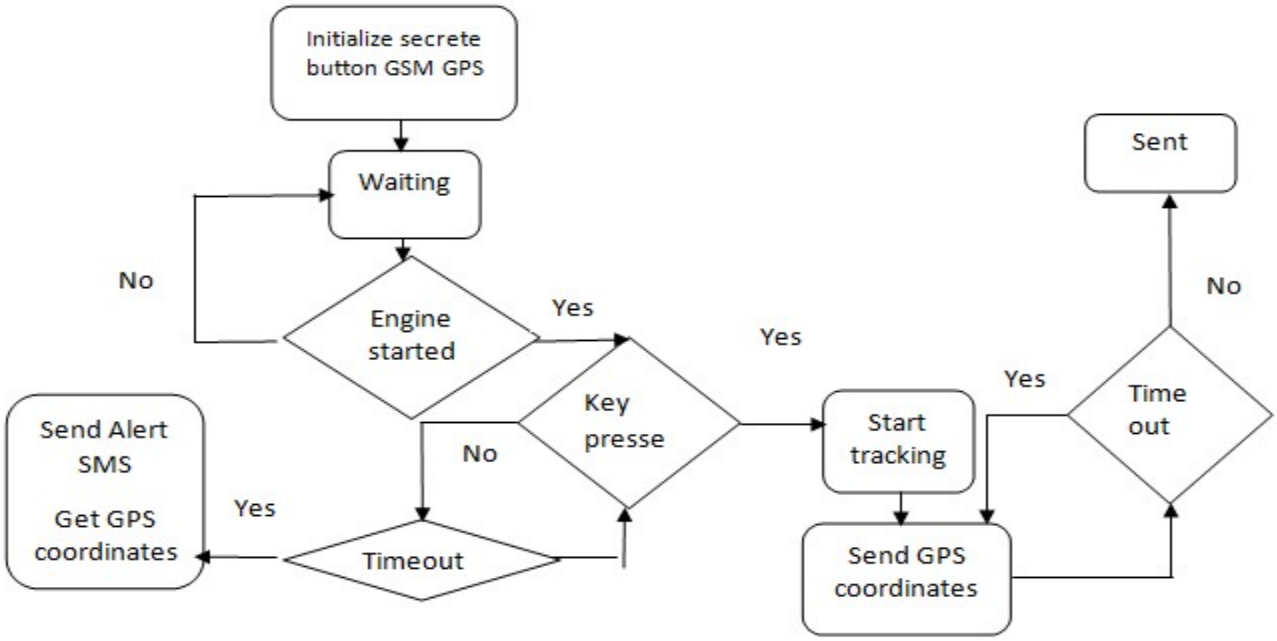

Fig 4 Flowchart for vehicle theft alert and location identification system

IV. RESULTS AND DISCUSSION

The outcome shows the confirmation work which is finished utilizing a mystery button associated with the microcontroller and modified so that it gives a period window of forty seconds for it to be squeezed. In the event that this catch isn't squeezed inside the forty seconds time span, the framework at that point realizes validation fizzled and sends the burglary Alert SMS to the proprietor. This framework works in two different ways which is it serves a ready framework and a global positioning framework to recognize the area of the vehicle. The ready framework is initiated when the mystery button isn't squeezed inside forty seconds from when the motor is turned over. At the point when security is penetrated, quickly the microcontroller sends an order to the GSM module to send the burglary Alert SMS, the GPS modem likewise picks the co-ordinate of the vehicle and is additionally shipped off the proprietor's cell phone. In a circumstance whereby the driver begins the vehicle and neglects to confirm inside the forty seconds, the framework will at present send the burglary ready SMS. As the vehicle proprietor u can just effectively disregard the SMS and be have confidence that the vehicle robbery ready framework is working. The outcomes likewise shows the following capacity which comprises of the GPS and GSM modules, where as we definitely realize the directions are gathered by the GPS collector and the SMS containing the connection to the web application and the directions data are shipped off the proprietor by an order from the microcontroller to the GSM modem.

V. CONCLUSION

The principle target of this paper is to convey a vehicle burglary alarm and area ID framework that can send a caution in type of SMS to the vehicle proprietor and get the area of the vehicle. It very well may be seen from the outcomes got that it is conceivable to plan and execute such a framework utilizing a GSM modem, GPS modem, and a microcontroller (primary segments). At the point when a man who has taken a vehicle with such a framework in it is captured later on, he would not have any desire to complete such a criminal demonstration again realizing that he could be captured whenever. With such a framework actualized in the general public, numerous vehicle hoodlums would reconsider prior to enjoying such criminal act, subsequently potentially diminishing crime percentage in the general public and the country overall.

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