AUTOMATED GLOBAL SYSTEM FOR MOBILE-BASED VEHICLE INSPECTION USING SHORT-CODE: CASE STUDY OF NIGERIA

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ABSTRACT

Insecurity been a major challenge that the entire world are battling with, each with different security issues/problems. Crime rate in our society these days is becoming frightening as vehicles are been used for committing crime and research shows that perpetrator of this acts make use of stolen vehicles snatched at gun points which is causing damages to live and properties. The Nigerian vehicle inspection system adopted a manual method that involves the use of screening papers for prove of ownership which is prone to error and very easy to manipulate. There are various methods of scheming the inspectors since lots of manipulation can be done on paper. This paper seek to designed a GSM-based vehicle inspection that will sending a short message to a particular designated shortcode, which in turns bring back all necessary information needed by the vehicle inspection team to verify the authenticity of the vehicle ownership. The system is designed using PHP and MYSQL server which is used in storing data being captured, PHP is an easy to learn language, open source, has large base of users and developers (community), it has larger database support and also has multiple platform support. If the system is implemented with the right technology it deserves, the rate at which vehicles will be stolen at gun-points or crime rate will be reduced if not totally eradicated and also shows that GSM is viable as a platform for managing the process of inspection of vehicles.

Keyword: Shortcode, Inspection, GSM, Vehicles, Insecurity, Law enforcement.

1. INTRODUCTION

In everyday fast insecure world, the need to maintain a well secure vehicle inspection is increasingly significant and increasingly complicated. Terrorism attacks is beginning to spread from states to states, from countries to countries and thus a proper security approach needs to be adopted by the government in order to protect the vehicles and their owners. It have proved by my researchers that the perpetrators of this acts make use of stolen vehicles and abandon it after finish using it for their evil acts. Most of these terrorist make used of government vehicles all they need to do is to change their plate number and make used of the vehicles for their evil did and later abandon the vehicle or even sell them to unknown person, which in most cases causes problems to the buyer of such vehicles.

Recently, it has become more evident that law enforcement agencies are spending money and efforts in computerizing their activities and examining current information systems. Existing systems are being considered for revision in light of modern business practices. Unlike other businesses, however, the bottom line in policing is not profit, but public order and safety. For the most part, police information systems have functioned as little more than expensive electronic file cabinets. While they have improved the efficiency of filing and retrieving a single file or piece of information, these systems have not helped to answer the question of how to best use the data collected and how to track the progress of crime cases starting from the incident scene through arrest and investigation process to the court.

The Motor Vehicle Inspection unit is charged with the responsibility of ensuring the provisions of the Traffic Act, Chapter 403 Laws of Nigeria and subsidiary rule that are under relating to Motor Vehicle examination is complied by all vehicle owners in order to minimize road accidents.

- Checking the vehicle is roadworthy before driving
- Ensuring that any equipment, fittings and fixtures required are present and serviceable
- Not driving the vehicle if faults are present or develop
- Ensuring all actions taken when driving the vehicle is legal.

These checks will help ensure one’s own safety and that of any passengers or other road users. Therefore to implement such workflow, it is required to have a firm understanding of the requirements of the system involved, identify who the actors of the system are and ability to specify the system's purpose. Several law enforcement agencies are involved in vehicle checking in order to combat crime and apprehend the offender. Therefore, there is need for proper automated vehicle information management system. The system involves the use of global system for mobile communication (GSM) by sending a short message to a particular designated shortcode that in turns bring back all necessary information needed by the vehicle inspection team to verify the authenticity of the vehicle ownership. The system registers all vehicles and captures all information about the vehicle and stores them in the database for future references using an application that housed all information on the server and the application responds to the message being sent to the shortcode by giving all details about the vehicle in question.
2. RELATED WORK

Nwobodo, & Inyiama (2013) Proposed a system which is GSM based Vehicle Inspection and Verification System. The system that will help to overcome the problems of vehicle stealing and vehicle verification. It is a means by which an authorized agent accesses the company’s database to view information about any type of vehicle anytime, anywhere, even in remote areas that has a GSM network coverage. The data or code which can be used to view the Vehicles details could be the chassis number or the engine number; this is a number that no two vehicles can have.

With this new system, the company will be able to achieve the following:

“The easy and fast way to detect unauthorized vehicle users, enhance effectiveness and efficiency in the work by avoiding the use of papers and files. There will be consistency and enhanced security of data and easy access to data in terms of update, retrieval and accessing of one's record”.

The major different with this system is that the proposed system used a short-code in send massage to the vehicle inspectors in response to the message received from him/her. Vandana & Deepali (2012) proposed a system GSM Modem Based Data Acquisition that is a process control system. The system help in gathered data from various processes present at distant places. It helps to scrutinize and monitor parameters like temperature, rainfall, humidity etc. With the proposed system the service personnel need not to visit distant sites for data collection .The data is collected automatically formed a data base and stored in a computer. Information gathered from the computer server can be used in industries as well as in home automation.

Ramamurthy et al (2010) proposed the development of a Low-Cost GSM SMS-Based Humidity Remote Monitoring and Control system for Industrial Applications. They proposed a wireless solution, based on Global System for Mobile Communication networks for the monitoring and control of humidity in industries. This system provides ideal solution for monitoring critical plant on unmanned sites. The system is Wireless therefore more adaptable and cost-effective. Utilizing Humidity sensor HSM-20G, ARM Controller LPC2148 and GSM technology this system offers a cost effective solution to wide range of remote monitoring and control applications. Historical and real time data can be accessed worldwide using the GSM network.

Ghose, et al. (2011) presented the design and development of microcontroller based SMS gateway for GSM Mobile. In their work, a microcontroller based SMS gateway for GSM mobile has been designed and developed. Most of the SMS gateway system was controlled by PC based software where microcontroller only used for controlling and sending status of devices or any appliances connected with the system. An Ericsson T66i, one of the cheapest GSM mobile phone sets available with most of the advanced features, has been interfaced with a PC via RS232 serial port. The SMS packet has been analyzed and its different fields have been identified for the Grameen Phone, the largest GSM operator in Bangladesh. Then the PC has been removed from the system and the transmission and reception technique of SMS have been implemented into the PIC microcontroller. Successful completion of the design and testing of the SMS Gateway indicates that the PC as an SMS gateway can easily be replaced by a PIC microcontroller. Beside this, the additional IC, MAX232, used for voltage adjustment between the mobile and PC is no longer needed in the proposed micro-controller based system. It also reduces the complexity and the overall development cost of such a system.

Oke, E, Emuoyibo, & Adetunji, (2013) proposed a system that used GSM module for receiving short message service (SMS) from user’s mobile phone that automatically enable the controller to take further action like switching ON and OFF electrical appliances such as fan, air- conditioner, light etc. The system was integrated with microcontroller and GSM network interface using C language. MPLAB software was utilized to accomplish the integration. The system is activated when user sends the SMS to the controller at home (regarded as Smart Home). Upon receiving the SMS command, the microcontroller then automatically controls the electrical appliances by switching ON or OFF the device according to the user’s order.

In other word, it reads message from the mobile phone and respond to control the devices according to the received message. Pany & Choudhury, (2011) proposed an Embedded Automobile Engine Locking System, Using GSM Technology, the proposed system deal with the design & development of an embedded system, which is being used to prevent /control the theft of a vehicle. The developed instrument is an embedded system based on GSM technology. The instrument is installed in the engine of the vehicle. An interfacing GSM modem is also connected to the microcontroller to send the message to the owner’s mobile. The main objective of this instrument is to protect the vehicle from any unauthorized access, through entering a protected password and intimate the status of the same vehicle to the authorize person (owner) using Global System for Mobile (GSM) communication technology.

3. RESEARCH METHODOLOGY

This paper aims at designing a system where vehicle owners will be checked by vehicle inspection officers by sending a short message to a short-code which in turns responds by bringing all the details captured in the database during the vehicle registration. The system involves the design of an application that seats on the server and this housed all information and data been collected from the vehicle owner during registration. The system registers all vehicles and captures all information about the vehicle and stores them in the database for future reference. The application is designed using HTML, CSS, PHP and MYSQL server in storing data being captured, PHP has a larger database shore up and it has multiple platform support. The data can be retrieved during authentication that is verification by the vehicle inspection officer to ascertain whether the vehicle owner is truly the person that he or she actually claims to be, if this system is actually implemented by the vehicle inspection team it will be a prominent way of reducing the rate at which vehicles is being stolen or vehicle particulars that normally forged will be drastically reduce if not totally eradicated.
4. SYSTEM DESIGN

System design is the part where each element within the new system is structured in order to create and integrate the processes that meet the user needs and requirements. At the same time, system design must conform to the specifications and scope or boundaries established at the data analysis phase. All input requirements and expected output are identified and established. Design is both a process and a product. The creative process of system design is the transformation of a process into a solution, otherwise known as “System Design”.

4.1 Data Flow Diagram

This is a graphical representation of the flow of data through an information system. It mainly reveals relationships between entities by showing what data comes from where, where it is going to, as well as where it will be stored. The processes timing is not usually included in data flow diagrams.

![Data Flow Diagram](image)

4.2 Database Design and Specification

MySQL is a RDBMS (which has a free community edition) that can be used to develop database application both locally and on the internet. MySQL is popular and used by many webhost online for storing data on the internet. The current version that is used in this dissertation is version 5.5.24. MySQL storage engines provide more flexibility and offer more performance, it can host millions of database simultaneously without much commotion.

4.3 Pseudo code for the Proposed System

Pseudo-code is an informal way to express the design of a computer program or an algorithm. The aim is to get the idea quickly and also easy to read without details. It is like a young child putting sentences together without any grammar. The following are the pseudo code for the new system:

**Pseudo code for the Proposed System**

```plaintext
Begin
  Compose SMS
  SD 11391 Plate Number
  Send 35811
  Case Invalid
    Return Back Message
  End Invalid
  Case Valid
    Look-up Vehicle Info for Plate Number
    If Found then
      Return Vehicle Info/Details;
    Else
      Return “Information Not Found”
    Endif
  End Valid
End
Stop
```

The pseudo code above is for the front end of the application system. This will allow an officer to compose an SMS with SD 11391 Plate Number then send it to a shortcode 35811. The application will look up the information and send the necessary data back to the user. If the information is not found, it will send a response indication that the information was not found.
Flowchart for the proposed system

Back-End Pseudo code
Begin
Display Welcome Screen
Main Menu Display
Select Menu Option
Case Admin
   Enter Admin Username and Password
   If Username and Password are correct then
      Display Admin Main Menu;
      Select Option;
   Else
      MsgBox “Check your Username and Password”
   Endif
End Select
Case Home
   Display Statistics of Activities (glance view) going on in the Application
End Select
Case Add-Vehicle
   Enter a New Vehicle Details
   Compare Reg no (plate number)/Chassis number/Engine number
   If Already exist then
      MsgBox “Check Reg no (plate number)/Chassis number/Engine number”
   Endif
End Select
Case Vehicle Lists
   Display Vehicle Information Currently available
Case Logs
   Display Users Accessing the Application through Shortcode Information
End Select
End
Stop

The pseudo code above is for the welcome page to the organization website. This will allow the Admin to select the available menus options which any administrator can choose. It also include the pass/authorization for the admin or the user. It is the validation and access for all users. The user is prompted here to enter a USERNAME and a PASSWORD for the administrator, the system verifies the correctness. It is from which the administrator manages all transactions. He/She can register a new vehicle details, modify, views registered vehicles, view details of numbers access the application through the short code and the access code at will.

A GSM-Based Vehicle Inspection Management System is a user friendly and having a Graphical User Interface. It is also interactive and will assist any law enforcement agency to collect, store, process and manage vehicle information and investigation for present and future needs of the Motor Vehicle Inspection Unit and other law enforcement agencies. System requirements include hardware and software requirements. Due to the rapid growth in technology, new systems are developed and presented in the market every day.
5. CONCLUSION

It is a well-known fact that insecurity is what most of the developing nation spend their affluence on. Many researchers have tried to have a lasting solution to these problems by try to profound solution in different ways in like manner of this paper. GSM-Based Vehicle Inspection Management System is widely available means of vehicle inspection for most laws enforcement agency. The use of this medium enhances easy access to vehicle owner’s information via mobile phone. The system designed which make used of a SMS and shortcodes technology automated program that handle the response and typically requires the sender to start the message with a command word or prefix.

This system uses a 2-tier level verification system involving the law enforcement agency’s mobile phone number. The GSM-Based Vehicle Inspection Management System tries to approach vehicle inspection from the point of social interaction between the vehicle users and inspection officers to improve the security to a certain level. The existing system needs the vehicle user to produce the registration documents, while in the new system the plate number is only required. With the used of this system the issues of vehicle be stolen or collect at gunshot will be reduced if not totally eradicated.
REFERENCE


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