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Private Cloud Solution for Vehicles in Afghanistan Using GSM

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Abstract

The traffic police around the world check vehicle papers and plate numbers to confirm if the vehicles are registered with the government. Nowadays this process takes place manually, and there are numerous hindrances associated with it. For instance, may be a vehicle has fake papers or fake plate number. Or May be a vehicle hasn't paid its taxes. So the traffic police are unable to identify or trace each vehicle correctly due to fake papers that look like genuine papers. Hence a system must be designed in which the mentioned issues need to be addressed. The sole intent of this paper is to design a cloud based system that verifies each vehicle's plate number through a single SMS. Traffic police should only send a plate number of an intended vehicle to the cloud using GSM technology; the system should send all the necessary information back to the concerned authority for confirmation. This paper consists of three main modules, the IT infrastructure module, the private cloud module and the GSM SMS module. This system is very easy to use, fast and can prevent many crimes too.

Keywords: Cloud Computing, GSM SMS, Vehicle Number Plate Verification.

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Introduction

In today's age the rapidly emerging technology is cloud computing, which is an integral part of all sectors including education, medical, businesses, government agencies and communication etc. Cloud computing plays an important role in many aspects and it can also play a pivotal role in vehicle controlling effectively.

Current vehicle system has no cloud for its data in Afghanistan. All vehicles' records are kept in local systems individually, even it is still paper based in some provinces of Afghanistan, which has created many hindrances and unmanaged security concerns. Traffic police need to check all the required documents of each vehicle make sure this car has been registered with the government. As a driver of the vehicle, you have to answer all the questions asked by traffic police on a roadside. This is a time-consuming and lengthy procedure.

The most dangerous side of current system is its security concern; fake registration book of the vehicle cannot be correctly checked on road side because if a document looks like genuine, which is not, a traffic police cannot trace stolen car or a vehicle which in fact is not registered with the government.

This paper has actually suggested a solution to effectively verify vehicle's documents; security parameter is not focused too much. It can be used to emerge and facilitate enormous resources for vehicle safety and assurance of security. This system shall be proved extremely helpful when someone is considering buying a used vehicle.

The proposed system will have all the information about a particular vehicle. Traffic police can verify all the authorized vehicles from any province throughout Afghanistan using GSM mobile network. Through the proposed system, traffic police don't need to check all manual documents of a particular vehicle on roadside to make sure its papers are not fake. They only have to send the plate number to the cloud via SMS. The system will send back automated reply with necessary information to the issuer. For instance engine number, original color, owner of the vehicle. The reason we use GSM is because a single SMS answers all the questions.

Verification of a vehicle's plate numbers helps you know to whom a car is registered and also it is very essential for security. As a driver you will find the service extremely helpful when you do not want to stay too long for hundreds of questions from police in a traffic police checkpoint. A single text message can answer all the questions regarding your vehicle.

This private cloud will be sharing its processing power and resources automatically while the requests are increased from traffic police. New records of vehicles will be entered into the centralized data center and data from all the provinces is synchronized.

The traffic departments will have an entry level access to the cloud to enter new records. Two reasons are important for choosing private cloud for the proposed system. First, there are millions of vehicles in Afghanistan, maintaining their data is very difficult because of the size and complexity, and cannot be processed by a single server. The system will automatically share its processing power which can be handled by virtualization technology. And secondly, as it is private cloud, it will be providing services only for General Directorate of Traffic, hence vehicles documents are sensitive data and we cannot put such data on a public cloud.

The sole intent of this paper is to overcome most of the problems concerning safety and security of vehicles. By sending a single plate number, traffic police can check everything within very short period of time. Only those SIMs which are allowed from the cloud can receive the information via SMS, it means only traffic police can have verification access to the cloud. In other words, only registered SIMs can verify and check vehicles plate number. This paper consists of five parts, literature review, and GSM technology, Cloud Computing, Conclusion and Limitation & Future Work.

II. LITERATURE REVIEW

Mukesh Thakur et al [1] had proposed The Cooperative Approach of Genetic Algorithm and Neural Network for the identification of vehicle license plate number. He has worked only to detect plate number. The License Plate Recognition (LPR) consists of three modules, A. detection of number plate area, B. segmentation of plate characters, and C. recognition of each character.

There was a big challenge in recognition of plate number due to variations in plate styles. In order to overcome this problem, he used Genetic Algorithm (GA) to detect any type of plate number; furthermore, he used Artificial Neural Network (ANN) to recognize any font style of character.

R Shreyas, Pradeep Kumar and Sunil M P et al [2] had proposed dynamic traffic rule violation monitoring system using automatic number plate recognition with SMS feedback. They had designed Automatic Number Plate Recognition (ANPR). In this system, an image processing technology is used. They claim that any vehicle can be detected if it violates traffic rules and the generated or gathered information about the particular car will be passed to the concerned authority for taking legal action. For recognition of plate number, they have used Optical Character Recognition (OCR) using ANPR algorithm

with the help of server, which is then given to GSM modem for further SMS feedback to the user or concerned authority.

Md. Shajahan, Kafi, Shamim and K. Murase et al [3] had proposed an implementation of On-Line Traffic Information System via Short Message Service (SMS) for Bangladesh. The main purpose of this paper was to detect levels of traffic congestion on certain roads in Dhaka city. The system is capturing digital image of passing by vehicles, process the image and make a clear decision about number of car. Any user can reach this information through SMS from system and the system should serve each request. This system is too costly to be implemented because to detect all vehicles passing by roads, CCTV cameras need to be installed on all roads. And also, processing such huge amount of video data needs super processing power.

Hanit Karwal and Akshay Girdhar et al [4] had proposed Vehicle Number Plate Detection system for Indian Vehicles. They tried to design and develop such system that captures image of plate number of vehicle, then sends it to the system for recognition. They have insisted that this system is very useful for both the management of traffic as well as for reduction of crimes related to vehicles. It is stated in this paper that accuracy of this algorithm is 98.07% for recognizing of any type of Indian vehicle plate number. Again there is a big challenge of capturing images and then sending these images to the system for further processing and recognition, which is absolutely costly.

Bhonsale Tejas, Dhamel, Rutuja and Prajata et al [5] had proposed Number Plate Recognition and Document Verification Using Feature Extraction OCR Algorithm. They have designed same system just like the proposed system. They also tried to identify and recognize any vehicles automatically without checking manual documents of the concerned vehicle. The system is very useful for vehicles management authority to easily get information about any vehicle on roadside. This information is retrieved using character segmentation which is done by Optical Character Recognition Algorithm (OCR). Again the problem with this system is image processing. CCTVs need to be used to detect and recognize the plate number of vehicle, and it is very costly and more complex.

Zi-Zia Chen and Kuaj-juan Zhang et al. [6] had proposed Research paper on Logistics Information Platform Based on SMS- system. The main job is done through SMS, to collect information about source and destination of any cargo. This system consists of four modules. A. Business Information Collection Platform, B Member Messaging Platform, C. Cargo Monitoring and Tracking Platform, D. Logistic Costs Payment Platform. In this paper they have worked to provide any kind of information about logistics or cargo to the driver or to the owner of the car using GPS. This information is being exchanged through

SMS. Using GSM technology is very reasonable and easy to get information at any point, any time, where there is no access to Internet.

III. GSM SMS

Global System for Mobile Communication (GSM) is a combination of several sub-systems. In the early 1990s, e group was formed by European Telecommunications Standards Institute (ETSI) for designing and developing a mobile communication system for all Europe, but luckily they have developed a better wireless system than what was proposed.

Short Message Service (SMS) is a wireless communication service that uses mobile for sending and receiving short messages. The communication between sender and receiver is not taking place directly. The sender needs to forward message to a centralized system named Short Message Service Center (SMSC). The SMSC is responsible for transferring this text to end user or destination mobile. If the receiver is out of coverage area or it is switched off, the SMSC is keeping this message in its storage until the receiver becomes available, once the receiver end becomes available, the SMSC then sends message to the receiver. [7].

In the proposed system the communication is done by GSM network between traffic authority and system for verifying vehicle documents. The salient side of cellular communication such as GSM is a potential solution for such remotely checking activities. Obviously the reason of using GSM network for communication of the proposed system is its wide coverage which enables the entire system online almost all the time and easily accessible from the rural community or remote areas where connection of Internet is not possible in Afghanistan.

IV. CLOUD COMPUTING

It is clear to all of us that cloud computing is a dispersed technology, which provides dynamically virtualized resources to huge number of clients using Internet connection. The prominent side of cloud is that the resources provided by cloud are dynamically allocated, on time and scalable through shared processing power. Private or public cloud supplies services in many shapes such as (IaaS), (PaaS) and (SaaS) with different deployment terminologies according to requirements like public cloud, private cloud, community cloud and hybrid cloud [8].

[9], "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., Networks, Servers, Storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction".

V. PROPOSED APPROACH

In the proposed system architecture as depicted in figure 1, it consists of three main modules. A. IT infrastructure, B. Private Cloud, C. GSM network.

1. The IT infrastructure for this system is the most vital module. It provides all the connectivity ground or structure throughout the country, which is the centralized data center. That should have proper secured connectivity to all the provinces in order to synchronize data.
2. The private cloud module represents the data center and cloud architecture. This module will be providing dynamically processing power and data for all the requests.
3. Global System for Mobile Communication (GSM) is a mobile network technology. It is used for verifying vehicle plate numbers. The main server is connected through modem to mobile network. All the requests will be coming to this SIM with the help of server that SIM will have to send and serve requests from mobile phones using SMS service. GSM network is chosen due to its wider coverage area, easy, fast and cost effective. Mobile network works perfectly. Through this system we can overcome all the hindrances and barriers which General Directorate of Traffic faces today. The proposed cloud system is very easy, fast and reliable.

Fig.1. System Architecture

VI. CONCLUSION

This paper pres les documents verification through cloud. The cloud of this system will be having all vehicles related information from entire Afghanistan. For instance vehicles registration numbers, original colors, engine numbers, owners and so on. Through the proposed system, traffic authority can check and verify vehicles from any corner of Afghanistan only by sending SMS to the

cloud using GSM mobile network. Choosing GSM mobile network is a convenient way, because the remote areas where internet connectivity is not available, mobile network works perfectly. Through this system we can overcome all the hindrances and barriers which General Directorate of Traffic faces today. The proposed cloud system is very easy, fast and reliable.

VII. LIMITATION & FUTURE WORK

There are numbers of limitations in this system. The first and big challenge is that developing and deploying private cloud for this system is not easy and its security assurance is a crucial side. Second, the synchronization of new data entry from all the provinces into the central data center needs a strong internet connection which is not available in Afghanistan all the time. Third, there are some areas in the country where GSM networks don't have coverage. Fourth, nowadays millions of vehicles are running in Afghanistan, collection of their data and putting it into the cloud is a tough task and time consuming process. And the last one, this paper is actually focusing to put data on cloud, meaning that the data will be accessed via the Internet too, so once internet comes to the game, then the term "security" comes into concern. Maintaining and keeping this important data on cloud needs more concern about strong security.

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