

Voice Enabled Android Application for Traffic Complaint and Pothole Notification System Using GPS and GSM-GPRS Technology

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Abstract: Commuters in India face a lot of vehicular problems which usually go unreported and thus, unattended. Malfunctioning traffic lights, potholes and roads in bad conditions are only a few of the innumerable common thoroughfare problems that occasionally contribute to traffic chaos. People tend to ignore reporting those issues as the channels for making a complaint is inconvenient. Accuracy of complaints is also at doubt as it tends to be general e.g. Potholes at NIBM Road, in front SBI bank. This paper presents the architecture of a Global Positioning System (GPS) based approach for reporting thoroughfare problems via Global System for Mobile Communication (GSM) for road maintenance management environment. To increase accuracy and efficiency, GPS can be used as it enables the tracking and tracing of the three figures of a GPS receiver's coordinates namely longitude, latitude and altitude. Data like location, date and time will be optimized by mapping the site of where the thoroughfare problem exists in a map, with the intention that the relevant authorities could identify the spot and have the problems resolved responsively. Since the proposed system is voice enabled and Android based on the complainant side, it will serve as a handier and convenient alternative means for Indian road users to send complaints to the relevant authorities, so that these issues could be addressed in a timely manner.

Index Terms: Android, Complaint management system, Global Positioning System, GSM, Speech recognition, Pothol

I. INTRODUCTION

The commute from one place to another via the roadways has slowly but surely become a menace. Many passengers face harassment from auto/taxi drivers like refusal of short distance ride (or any rides), not using a meter, asking more meter, asking more meter fare or other similar complaints of serious nature. Also there are traffic, wrong parking, rash driving, drunken driving and misbehavior grievances for vehicles in general. A lot of these complaints go unregistered due to the lack of an easy-to-use and convenient complaint system that records and manages reports at the appropriate agencies. The research finding aim to develop an android based mobile application that combines the ease of a Short Message Service (SMS) with the convenience of speech recognition to register complaints. An added feature is integration of Global Positioning System (GPS) technology with Global System for Mobile Communication (GSM) in order to point to the exact location of the problem which will make area wise addressing of problems easier for the concerned authorities. Presently the commuters of metropolitan cities can register a complaint against the auto/taxi defaulters by calling the helpline number or by registering a complaint on a traffic police website or by sending an email to the Regional Transport Office (RT). All these methods are inconvenient due to several reasons. Commuters find it tedious to send an email or register a complaint online immediately. They have to note down the vehicle number and may forget to register the complaint later. Also they find it difficult to remember different helpline numbers and message formats required. Thus limitations of access reduce people's interest from the process. Hence many people refrain from complaining and the purpose of complaint system is not met.

Help lines may become congested at peak hours due to which the commuters have to wait for a long time to register the complaint. Moreover, considering the present scenario, in order to handle the load during the peak hours, a number of operators are required. But this man power goes waste during the remaining periods. With this system in place, there will be nothing as a peak hour.

Our system aims to give harassed commuters a simple and convenient way to register their complaint. It will qualify the menace faced by the commuters and will also expose the concerned transport authority's response and readdress system and thereby make it more robust. Dangerous road surface conditions are major distractions for safe and comfortable transportation. Both drivers and road maintainers are interested in fixing them as soon as possible. However, these conditions have to be identified first. One approach to road damage detection is to use human reports to central authorities. It has the highest accuracy, assuming that people are fair; it also has the most human interaction.

II. EXISTING TECHNIQUES

Kim nee Goh, Yin ping Ng, Kamaruzaman Jusoff, Yoke Yie Chen and Yoon YehTan[1] have developed architecture for GPS based road management system. The proposed system obtain GPS coordinates namely longitudes, latitude, and altitude on a cell phones supporting Assisted GPS (A-GPS). The user complaint along with the obtained GPS information was sent via an SMS to the SMS server over the GSM network. The data in the SMS is retrieved and stored in a database. This information stored in the database was then plotted on

Google Maps, thus providing the exact point of location of the user problem.

The Delhi Traffic Police (DTP) [2] have put to practice SMS based technology to widen the reach of the commuters to register grievances and complaints against auto rickshaw drivers. All such complaints received via SMS are downloaded through Internet and necessary action is taken against such defaulting auto-rickshaw drivers. A similar system is employed by the Bangalore Traffic Police (BTP) [3]. The BTP have initiated an SMS based campaign to eliminate auto rickshaw drivers from harassing commuters.

The commuters of Mumbai can register a complaint against the auto/taxi defaulters by calling the helpline number 1800-220-110 or by registering a complaint on the Mumbai Traffic Police (MTP) website [4] or by sending an email to transport commissioner. Ahmad ShukriMohd Noor [5] proposed a research project of a Java-based smart mobile complaint application m-Aduan. It is designed using the Java Micro Edition (JME) platform and is based on the three-tier client server architecture. The client side is a java user interface which can send (public user) and receive (staff) data from the server using the Hypertext Transfer Protocol (HTTP). Java servlets on the Apache Tomcat web server side are used to support client request and server responses. Data received from client (public user) is stored into MySQL database on the server. Malaysian government provides SMS services for convenience of the public to interact with the government agencies. Some SMS-based applications developed for Board Complaint system for those relying on buses, feeder buses, taxi or the Light rail Transit (LRT). The SMS number and data format for submission vary from one with another. This causes a problem as commuters may not remember numbers or formats at the time of need.

III. TECHNOLOGIES

A. Speech Recognition

Speech recognition as a mobile text input method is highly advantageous as it is more convenient in an actual mobile scenario where users are walking around while entering text. Moreover it is a naturally acquired skill which can make text entry faster and safer especially in situations where the user is driving or engaged in any other activity. In the past, speech recognition systems suffered from poor accuracy but Speech Input Application Programming Interface (API) for android is very practical and has a high efficiency. Android 2.1 and later have a voice-enabled keyboard feature that lets one dictate a message instead of typing it.

B. GPS

Often it has been observed that auto/taxi/other drivers in certain areas are prone to misbehavior, refusal or overcharging. In such cases, knowing the exact location of a complaint plays an important role. GPS devices retrieve GPS signals from three or more satellites in the user's vicinity. With the help of these signals, the GPS unit calculates data which includes three-dimensional position,

velocity and time information. Due to the incorporation of GPS devices in Android and other smart phones, it is easier to provide such location based services. Android SDK provides API for such location based services since one of the first versions Android 1.5.

C. GSM-SMS

Over the past few years, the GSM cellular phone has grown from luxury device owned by the rich to an item so common that almost everyone possesses it even in a developing country like India. Along with it, another technology that has gained tremendously popularity is the Short Message Service (SMS) created as part of the GSM Phase 1 standard that allows text messages to be sent and received to and from cell phones by communicating with the GSM network. Together they make a mobile, inexpensive, worldwide system ideal for intelligent small packet (maximum 160 characters in length) digital data transmission.

The Short Message Entities (SME's) are the sources as well as the destination for SMS messages. SME's communicate with a Short Message Service Center (SMSC) but do not directly communicate with each other. Mobile phone is a common example of an SME.

IV. PROPOSED APPLICATION

This android application is the extension of current technologies which are used for Traffic complaints management. Our application will take the user complaints by using voice recognition system including the vehicle registration number so as to ease the process of vehicle recognition and it will append the following data with user's current location (i.e. current longitude and latitude) in SMS format and will send the message to server as well as the concerned authority's android device.

Same is the case with potholes notification system only an image will be attached with the current GPS location of the user and this SMS containing the current user's GPS location and image link will be sent to the concerned civil authority's android device. If the authority wants to view the image of pothole he can click the image after which the image will be downloaded from the server and the authority can view the image and take action accordingly. Also a high ranking official can view the traffic complaints data views as well as pothole notifications sent via SMS.

The reports of the traffic complaints will contain complaint records of last ten days. The record will contain the mobile number of user, time and date of complaint, complaint information and GPS location. In potholes notification report the authority will be able to see the GPS locations of potholes on the map itself. Apart from that how many users have notified the same pothole using this application will also be shown.

In short how many users have complained for the same pothole will be displayed with the GPS location of pothole and area in which it is present.

V. ADVANTAGES OVER EXISTING TECHNIQUES

The proposed voiced enabled android application that uses GPS and GSM-SMS technology has following advantages over the existing system:

A. Higher Efficiency

This system will offer more convenient alternative means for user to make complaints regarding thoroughfare issues to relevant authorities. The complaint can be made immediately by the commuters with the help of this GPS based system on a mobile platform. This increases the probability that a commuter will lodge a complaint when faced with an issue as tendency to forget to forget and ignore the problem increases as time elapses. Since the proposed system is voice-enabled, it adds to the convenience in the complaint making process. The commuter can lodge complaints on the go, even doing tasks like driving. Also, instant plotting of the problem area on the maps after an entry is made on the database ensures effectiveness in issue resolving process from the side of authorities

B. Higher Accuracy

The exact position which is obtained GPS will help the relevant authorities to find the location of a particular road problem with higher accuracy level. For instance, a user using SMS or Internet to file a complaint would probably input a street name as the location of the road problem to be fixed. First, the particular street might be a long lane, thus making it difficult for the authorities to look for the exact location of the problem. Second, there might be two or more streets in the city bearing the same name. This proposed system eases them by providing them the exact location of the problem, namely longitude and latitude. Our proposed system integrates GPS to provide accuracy as the data is of high importance. Efficiency will further play a major factor when the application is extended to report potholes. Authors Mohammad, Mohd Ali and Ismail [9] have performed two types of test study the availability, reliability and accuracy of GPS data in Malaysia. Both static positioning and mobile positioning tests have been conducted and it is proven that GPS receiver has position accuracy of 2.5m (50% out of 17280 GPD data) and 5m (90% out of 17280 GPS data) in Kuala Lumpur area. This result add to new refinement in the interpretation of GPS data in the proposed system: a GPS data with latitude and longitude of 3.9217862 and 121.4643821 could possibly mean that a pothole is within the range of 5 meters from the position (3.9217862, 121.4643821).

VI. CONCLUSION

In this paper we have a proposed a method to develop an Android application for vehicular complaint and pothole notification systems. The application provides for a voice to text conversion utility which increases the convenience of use by reducing the user's dependency on typing, hence enabling him/her to register his complaint even when driving. Pothole Notification (image) by the user will help relevant authorities to identify the bad conditions of roads

and rectify them soon. Using the real time GPS tracking feature the exact location of the problem is captured.

Thus the proposed method provides a very efficient way for the user to register the complaint and for the authorities to resolve the issues. For future, the application can be implemented on all kinds of mobile phones. The scope of the project is enhanced by making it applicable for other uses such as reporting accidents, road problem tracking and lives traffic updates, chain snatching incidents and other crimes. The complaint data can be further analyzed to determine accident zones, crime zones, bottlenecks and problematic locations so as to take immediate actions.

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