

Real Time Pothole Tracking System Using Android Smart Phone.

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Abstract— Pothole Tracking System investigates an application of mobile detecting and reporting the surface conditions of roads. It describes a system to monitor this important civil infrastructure using an android based smart phone. The pothole tracking system uses the inherent mobility of the participating smart phone by the citizen, opportunistically gathering data from image clicking from an android based smart phone which is GPRS enabled, and processing the data to assess road surface conditions. Using a simple geotagging technique which is a feature of android OS, it show that we are able to identify potholes and other severe road surface anomalies from images clicked by the citizens and uploaded by the same application on the server.

Index Terms— Global Positioning System (GPS), Road maintenance.

I. INTRODUCTION

This paper investigates an application of mobile detecting and reporting the surface conditions of roads. The describe a system to monitor this important civil infrastructure using an Android based smart phone. The pothole tracking system, uses the inherent mobility of the participating smart phone by the citizen, opportunistically gathering data from image clicking from an Android based smart phone which is GPRS enabled, and processing the data to assess road surface conditions.

A pothole (sometimes called a kettle) is a type of disruption in the surface of a roadway where a portion of the road material has broken away, leaving a hole.



Fig1:-Potholes on Road

Citizens are fed up of the long Queues of Municipal Corporation for their mere complaints regarding potholes on road and highways. Road Accidents are increasing now days because of bad condition of roads everywhere. Contractors who take up road and highway contracts and maintenances contract does not do their task as stated in the tenders they file, so to have foolproof evidence and also to make them notice of their work done on roads.

II. LITERATURE SERVE

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. While it has the highest accuracy, assuming that people are fair, it also has the most human interaction and is not comprehensive. Statistical analysis can be used to estimate damage probabilities of road segments based on their usage intensity.

III. PROPOSED SYSTEM

Basically our proposed system is a pothole tracking system. The system will be implemented on java-android. So for the implementation purpose three modules are taken into consideration and they are as follows:

Our System:

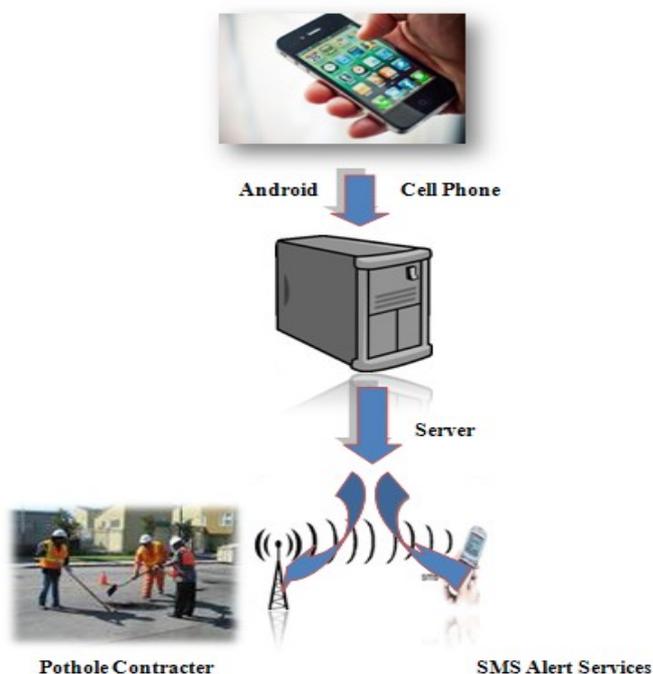


Fig2:- Our System

The pothole tracking system but is available only for Android handsets till now. According to this, the application can be expanded to non-android phones in a week's time. With this, users of non-android mobile phones but with GPS and GPRS capabilities will be able to upload pictures of potholes directly on the website.

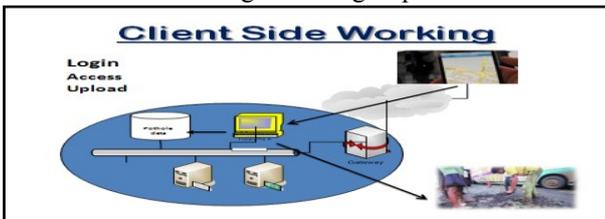
IV. IMPLEMENTATION

Basically our proposed system is a pothole tracking system which will be implemented on java-android. So for the implementation purpose three modules are taken into consideration and they are as follows:

- Website(to download application)
- Client side system.
- Server side system.

A. Client side system.

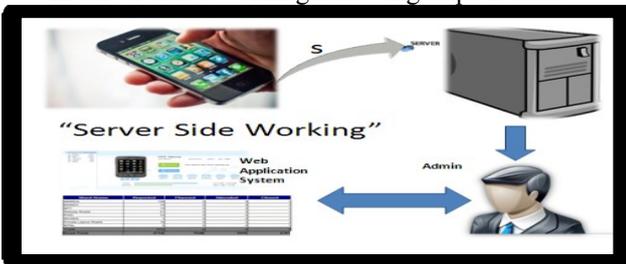
In client side a working following steps is used:



1. **Login :** User logs in to its account using its id and password given during registration
2. **Access :** The snapped pic is directly clicked and geotagged with latitude & longitude using GPS and GPRS and geotagged image is sent to the server and the location is recorded through user interaction and input.
3. **Upload:** Then pic is uploaded to pothole server for verification & validation for confidential purpose.

B. Server side system.

In server side a working following steps is used:



1. **Upload:** Pic via App is uploaded to the web server then it goes to the data mining server. The pothole server store & the pic for further processings and authenticity
2. **Server :** It stores the content uploaded and all the privileges to the admin section is provided through this server because server administrator cell is the authenticator and authoriser of the content uploaded.
3. **Conformation & Resolution :** Conformation SMS are instantly sent to the uploader with complaint ID and the date of resolution and also to the contractor of that road.

V. MODULES DESCRIPTION

- a) Android Application
- b) Tomcat Server
- c) Website (web application)

- d) Internet Connection On The Smartphone
- e) Website Administrator

Let us see the important components in briefly:

A. Android:

Android is a Linux-based operating system designed primarily for touch screen mobile devices such as smart phones and tablet computers, developed by Google in conjunction with the open handset alliance. Initially developed by Android Inc, whom Google financially backed and later purchased in 2005, Android was unveiled in 2007 along with the founding of the Open Handset Alliance, a consortium of 86 hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices.



Fig3: Android Smartphone and Android OS™

B. Tomcat Server

Apache Tomcat (or simply tomcat, formerly also jakarta tomcat) is an open source web server and servlet container developed by the apache software foundation (ASF). tomcat implements the java servlet and the javaserver pages (JSP) specifications from oracle corporation, and provides a "pure Java" HTTP web server environment for java code to run.

C. Interface:

Android's user interface is based on direct manipulation, using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects. The response to user input is designed to be immediate and provides a fluid touch interface.

Android devices boot to the home screen, the primary navigation and information point on the device, which is similar to the desktop found on PCs.

D. Geotagging:



Fig4:- Pothole Position.

An image is evaluated by our system on server due to geotagging the server can track down the address of the clicked pothole, and show that it can successfully detect a number of real potholes in and around the city. After the

detection of potholes, is done by the municipal worker and if the road needs a repair or not is decide then contacted to the contractor of that road.

VI. MATHEMATICAL MODEL

This uses the formula to calculate the great-circle distance between two points that is, the shortest distance over the earth's surface giving an 'as-the-crow-flies' distance between the points (ignoring any hills).

$$a = \sin^2(\Delta\phi / 2) \div \cos(\phi_1) \cdot \cos(\phi_2) \cdot \sin(\Delta\beta / 2)$$

$$c = 2 \cdot a \tan 2(v_a, v(1 - a))$$

$$d = R \cdot c$$

Where ϕ is latitude, β is longitude, R is earth's radius (means radius=6,372km)

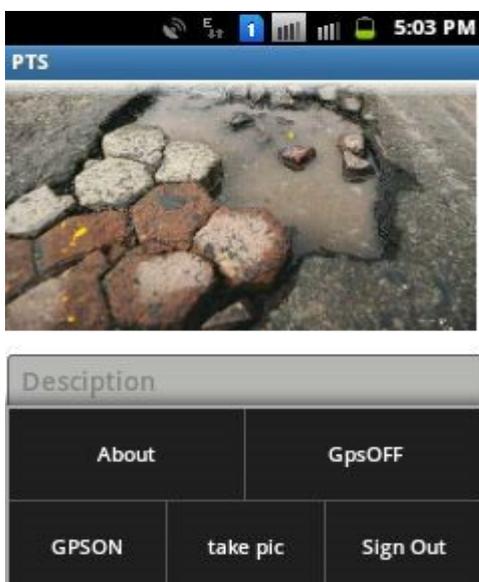
Note:- that angles need to be in radians to pass to trig functions!

VII. SYSTEM LAYOUT

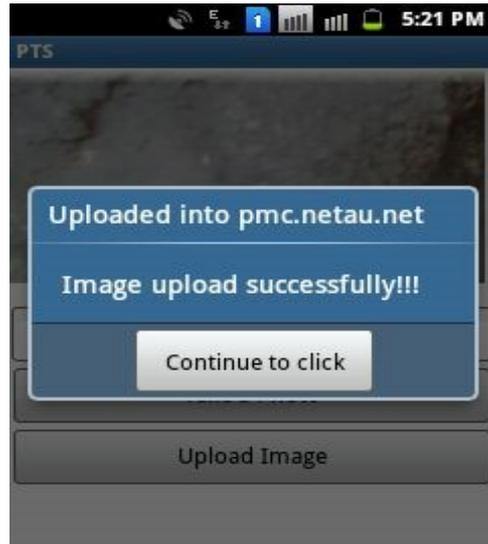
Application Screen Shot:



Take Pic:



Upload Pic:



VIII. FEATURES OF PROPOSED SYSTEM

1. Problems can be solved fast instead of manual work we just need to snap a photo and upload it on website then the work would go faster and then the server would authenticate it and upload the image.
2. Admin can see the location of image using Google Maps.
3. Registering a complaint is easy.
4. Minimum time required for processing.

IX. ADVANTAGES & LIMITATION

A. Advantages:

1. Getting a pothole on your street should be as easy as sending a photo on your phone so a city roads foreman can look it up on his android phone and get his crew working on it. Citizens are set aloof of the long queues.
2. The mobile app is aimed at providing government with detailed statistics of areas with high numbers of potholes. No long procedures of complaints.
3. It's easy for the citizens to complaint the potholes and doesn't need to go for long process of complaining. Corporations are having evidence to all the work done or doing.
4. It's also easy for the admin and the contractor to the potholes.

B. Limitation:

1. You will be able to upload photos and apprise the civic officials on a real time basis. you need to have an android phone with GPRS connection.

2. The initiative, however, has drawn flak from citizens for its limited use. Symbian and Blackberry users will have to wait for this application as it is only meant for android users.

X. FUTURE SCOPE

1. Can be implemented in Cities under Municipal Corporation.
2. Can Also be implemented for Sewage Lines and Water Pipelines.
3. Efficient and Easy Work for Citizens i.e. Human Interaction.
4. This System Can Also Be Implemented Using GPS Sensors On Vehicles.

XI. CONCLUSION

Pothole Tracking System it will be easy to track down the pothole on the road and can easily get rectified. By this system the Municipal can also keep an eye on the quality of work of the contractor & we can get world class roads in our city will be done.

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