

Pothole Tracking System Using Android

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Abstract: Pothole Tracking System which assists the driver in avoiding pot-holes on the roads, 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. 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.

Keywords: Global Positioning System (GPS), Road Maintenance, Android, Complaint management system, Global System for Mobile Communication (GSM).

I. INTRODUCTION

This paper investigates an application of mobile detecting and reporting the surface conditions of roads. The objective of this Portal is to provide Citizen facility to report their inconveniences and problems related to MCGM's public work management. This is an attempt by MCGM to bring transparency into the operation of Corporation. With the first release we are bringing in Pothole Reporting Feature.



Fig1:-Potholes on Road

Citizens are feed 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. EXISTING SYSTEM

- Citizens have to go Municipal Corporation to report the complaint regarding potholes.
- Citizens are feed up of the long queues of Municipal Corporation for their mere complaints regarding potholes on road and highways
- Lengthy and time consuming
- Less people report a complaint
- Stages of Potholes

Report new pothole using Android Application or manually using website www.voiceofcitizen.com
Planned pothole by MCGM's officers (SE/ Surveillance Team)
Attended pothole by contractors
Closed pothole by MCGM's officers (SE/ Surveillance Team)

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:



Fig2:- Our System

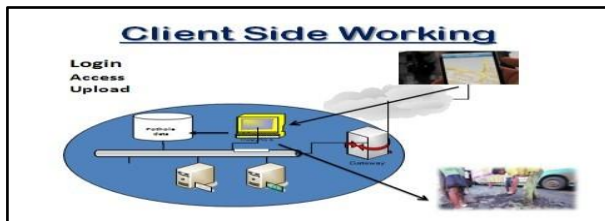
The pothole tracking system but is available only for Android handsets till now. According to this, the application can be expanded to non-android phones in a week's time. With this, users of non-android mobile phones but with GPS and GPRS capabilities will be able to upload pictures of potholes directly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

IV. IMPLEMENTATION

- This application can be used with Android Mobile phone.
- Following are the step for the citizen to download.
- Pothole tracking application in there Android enabled mobile phone.
- Open browser in your Mobile phone
- Enter Pothole tracking website URL in address bar
- www.voiceofcitizen.com
- Click link Download Android Mobile Application to download android mobile pothole application.
- Using this application citizen can report pothole in their ward or area.

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.



Client side system. In client side a working following steps is used:

Login: User logs in to its account using its id and mobile no given during registration



2. Access: The snapped image 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.

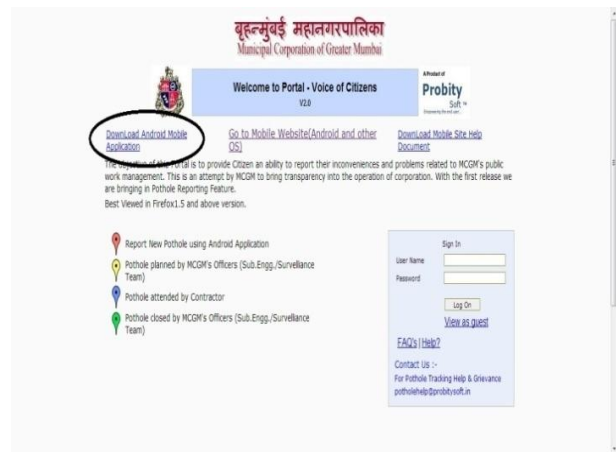
3. Upload: Then Image is uploaded to pothole server for verification & validation for confidential purpose.

B. Server side system.

In server side a working following steps is used: 2003. Upload: Image via App is uploaded to the web server then it goes to the data mining server. The pothole server store & the image for location processing's 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

3. Confirmation & Resolution: Confirmation 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

- Android Application
- Tomcat Server
- Website (web application)
- Internet Connection on The Smartphone
- Website Administrator

Let us see the important components In briefly:

Android:

The Android OS is an open source operating system primarily used in mobile devices. Written primarily in Java and based on the Linux operating system, it was initially developed by Android Inc. and was eventually purchased by Google in 2005. The Android operating system is symbolized by a green colored Android Robot logo.



Fig3: Android Smartphone and Android OS™

B. Tomcat Server

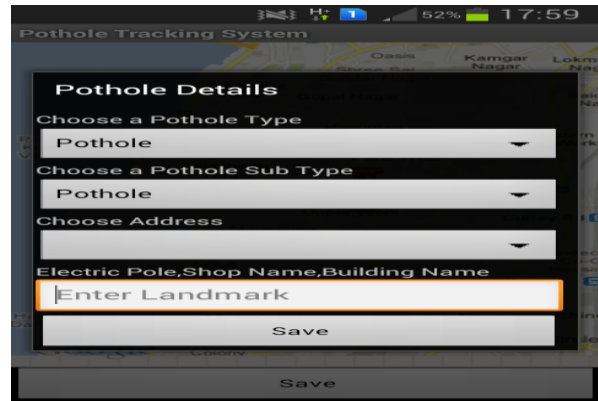
Apache Tomcat is an open source Web server tool developed by the Apache Software Foundation (ASF). It is one of many Apache-related open source products used by IT professionals for various tasks and objectives..

C. Interface:

Your app’s user interface is everything that the user can see and interact with. Android provides a variety of pre-built UI components such as structured layout objects and UI controls that allow you to build the graphical user interface for your app. Android also provides other UI modules for special interfaces such as dialogs, notifications, and menus

D. Geotagging (You don’t need a GPS to use Geo-tag)

Even if you don’t own a GPS unit (or it wasn’t switched on when you took a picture) you can still assign a location to the photo. Geo-tag will show a default location on the map and you can drag the marker and zoom in to give the photo a location.



Email Notifications after reporting a pothole:

- Citizen will immediately get an SMS for reported pothole as “Your complaint has been registered. Your Pothole No. is 100. Thank You.”
- As well as the RE will also get the Sms as “A new pothole is reported in your ward. Pothole No. is 100”.

VI. MATHEMATICAL MODEL

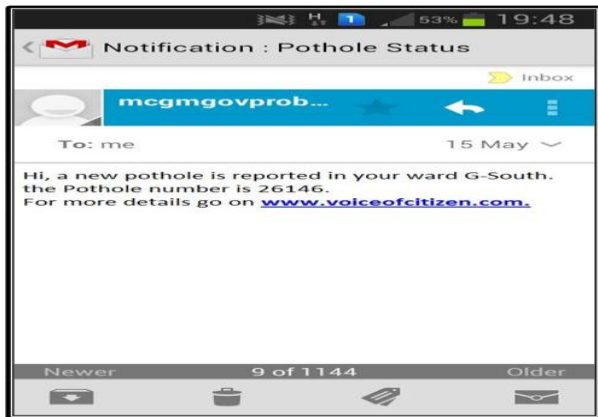
This uses the formula to calculate the great-circle distance between two points that is, the shortest distance over the earth’s surface giving an „as-the-crow-flies” distance between the points (ignoring any hills).

$$A = \sin^2(\frac{\phi_1 - \phi_2}{2}) + \cos(\phi_1) \cdot \cos(\phi_2) \cdot \sin^2(\frac{\lambda_1 - \lambda_2}{2})$$

$$c = 2 \cdot a \cdot \tan^{-1}(\sqrt{v})$$

$$d = R \cdot c$$

Where ϕ is latitude, β is longitude, R is earth’s radius



VII. ADVANTAGES & LIMITATION

Advantages:

1. Getting a pothole on your street should be as easy as sending a photo on your phone so a city roads for man 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:

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

Select the pothole type from the dropdown –

- “Pothole, Cross-cut, Trench, Raising, No Cover, Lowering etc.
- Click on “Save” to upload the pothole image & details on the server.
- Your pothole is “Reported”.

2) Reporting Pothole on Mobile Site:

Pothole details to be filled in order to report the pothole successfully.

- ❖ Address, Latitude and Longitude will be automatically detected by the site and the fields will be auto filled.
- ❖ One Time registration facility for the user is provided so that they do not need to enter their personal details every time they report a complaint.
- ❖ Users need to choose and upload the geo-tagged image of the pothole or capture the image of the pothole with GPS enabled on their mobile phones.

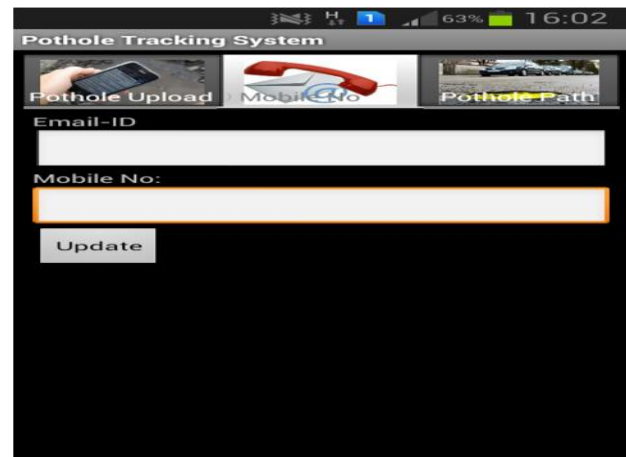
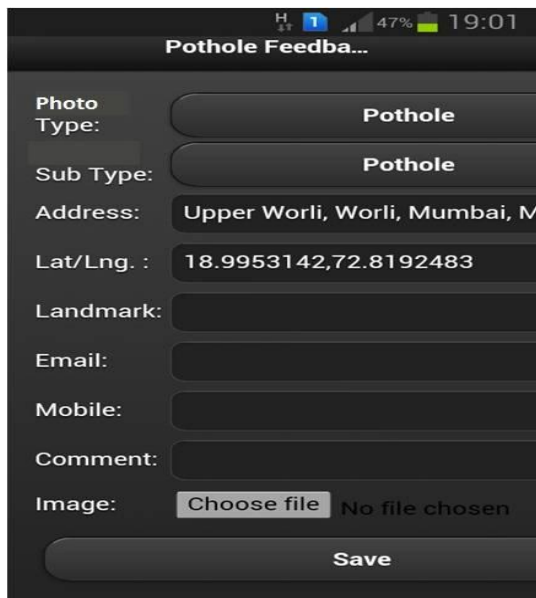
3) Roles & Responsibilities:

1) Sub-Engineer:

- Identify the Reported pothole.
- Plan pothole.Assign contractor.
- Close pothole by clicking the photo in android mobile.
- View all the MIS reports related to pothole life cycle.

2) Contractor

- Attend the pothole assigned to them practically on site.
- View various escalations & remarks given by MCGM authorities.
- Access to View Reported, Planned, and Attended & Closed pothole in their jurisdiction



Application Screen Shot:

1. Download Android Mobile Application for Reporting Potholes:

2. How to Report a Complaint:

- Open the application “Pothole Tracking System”. Register your personal details once and proceed One Time-Registration facility is provided so that user need not enter his details every time he reports a complaint.
- It automatically shows the pothole location on Google map (via GPS+GPRS).

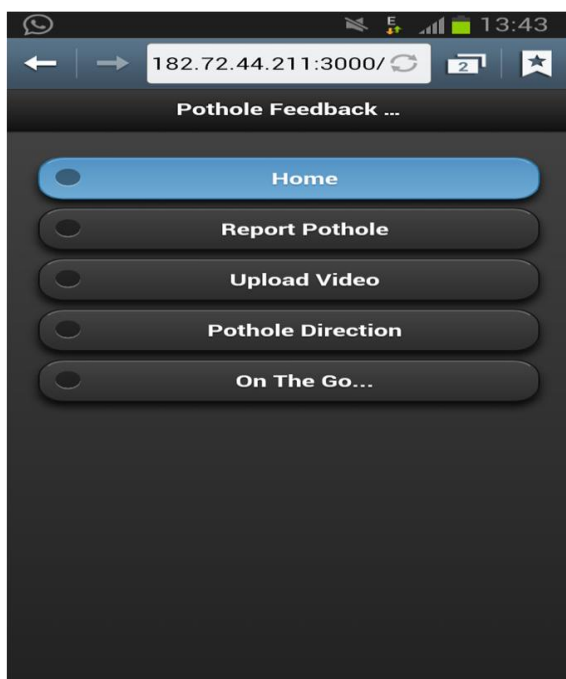
4) New Technique of Pothole Detection System Using a Black-box Camera

In this paper, we collected pothole video data through recordings made with a black-box camera mounted on the front windshield of a survey vehicle (typically, a black-box camera is installed on the front windshield), as shown in Figure 11. The resolution and frame-rate were 1920 × 1080 pixels and 27 f/s, respectively. The camera lens could be tilted by the user. The recorded video data was saved in H.264 format with 32 GB of memory. A Cortex-A8 application microprocessor was used for recording and processing the video data. Before implementing the proposed pothole-detection algorithm in the black-box camera, we developed simulation software using C++, as shown in Figure 12. This software displays the pothole-detection results and also the parameters such as the width, height, and variance.

VIII. NEW FEATURES OF PROPOSED SYSTEM

1) Pothole Tracking Mobile Site for Blackberry, IOS, Symbian, Windows Phones

- This mobile site can be used with all Mobile phones. Following are the steps for using the Pothole Tracking Mobile site
- Open browser in your Mobile phone
- Enter Pothole tracking website URL in address bar www.voiceofcitizen.com



Using this mobile site, you can report pothole by uploading images and videos

- ❖ Using the mobile site you can report a pothole.
- ❖ Also videos can be uploaded in case there are multiple potholes
- ❖ You can get directional assistance to the location of any pothole you want to trace.
- ❖ Using the ‘On the Go’ function you can locate potholes around your current location.

XIV. FUTURE SCOPES

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.

X. 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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