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Real Time Pothole Tracking System using Android Smart Phone

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.

Keywords: *Global Positioning System (GPS), Road maintenance.*

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1. INTRODUCTION

This paper 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.

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 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.

2. 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

3. DESIGN AND IMPLEMENTATION CONSTRAINTS

3.1 Android Smartphone:

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. one of the most widely used mobile OS this day is android.

3.2 *Applications:*

Fig2. Application

Applications are usually developed in the java language using the android software development kit, but other development tools are available, including a native development kit for applications or extensions in C or C++, Google app inventor, a visual environment for novice programmers and various cross platform mobile web applications frameworks.

3.3 *Geotagging:*

Fig3. Geotagging

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.

3.4 *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.

3.5 *Mathematical Model:*

This uses the 'have sine' 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).

Have sine formula:

$$a = \sin^2(\Delta\varphi/2) + \cos(\varphi_1).\cos(\varphi_2).\sin^2(\Delta\lambda/2)$$
$$c = 2.\text{atan2}(\sqrt{a}, \sqrt{(1-a)})$$
$$d = R.c$$

where φ is latitude, λ is longitude, R is earth's radius (mean radius = 6,371km) note that angles need to be in radians to pass to trig functions!

4. 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.

4.1 Client side system.

In client side workings following steps are as follow:
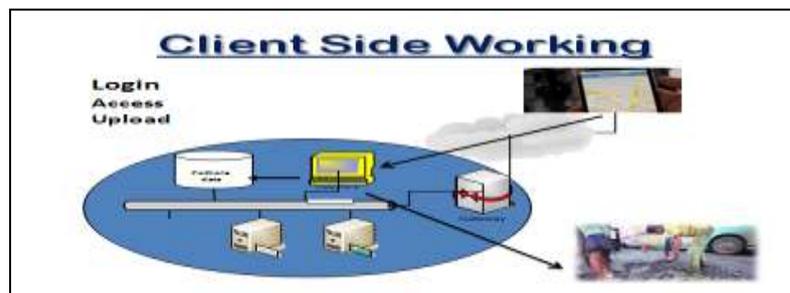
- **Login:** User logs in to its account using its id and password given during registration.

- **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.

- **Upload:** Then pic is uploaded to pothole server for verification & validation for confidencial purpose.

4.2 Server side system.

In server side workings following steps are as follow:

- **Upload:** Pic via**App is** uploaded to the web server then it goes to the data mining server. The pothole server stores the pic for furter processings and authenticity.

- **Server :** It Stores the content uploaded and all the privileges to the admin section is provided through this server administrator cell is the authenticator and authoriser of the content uploaded.

- **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.
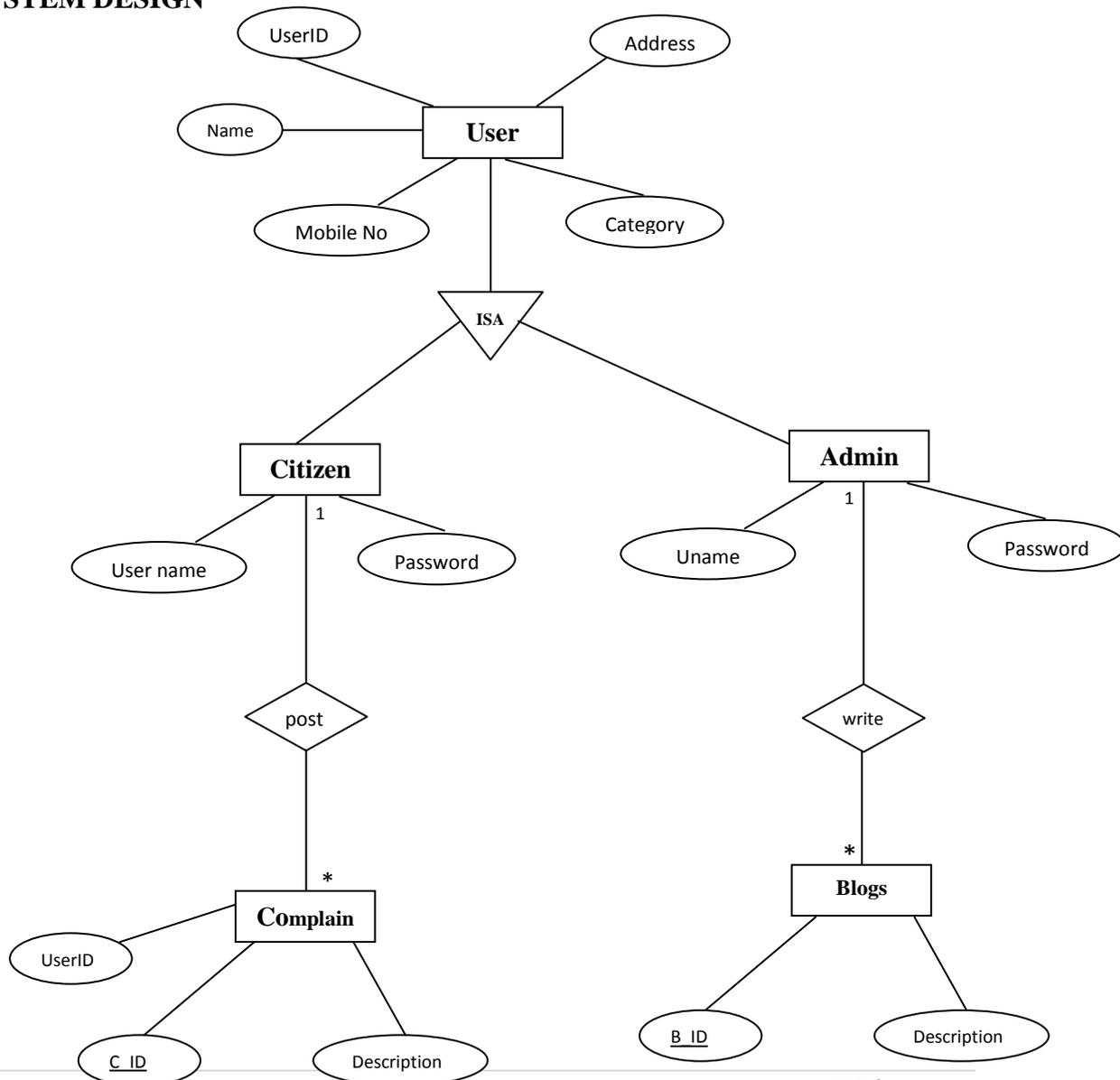
5. SYSTEM DESIGN

Fig4: System work flow.

6. TECHNOLOGIES USED IN THE SYSTEM

- *Android*

- *GPS: Global Position System.*

7. FEATURE SCOPE

Android is the latest smart device in the market and as we see it growing immensely now a days in the coming 2-3 years it would be like everyone would be using smart phones. So it's better and as technology progresses it would also be available for non-android phones as well and its having better processors and features to use it for such types of applications.

8. 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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