© 2017 IJSRSET | Volume 3 | Issue 8 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section : Engineering and Technology

Developing an Android Based Learning Application for Pothole Detection

Sangita Gujar, Ayubkhan N. Mulani

Assistant Professor, PK Technical Campus , Chakan, Pune, Maharashtra, India

ABSTRACT

In this paper we are going to develop a Smart Phone application on the android platform that will detect potholes on the roads while the user is driving and Report the location to location Authorities for maintenance. This is a platform that assists, through Android cell phones and tablets, the mobility of users of learning virtual environments. Mobile application development is the process by which applications are developed for hand held devices such as personal digital assistants, enterprise digital assistants or mobile phones. These Applications are either pre-installed on phones during manufacture, or downloaded by customers from app stores and other mobile software distribution platforms. When the user starts their journey, they launch the application on their phone and set it to record. The application launches the accelerometer and Network Location Provider (NLP) in the phone. The application monitors for changes in acceleration. When such a change is recorded, the application calls the NLP and asks for the coordinates of the pothole. The application then adds the time, the geographic coordinates and the severity of the pothole to the event log. When the user finishes their journey they press stop and are presented with the event log.

Keywords : Accelerometer, Location, Pothole Agent

I. INTRODUCTION

The Application is based on the Android is built-in Accelerometer. An Accelerometer is a device that measures acceleration relative to free fall. Any significant changes in the phones acceleration are logged by the Senior Event Listener. The event is then added to an event log The Android platform also has tools for identifying the location- including a Global Positioning System (GPS) receiver (this is discussed further in the research section). One of the issues we have identified is the difficulty of getting an accurate location while travelling at average driving speeds.

One possible solution is to record the journey from start to finish by regularly calling the location coordinates. This allows the application to plot the route and compare the event's time stamp with the route to calculate the location of the car at the time of the event. When the journey finished, the user presses the "stop recording" button and is presented with the event log. This lists the events that have been recorded in this session (identification, time, location and severity). By clicking on the location the user can see the event displayed on a map (using the Google Maps API). Each event also has a tick box (ticked by default). If the box is not ticked the event will be excluded from the data to be transmitted to the database.

II. BLOCK DIAGRAM

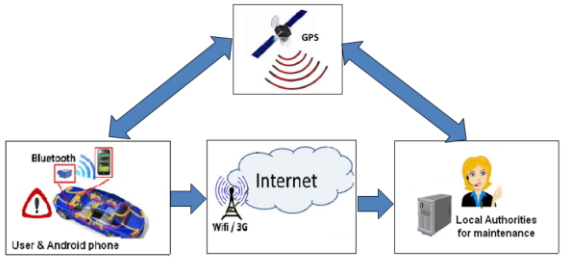

Figure 1. Block dia. of Pothole detection system

Pothole detection system consists of a set of sensor-equipped vehicles, and a central Server, as illustrated in Figure 2. Sensor data is collected using a GPS device and an accelerometer, resulting in the following information:
<time,location,speed,heading,3-axis acceleration>

The first four parameters come from the GPS device and the acceleration vector comes from the three-axis accelerometer. These two data streams are combined using GPS interpolation. On-board processing filters the combined data stream to produce high probability pothole detections. When network connectivity is available, the cars automatically upload their detections to a central server, which maintains a database of detections. The central server clusters detections based on location, and applies a minimum cluster size, resulting in the final output of the system: a series of "pothole" detections of varying confidence and severity.

III. LAUNCH ELEMENT

A. Accelerometer

An accelerometer is an electromechanical device that measures acceleration. An accelerometer is one of the many hardware features contained in some android phones and has been used to create several interesting Android Applications.

1) G-Lock: locks/unlocks the key pad based on movement of the phone.
2) Raging Thunder: A car racing game.

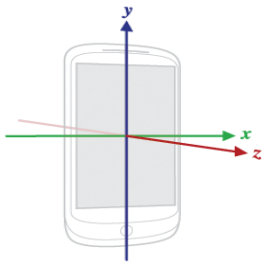

Figure 2. XYZ axes

The Accelerometer measures acceleration on three axes- Azimuth (X), Pitch (Y) and Role (Z). The X axis is horizontal and points to the right, the Y axis is vertical and points up and the Z axis points towards the outside of the front. Any sudden significant changes to one of the Axes should indicate that the car has hit a bump while driving

B. Identifying potholes

There are three ways to display the data. Pothole agent uses a graph displaying the X, Y and Z axes while Street Bump displays the data as circles that expand as acceleration increases. Other sensor apps simply display the X, Y and Z as text.

C. Location

Record the location of the event. One of the better known features of android phones is the Network Location Manager which can record the devices location using either GPS and then display it using Google map.

IV. ANDROID APPLICATIONS

A. POTHOLE AGENT

Pothole agent is an application made by the BITS Android Team and is free to download from the android market. It works by recognizing the acceleration over time (displayed on the graph). When you start the app you are presented with the graph and two event controllers (one which starts the accelerometer and one which starts the session).

One of the flaws identified was that the GPS is not automatically turned on when launching the app. The user needs to go to the phone's settings to turn it on. It is possible for applications to change the GPS setting on launching.

One positive feature is that there is a simple option called "Start Recording". It also automatically starts the GPS function. This app has received criticism due for being battery heavy, so much so that users are advised to use car chargers while the app is in use.

B. STREET BUMP

Street bump is relatively new application based upon the same concept. Like the user interface it is confusing. Instead of a graph the X, Y and Z fields are represented by circles with the size and colour changing depending on acceleration

V. LITERATURE SURVEY

[1] et. al .The University of Latvia carried out two studies in 2011 considering smart phones with Android OS. In the first work two auto, three mobile devices and their sensors were used. In particular, the accelerometer was used for the potholes detection, while a GPS receiver allowed the correct localization of the detected road anomalies. The bump event could be established with four different algorithms. Furthermore, data obtained from the different devices were compared.

VI. MARKET RESEARCH

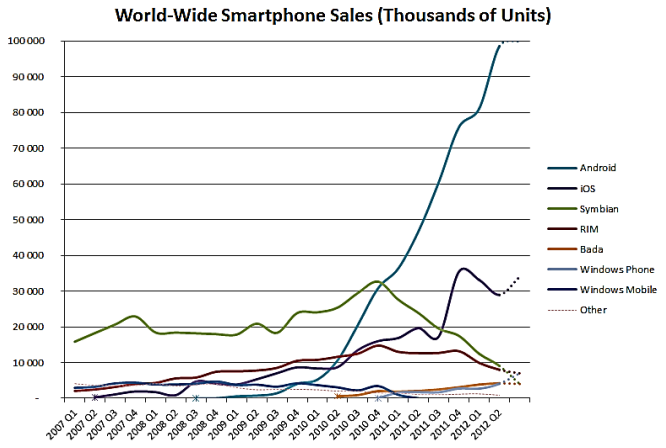

Figure 4. Market Search

A new generation of mobile device users is coming in the next decade. These users are going to explore the mobile internet afresh with its new features, compatible mobile phones, new services and applications.

VII. ADVANTAGES

1. That can identify a change in acceleration unique to potholes (excludes speed bumps, cat's eyes etc.)
2. That can obtain the most accurate location data possible
3. That is able to transmit data to an external destination
4. That has a good user interface- easy to use, clear instructions

VIII. LIMITATIONS

One of the major difficulties would be differentiating between potholes and non-potholes. e.g. a bump on the road might also be recorded if a driver goes over speed bumps, cat's eyes or other objects lying on the road. Another difficulty will be getting the exact location of the event whilst the car is moving at speed. Battery drainage is one of the key issues. The Accelerometer and GPS will drain the battery over time, especially during an extended journey. For such journeys a car charger is recommended.

IX. CONCLUSION

Thus, we can conclude that Android is open to all-industry, developers and users. It is participating in many of the successful open source projects. Aims to be as easy to build for as the web.

X. REFERENCES

[1]. Artis Mednis, Girts Strazdins, Reinholds Zviedris, Georgijs Kanonirs, Leo Selavo, "Real Time Pothole Detection using Android Smartphones with Accelerometers" in IEEE, DOI: 2011

[2]. Mohan, P., Padmanabhan, V. N., Ramjee, R. Nericell: Rich monitoring of road and traffic conditions using mobile smartphone. (2008).

[3]. Accelerometer Android Freeware, Download free accelerometer apps for Android Phones. [Online]. Available from: http://www.androidfreeware.net/tag-accelerometer.html [Accessed: 20, December, 2010].

[4]. Darcey, L & Conder, S, Sams Teach Yourself Android Application Development in 24 Hours (Sams Teach Yourself -- Hours). 2010

[5]. Berry kennedy ,Engineering, D A beginner's guide to accelerometers [Online]. Available from http://www.dimensionengineering.com/accelerometers.htm [Accessed : 18, December, 2010].