Design paper on Pothole Monitoring System

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Abstract - *In today's life transportation is one of the most important part of human's life. That is why road surface quality becomes major issue as many of the accidents takes place because of bad condition of roads. The optimal solution for road repairs can be provided by collecting multiple amount of real time data about the state of the roads and this data can be achieved by participation and interaction of people. Several methods have been implemented to overcome this problem. Several proposed methods require dedicated hardware for implementation of system such as GPS devices and accelerometers in vehicles or cameras on roadside and near traffic signals for collection of data. All such methods are expensive in terms of monetary cost and more human power is required. Instead of using such expensive devices we can use some sensors which are already present in our smart phones. A simple smart phone can be used for detecting potholes on the roads and which can be used by anyone. Our main motive is to reduce the human efforts for detecting a pothole using a simple, easily usable and cost-efficient way and which result into reduction of accidents that cause due to potholes.*

Key Words: Pothole, Authorities, Acceleration, Android, Sensors

1. INTRODUCTION

Bad road conditions are big problem for safe and comfortable transportation However, this condition is supposed to be find out first. First approach towards detection of road damage is human reports by themselves to central authorities. While that process has the highest accuracy assuming that people are fair, it also requires the most human participation. Statistical analysis can be used to find out approximate damage probabilities of road segments based on their usage intensity. For the same purpose of detection of road surface monitoring new method called surface analysis method is developed which uses different hardware like Ground Penetrating Radar (GPR) etc. and its commercial products are also exist. Unfortunately, the equipments which are required for above method are very expensive therefore limits its accessibility. As an alternative, participatory sensing has the potential to increase the collected data resolution and scope.

The simplest method might be to click the photos of road damage such as potholes by the people and to send them to a respected authority. However, this requires strong participation and interaction from the users as well as manual image analysis. As it requires more human interaction it can be more human resource consuming as well as time consuming. To make this process less power and time consuming, an automated approach for detecting potholes with little or no human interaction is more promising. This would help to collect more accurate real time data with less errors caused by human factors than generated by participation of the people. To create properly working pothole monitoring system accepted by wide user community, it is important to make it more attractive, Interactive and user-friendly so that user can access it very efficiently.

2. AIMS AND OBJECTIVES

Now days there are lots of accidents happen due to bad road conditions or potholes so our aims and objectives are as follows:

1.   To make road conditions better by allowing municipality department to know about location of potholes using our app as we send our data to them this will helps to save peoples life.
2.   According to survey we get to know that bad road conditions consume large amount of fuels so on the other hands we are also reducing consumption of fuels.
3.   Bad road conditions reduce the lifecycle of vehicle so our objective is to make road conditions better which automatically increases vehicles working capacity.

3. LITERATURE SURVEY

In [1] Artis Mednis, Girts Strazdins, Reinholds Zviedris, Georgijs Kanonirs, Leo Selavo**"** has proposed "Real time pothole detection using android with accelerometer" which uses primary data of the accelerometer sensors were collected using LynxNet collar device on an urban road with various potholes. The working of device is based on Tmote Mini sensor node with Texas Instruments micro-controller MSP430F1611 and Analog Devices3axis accelerometer ADXL335.MansOS based software was used for raw acceleration data acquisition which having sampling rate about 100Hz and data is transmitted using USB interface to a laptop computer. It uses various algorithms like Z-diff, Z-Thresh to detect potholes on road surface.

In [2] Bhoraskar R., Vankadhara N., Raman B. & Kulkarni, P. has proposed "Traffic and Road Condition Estimation using Smartphone Sensors" which uses accelerometer for detection of potholes with magnetometer and gps is implemented. However, this project does not have a real time access to the location where the detection was triggered.

In [3] G. Strazdins, A. Mednis, G.Kanonirs, R. Zviedris, and L. Selavo has proposed "Sensor Networks with Android Smartphones for Road Surface Monitoring" uses hardware components and is attached to the vehicles and uses clustering algorithm for data analysis.

4. TECHNICAL REQUIREMENTS

The following technical requirements were necessary for better performance of pothole detection system:

1. Person should have smartphone with embedded features like accelerometer, gyrometer and GPS etc. which would act as sensors in this system.

2. The system should run on different smart-phone models as different smartphone models are based on different OS platforms. While running the system on smartphones, the required set of minimal smart-phone parameters should be determined and described.

3. The system running on a smartphone should be able to use proper communication protocols and able to communicate to other systems in proper way.

4. Pothole monitoring system should be able to detect potholes while driving different vehicles on the basis of threshold settings and giving alert by vibrating.

5. System should have evaluation functionality, as different vehicles are likely to work in different manners to generate sensor data when pothole is detected.

5. PROPOSED SYSTEM

This system works or is divided into different modules. The different steps can be shown using a flowchart. Flowchart can be formed as follows: -
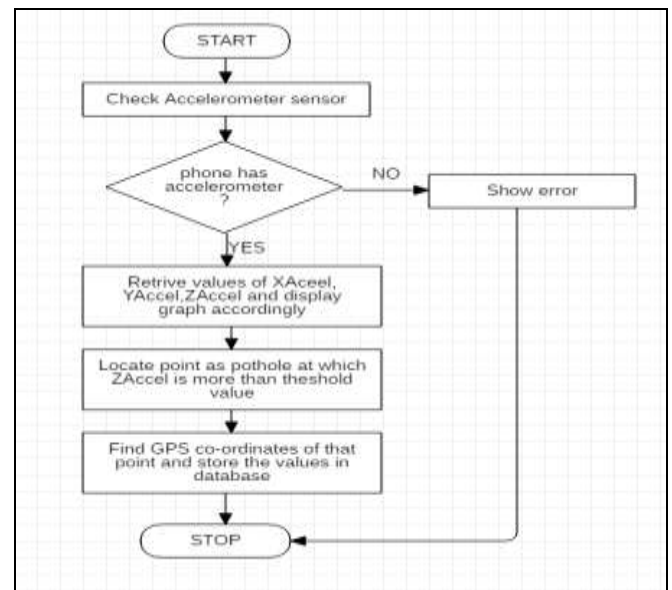

Fig1.Proposed System Flowchart

In this app we read data from the accelerometer sensor and detect when the phone has been shaken and detection of potholes on the road:
1. The first thing to do is check whether the phone has an accelerometer in the first place. If not, you can notify your user.
2. Alternatively, if your user must have an accelerometer to use your app properly you can notify the user and then close the app. This project retrieves the values of the x, y, and z axis from the accelerometer sensor. It also indicates when the device has been shaken. If your Android device is laid face up on a table top, the ZAccel value from gravity will be positive. Turning the device on its left side will make the XAccel value positive Standing the device upright will give YAccel a positive value. Gravity (9.81 m/s/s) and we can view this with an Android app. If the accelerometer value changes the shaking function is called. And instantly the coordinates will be taken through GPS where the jerk took place by calculating longitude and latitude of the specific position where the event occurred.
The coordinates will be located and will be entered into database containing exact shaking positions where the potholes are present.

6. CONCLUSION AND FUTURE SCOPE

From the above analysis we can conclude that implementation of this system will help Municipal authorities to take quick action against the potholes whose location will be detected using the created application and will result into minimizing the rate of road accidents compared to the current rate.

REFERENCES

1. Artis Mednis, Girts Strazdins, Reinholds Zviedris, Georgijs Kanonirs, Leo Selavo, "Real time pothole detection using android with accelerometer". 2011 7th IEEE International Conference on Distributed Computing in Sensor Systems and Workshops (DCOSS).

2.Victor Akinwande, Kayode Adewole, Olayiwola Bello, Abimbola Akintola, "Automatic and real-time pothole detections." International Conference on Computer Science Research and Innovations (CoSRI 2015), At University of Ibadan, Nigeria, August 2015.

3. Bhoraskar, R., Vankadhara, N., Raman, B. and Kulkarni, P. (2012) Wolverine: Traffic and Road Condition Estimation Using Smartphone Sensors. 2012 Fourth International Conference on Communication Systems and Networks (COMSNETS), Bangalore, 3-7 January 2012.

4.Chugh, G., Bansal D., & Sofat S., "Road Condition Detection Using Smartphone Sensors." International Journal of Electronic and Electrical Engineering. ISSN 0974-2174, Volume 7, Number 6 (2014), pp. 595-602 © International Research Publication House.

5.Chen K., Lu M., Fan X., Wei M., & Wu J., (2011, August), "Road condition monitoring using on-board Three-axis Accelerometer and GPS." Conference: Proceedings of the 2011 6th International ICST Conference on Communications and Networking in China, CHINACOM 2011.