

# Perceiving Pothole Profiles with Warning System using Wireless Sensor Networks

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## ABSTRACT

**In the proposed work, We are perceiving pothole profiles in the participatory vehicle journey. It achieves a an effective road surface monitoring system for automated path hole detection. In addition performance benefit to accessing timely and accurate road condition information also keeping up with maintenance of our vehicle. It contains the wireless sensor network for path hole detection**

**Keywords: Potholes and Humps, GPS Receiver, Ultrasonic Sensor, Wireless Sensor Network.**

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## I. INTRODUCTION

Pothole Detection system is a unique concept and it is very useful to whom which face the problem of pothole in their route. The technology is purely new and idea is generated a profile for pothole in your vehicle journey. It is an application which is Accessing to timely and accurate road condition information, especially about dangerous potholes is of great importance to the public and the government. We are going to develop an effective road surface monitoring system for automated pothole detection. This is a low cost solution for the road safety purpose. This will help to avoid accidents and can use to identify problem areas early.

This is first ever system for pothole detection. In this we are using wireless sensor network.

[1]We are going to develop an effective road surface monitoring system for automated pothole detection.

[2]This is a low cost solution for the road safety purpose.

[3]This will help to avoid accidents and can use to identify problem areas early.

[4]The authorities can be alerted to take preventive actions; preventive actions can save money.

Over the past few years, there has been huge vehicle population and this population has led to increasing road accidents and also traffic rush hour. According to Global Road Safety Report, 2015 rolled by the World Health Organization (WHO), India accounts for more than 200,000 deaths because of road accidents. These accidents can be due to over speeding, drunk and driving, jumping traffic signals and also due to humps, speed-breakers and potholes. Hence it is important to collect information regarding these poor road conditions and distribute the same to other vehicles that in detour help reduce accidents caused due to potholes and humps. Hence, in this proposed a system that would inform the drivers regarding any hurdles or conditions such as potholes and humps and this information can be used by the Government to correct these roads effectively.

To develop a system based on IOT to detect Potholes and the road which will be uploaded on server and notified to all the user using the application and update as per the road condition.

Road condition incidentally contribute to the economic growth of the country and it is exceptionally for most essential that the roads are well built and strong. India is home to several bad roads be it the metropolitans, the cities or the villages. Since India is a developing nation there is a constant demand for good quality infrastructure, transportation and services. Roads are ordinarily joint with speed breakers that are used to control the speed of the vehicle. But these speed breakers have been a cause of accidents because a definite dimension is not followed throughout our journey. Potholes are constitute due to oil spills, heavy rains and also due to shifting of heavy vehicles. These bad road conditions cause accidents, consumes more fuel and also affect the quality of driving.

## II. LITERATUE SURVEY

I. Moazzam, K. Kamal, S. Mathavan, S. Usman, and M. Rahman, "Metrology and visualization of potholes using the microsoft Kinect sensor," in this paper proposed a model in which a low cost Kinect sensor is used. Kinect gives the direct depth measurements, thereby reducing computing costs. Meshes are generated for better visualization of potholes. Area of pothole is examine with respect to depth. The approximate volume of pothole is precisely calculated using trapezoidal rule on area depth curves through pavement image analysis. In advanced pothole's area, length, and width are estimated. The paper also proposes methodology to characterize pothole[5].

H. Youquan, W. Jian, Q. Hanxing, Z. Wei, and X. Jianfang, "A research of pavement potholes detection based on three-dimensional projection transformation," they have developed a model which employs optical imaging principle of 3-dimensional projection transformation to obtain pictorial information of pothole's cross-section in pothole detection. Multiple digital image processing technologies, including: binarization, image processing, thinning, three dimensional reconstruction, error analysis and compensation are coordinated in the series of image analysis and processing[3].

Taehyeong Kim, Seung-Ki Ryu, "A Guideline for Pothole Classification", proposed a paper in which classification of potholes are given. Potholes are categorized with the help of location, shape, length and depth. Many researchers have studied the methods to detect potholes and improve survey excellent and pavement quality through prior investigation and immediate action. With these detecting methods, there is need for developing a classification guideline for supporting decision-making system of pothole repair. The purpose of this study is to develop a guideline of pothole classification for supporting a decision-making system of pothole repair[9].

S. S. Rode, S. Vijay, P. Goyal, P. Kulkarni, and K. Arya, "Pothole detection and warning system: Infrastructure support and system design," have designed a system in which novel Wi-Fi based architecture for pothole detection and warning system which assists the driver in avoiding pothole on the roads by prior warning. The system consists of access points placed on the road sides for broadcasting

data, which can be received by Wi-Fi enable vehicles as they enter the area covered by the influence of the access points. The application can be integrated in the vehicle so as to alarm the driver in the form of a visual signal, audio signal or even trigger the breaking system[6].

## III. BASIC CONCEPT

[1] Server unit: The server unit is nothing but the database for system. It is an transitional layer between sensing and user units. Its function is to store the updated information received by the sensing unit and provide to the requested user unit whenever needed. This unit can also be updated frequently for precise information related to the potholes and humps.

[2] Sensing unit: This model consists processor, GPS receiver, ultrasonic sensor (HC-SR04) and GSM SIM 900 modem. The distance between the car physique and the road is measured using an ultrasonic sensor. A threshold value is set such that the value depends on ground clearance of the vehicle. The calculated distance is compared with the threshold value to detect pothole or hump. If the calculated distance is greater when compared with the threshold value, then it is classified to be a pothole, and if the measured distance is less, then it is classified to be a hump. The location co-ordinates fetch by the GPS receiver, along with this data the information regarding the detected pothole or hump at a particular location co-ordinate is broadcast to the server using a GSM modem.

[3] User unit: The user unit is responsible for providing notification regarding the potholes on roads at a specific given location. The GPS receiver is constantly receiving update regarding its location co-ordinates, using this information the database is checked for any data nearby the given location co-ordinates. Any data found, it is received by the processor from the database through the GSM modem and the same is displayed in system .

## IV. EXISTING SYSTEM

### [1] Vision Based Method:

This method uses 'Camera' as sensor to scan the road. The camera captures the images in real time application. These images are used in image processing algorithms for edge detection. This requires lot of processing time and power. There are two design approaches possible. Hardware based methods like using special Digital Signal Processors or Application Specific Integrated Circuits enhances the performance over software based method. But still the response time of the operations required like windowing convolution for the image processing algorithm is still more. This method has one benefit over the other is, it can sense a pothole without experiencing it i.e. Vehicle does not actually has to pass through the pot hole to sense it.

### [2] Vibration based Method:

This method uses 'Accelerometer' to sense potholes. Accelerometer is measures total specific external power on

the sensor. For example if the device is stationary, it will show some reading almost exactly to earth's gravitational force. An accelerometer dropping freely in the vacuum will show reading zero. The design of the accelerometer is often very simple. The easiest design can be a mass hanging by a thread and some sensor to measure its deflection for original. The device is mostly used to measure vibration or inclination. It is specifically used in iTouch and some cameras to detect inclination and change the sight of the display.

## V. PROPOSED SYSTEM

The proposed system can be classify into three parts: the sensing unit, the server unit and the user unit. At the sensing part, an ultrasonic sensor is used to detect potholes and humps, whose location co-ordinates are collected from the GPS receiver. This data is stored to the database, which is at the sever unit. At the user side a hardware module is set-up that provides timely inform to the drivers about potholes and humps. This system is also helpful in rainy season when roads are full with rain water also in inclement during low visibility, as the notification are sent from the stored information in the server/database. In this particular system we are using Ultrasonic sensors which is function well in wet environments where as an optical beam may refract off the water droplets. In additionally apply different scenarios like potholes on the slopes, turns and see how the system inform about characterize such condition.

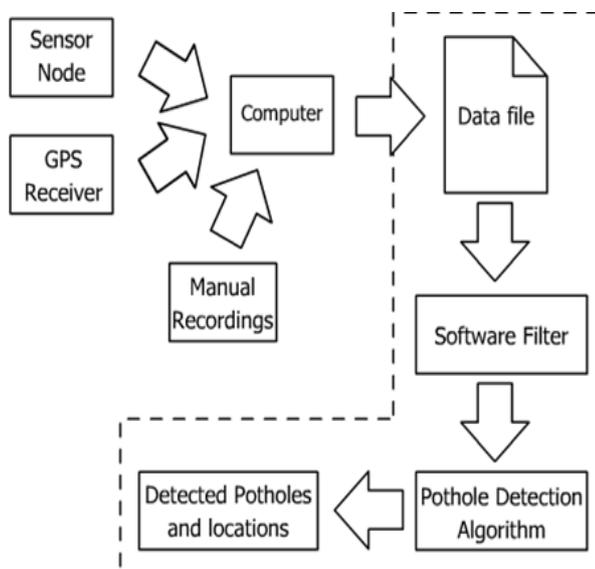


Fig 1. Proposed System

## VI. CONCLUSION

In this project unique concept where it a low cost solution for the road safety purpose. This will help to avoid accidents and can use to identify pothole problem areas early. The authorities can be notify to take a preventive actions. The information can also be used by the Government authorities for the maintenance of the roads. In fact fast economic growth and rapid technology have increase to significant impact on the quality of traditional transport system. Intelligent transportation system.

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