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# Pothole Detection and Accident Avoidance System

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**ABSTRACT:** 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. I am going to develop an effective road surface monitoring system for automated pothole detection. It is a unique concept where it a low cost solution for the road safety purpose. This will help to avoid accidents and can use to identify problem areas early. The authorities can be alerted to take preventive actions; preventive actions can save money. Poorly maintained roads are a fact of life in most developing countries including our India. A well maintained road network is a must for the well being and the development of any country. So that we are going to create an effective road surface monitoring system. Automated pothole detection is our focus in the system.

**KEYWORDS:** Pothole, Accident Avoidance, GPS Receiver, Ultrasonic Sensor, Wireless Sensor Network, Micro-controller, Android, GSM Modem**,** Microcontroller, Database Server.

## I. INTRODUCTION

India is considered one of the fastest developing countries as of today. India's road network is gigantic, giving it a thought about the condition of the roads. Roads indirectly contribute to the economic growth of the country and it is extremely 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. But since India is a huge country with quite a sizable population this problem still has not been addressed in totality. Roads are normally placed 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. Likewise, potholes are formed due to oil spills, heavy rains and also due to movement of heavy vehicles. These bad roads conditions because accidents, affect the quality of driving and also consumes more fuel.

It achieves an effective road surface monitoring system for automated pothole 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 pothole detection. The goal of our project is to design a Pothole detection System which assists the driver in avoiding potholes on the roads, by giving him prior warnings. Warnings can be like a buzzer or series of LED, if the driver is approaching a pothole, or driver may be warned in advance regarding road pothole. Due to weather conditions, improper construction and overloading of vehicles the roads are getting damaged. The scope of the project lies, where the irregularity of the road affects public people. This can be used in 4 wheelers, especially for ambulance drivers so that they could save many lives in time.

## II. LITERATURE SURVEY

In this paper, we propose a novel scheme, called P 3, which utilizes smart phones placed in normal vehicles to sense and estimate the profiles of potholes on urban surface roads. In particular, a P 3 -enabled smart phone can actively learn the knowledge about the suspension system of the host vehicle without any human intervention and adopts a one degree-of-freedom (DOF) vibration model to infer the depth and length of pothole while the vehicle is hitting the

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pothole. Furthermore, P 3 shows the potential to derive more accurate results by aggregating individual estimates. In essence, P 3 is light-weighted and robust to various conditions such as poor light, bad weather and different vehicle types. We have implemented a prototype system to prove the practical feasibility of P 3. [1]

This paper discusses previous pothole detection methods that have been developed and proposes a cost effective solution to identify potholes and humps on roads and provide timely alerts to drivers to avoid accidents or vehicle damages. Ultrasonic sensors are used to identify potholes and humps and also to measure their depth and height respectively. The proposed system captures the geographical location coordinates of potholes and humps using GPS receiver. The sensed-data includes pothole depth, height of hump and geographic location, which is stored in the database (cloud). This serves as a valuable source of information to the Government authorities and to vehicle drivers. An android application is used to alert drivers so that precautionary measures can be taken to evade accidents. Alerts are given in the form of flash messages with an audio beep. [2]

In order to detect the three-dimensional cross-section of pavement pothole more effectively, this paper proposes a method which employs optical imaging principle of three dimensional projection transformations to obtain pictorial information of pothole's cross-section in pothole detection. Multiple digital image processing technologies, including: image preprocessing, binarization, thinning, three-dimensional reconstruction, error analysis and compensation are conducted in the series of image analysis and processing. Experimental results indicate that the method is markedly superior to traditional methods in many aspects. For its simple detection principle, low cost and high efficiency, the method suggests great practical and promoting value. [3]

There are much more researches on the recognition of the cracks on the distress pavement, but the research on the potholes is relatively less. In this paper, Texture measure based on the histogram is extracted as the features of the image region, and the non-linear support vector machine is built up to identify whether a target region is a pothole. Based on this, an algorithm for recognizing the potholes of the pavement is proposed. The experimental results show that the algorithm can achieve a high recognition rate. [4]

Pavement distress and wear detection is of prime importance in transportation engineering. Due to degradation, potholes and different types of cracks are formed and they have to be detected and repaired in due course. Estimating the amount of filler material that is needed to fill a pothole is of great interest to prevent any shortage or excess, thereby wastage, of filler material that usually has to be transported from a different location. Metrological and visualization properties of a pothole play an important role in this regard. Using a low-cost Kinect sensor, the pavement depth images are collected from concrete and asphalt roads. Meshes are generated for better visualization of potholes. Area of pothole is analyzed with respect to depth. The approximate volume of pothole is calculated using trapezoidal rule on area-depth curves through pavement image analysis. In addition pothole area, length, and width are estimated. The paper also proposes a methodology to characterize potholes. [5]

## III. PROPOSED SYSTEM

In this paper we have proposed a system it automatically detects the potholes and humps and sends the information regarding this to the vehicle drivers, so that they can avoid accidents. This is a cost efficient solution for detection of humps and potholes. This system is effective even in rainy season when roads are flooded with rain water as well as in winter during low visibility, as the alerts are sent from the stored information in the server/database. This system helps us to avoid dreadful potholes and humps and hence to avoid any tragic accidents due to bad road conditions.

## IV. ARCHITECTURE

System can give alert information regarding the pothole for road safety purpose. In main system we classified into the four sub systems the sensoring subsystem, the data processing subsystem, and the logging and reporting system and the power sub system. Power subsystem starts the vehicle and it enables the sensors and data processing module to start its working. The data processing module will examine the information from the sensors and output pothole data to the

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reporting and logging subsystem. The logging and reporting subsystem build on the android mobile device, will store the pothole locations on a network server.

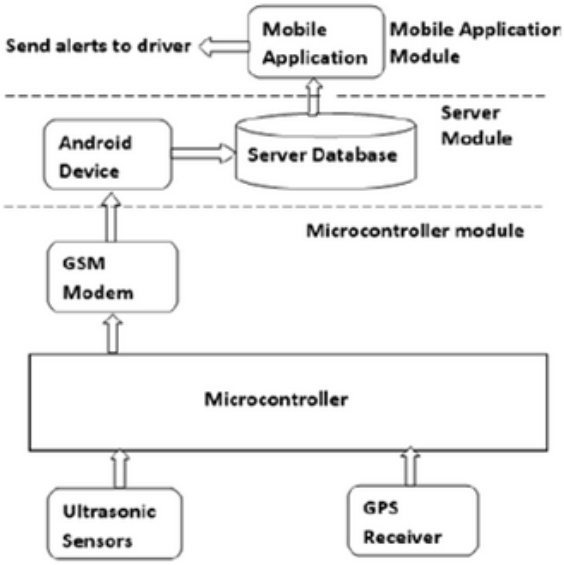


Fig 1: System Architecture

## V. RESULT

In experiment, hardware is attached to the vehicle to detect the pothole on roads. Ultrasonic sensor detect the depth of vehicle and continuously transferring to the controller. Once threshold get crossed by distance capture by sensors, controller sends the location details with latitude and longitude to the server. These pothole information can be stored on server and server sends the notifications about next pothole to the users who are travelling on same road. To display pothole locations on map, proposed system uses Google map API.

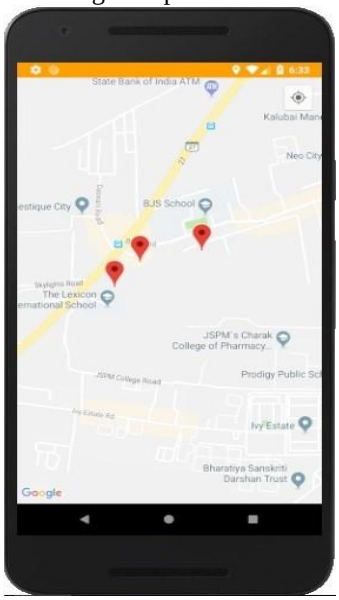

Fig 2: Pothole Detection

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## VI. CONCLUSION

System alerts the driver regarding the upcoming pothole in vehicle journey. In our proposed system which aims at providing appropriate information to the driver about potholes. It is a low cost solution for the road safety purpose. This will help to avoid accidents and can use to identify pothole problem areas early. In countries where updated economic growth and excellent technology have increase to gives impact on the quality of traditional transport system over intelligent transportation system.

## VII. FUTURE SCOPE

This system can be further improved to consider the above fact and update server database accordingly. Also, Google maps and SATNAV can be integrated in the proposed system to improve user experience.

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