

## A SURVEY ON DETECTION POTHOLE AND HUMPS ON THE ROAD AND INFORMATION SHARING

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**Abstract:** *One of the ways to reduce road accident is to identify the humps and potholes present in the path. In this paper, an internet of things based road monitoring system (IoT -RMS) is proposed to identify the potholes and humps in the road. The pathway which is affected by the pothole is greatly influenced by the scattering signal of the ultrasonic sensor. So the magnitude of the reflected signal decreased due to the roughness of the surface and the signal amplitude is difficult to analyze. image pre-processing based on difference of Gaussian-Filtering and clustering based image segmentation methods are implemented for better results. From the results the K- Means clustering based segmentation was preferred for its fastest computing time and edge detection based segmentation is preferred for its specificity. The main goal of this paper is to identify a better method which is highly efficient and accurate compared to the conventional methods. Different image pre-processing and segmentation methods for pothole detection where reviewed using performance measures. Raspberry Pi; Wireless Sensor Network (WSN), Sensors;*

impart with any other. Shortly, according to Gartner, about 25b recognize devices are expected to be a sector of this computable network by the year 2020. B. Wireless Sensor Network Wireless Sensor Network abbreviation. Wireless Sensor Network is a distributed collection about small devices, capable of economic processing also wireless communication. As the implementation of wireless communication technologies in industrial areas is basic due to inaccessibility to a remote location at every time, to transmit the report produced by sensors along for controlling them. So, to achieve interoperability between devices in industrial areas, configuration also implementation of a wireless communication system is done. The structure of the description is as follows. In literature study, includes theoretical contribution also investigation of current security devices and technologies. Also discusses the research and development methodology of the device in which we present our architectonic and design modules, the data transmitted in them. Existing examples of how our device operates and the statistics of efficiency. Also finally, concludes the paper.

### I. INTRODUCTION

Potholes are uneven surface found on roads and highways, which are made by constant vehicular traffic and weather conditions. These potholes are the main cause for the accidents which may be fatal. Potholes are bowl-shaped openings on the road that can be up to 10 inches in depth and are caused by the wear-and-tear and weathering of the road. They emerge when the top layer of the road, the asphalt, has worn away by lorry traffic and exposing the concrete base. Once a pothole is formed, its depth can grow to several inches, with rain water accelerating the process, making one of the top causes of car accidents. Potholes are not only main cause of car accidents, but also can be fatal to motorcycles. Potholes on roads are especially dangerous for drivers when cruising in high speed. Because, the driver can hardly see potholes on road surface. Moreover, if the car passes potholes at high speed, the impact may rupture car tires. Even though drivers may see the pothole before they pass it, it is usually too late to react. Any sharp turn or suddenly brake, may cause car rollover or rear-end.

Detection and counting of potholes using different image processing techniques helps in classification of different types of road profile. A. Internet of Things In 1999, Kevin Ashton proposed the term "IoT" to refer to interconnected mechanism. It is a major tech revolution in information also communication technology with updated infrastructure and networks where all the connected devices can identify also

### II. LITERATURE SURVEY

According to previous research Potholes are uneven surface found on roads and highways, which are made by constant vehicular traffic and weather conditions. These potholes are the main cause for the accidents which may be fatal. Motivated from the above reasons, we decided to investigate a system to detect potholes on roads while driving. The following sections provide sufficient background and insight into our aim to develop a system that detects potholes, logs their location and creates a document in a distributable format that can be utilized to upload to a centralized server or sent to concerned authorities immediately. The road provides maximum safety when it is maintained properly and the surface discontinuity may cause an increasing number of accidents. The bad road condition is the main reason for all the truck accidents, according to the survey

2.1 Road Pothole Detection System Based on Stereo Vision  
Yaqi Li      Christos      Papachristou Daniel      Weyer  
Department of Electrical Engineering and Computer  
Science Case Western Reserve University Stereo vision  
system which detects potholes through driving. This system  
contains two USB cameras taking photo at the same time. 2-  
dimensional image points can be projected to 3-dimensional  
world points using the disparity map. With all the 3-  
dimensional points, we use the bi-square weighted robust  
least-squares approximation for road surface fitting. The one

camera calibration using 20 checkerboard images for 2 cameras together takes around 3:52s. Stereo vision is an attempt to imitate the eyes of human beings. Camera calibration can be done in advance and all camera parameters saved locally for later use. Of course, the time consumption for the road pothole labelling depends on how many potholes detected. This experiments we conducted show robust detection of potholes in different road and light conditions.

## 2.2 Pothole Detection System using Machine Learning on Android

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This paper investigates an application of mobile sensing: detection of potholes on roads. This system, that we call the Pothole Detection System, uses Accelerometer Sensor of Android smartphone for detection of potholes and GPS for plotting the location of potholes on Google Maps. This paper aims at proposing a novel pothole detection system which assists the driver in avoiding potholes on the roads, by giving prior warnings. The pothole sensor plug-in monitors the changes in the acceleration in order to detect potholes. This system also deploys a neural network to implement Machine Learning on Android, and to improve the efficiency and accuracy of the detection of potholes. The result is an Android application which offers facilities to collect the data from sensors by recording a journey, to display the data using graphs using AChartEngine, and to run the data through the neural network deployed. The neural network has been implemented using a machine learning framework available for Android called 'Encog'. We evaluate our system on the outputs obtained using two, three and four wheelers.

## 2.3 Automatic Detection and Notification of Potholes and Humps on Roads to Aid Drivers

Rajeshwari Madli, Santosh Hebbar, Praveenraj Pattar, and Varaprasad Golla

This paper discusses previous pothole detection methods that have been developed and proposes a cost-effective solution to identify the potholes and humps on roads and provide timely alerts to drivers to avoid accidents or vehicle damages. Ultrasonic sensors are used to identify the potholes and humps and also to measure their depth and height, respectively. The Kinect sensor consists of RGB camera and an IR camera, and these cameras capture RGB images and depth images. These images are analysed using MATLAB environment, by extracting metrological and characteristic features, to determine the depth of potholes. The results get affected by LED light intensity and environmental factors. The images are segmented by using partial differential equations. In order to detect potholes, the method trains the SVM with a set of pavement images. The proposed system captures the geographical location coordinates of the potholes and humps using a global positioning system receiver. The sensed-data includes pothole depth, height of hump, and geographic location, which is stored in the database. The architecture of the proposed system is shown in figure 3. It consists of 3 parts; microcontroller module, server module

and the mobile application module. this paper serves 2 important purposes; automatic detection of potholes and humps and alerting vehicle drivers to evade potential accidents. 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 a flash messages with an audio beep.

## 2.4 IoT Based Humps and Pothole Detection on roads and information sharing

Chellaswamy C, Anusuya T, Famitha H, Amirthavarshini S B

In this paper, an internet of things based road monitoring system (IoT-RMS) is proposed to identify the potholes and humps in the road. The pathway which is affected by the pothole is greatly influenced by the scattering signal of the ultrasonic sensor. So the magnitude of the reflected signal decreased due to the roughness of the surface and the signal amplitude is difficult to analyze. The measurement of roughness and depth of potholes has been detected by NPRA on the network of Norwegian national roads for so many numbers of years. The Proposed system to monitor the surface of road uses Ultrasonic sensors and accelerometer for sensing and detecting. The Arduino Uno with ESP 8266 can be connected to a cloud server, the Remote XY allows us to manage the device from anywhere in the world. HBO algorithm is used to optimize the received signal from the accelerometer (DACC), an ultrasonic sensor (DUS) and from the GPS receiver (DGPS). Ultrasonic sensor is used to detect the potholes and the information will be updated in the server. The simulation is carried out for two different speed scenarios such as 40 km and 60 km using MATLAB 2017. The location of abnormality is measured with the help of a GPS receiver which is linked with IoT-RMS. Here the HBO optimization algorithm is used to optimize the measured signal from the sensors.

## 2.5 Detection and Counting of Pothole using Image Processing Techniques

Vigneshwar.K, Hema Kumar.B

In this paper image pre-processing based on difference of Gaussian-Filtering and clustering based image segmentation methods are implemented for better results. The original pothole image captured has high resolution and hence more information stored. Using original pothole image may take more computational time. The K-Means clustering based segmentation was preferred for its fastest computing time and edge detection based segmentation is preferred for its specificity. This work can be implemented in future for different automated application. After image segmentation the performance of the different segmentation techniques where evaluated. The future work could be implementing these image segmentation techniques using hybrid classifiers like neural network and fuzzy rule base and to develop a standalone product for pothole detection. From the results the K - Means clustering based segmentation was preferred for its fastest computing time and edge detection based segmentation is preferred for its specificity. The main goal of this paper is to identify a better method which is highly

efficient and accurate compared to the conventional methods. Different image pre-processing and segmentation methods for pothole detection were reviewed using performance measures.

### III. CONCLUSION

The Identification of different image processing techniques for pothole detection was done by comparing performance measures for different image segmentation techniques. This work can be implemented in future for different automated application. My future work could be implementing these image segmentation techniques using hybrid classifiers like neural network and fuzzy rule base and to develop a standalone product for pothole detection. An IoT based road abnormality monitoring and the status sharing through the cloud is proposed in this paper. The location of abnormality is measured with the help of a GPS receiver which is linked with IoT-RMS. the system detects humps or pothole, immediately it stores the coordinates in the server and alert information will be shared to the other vehicles which are passing in that location and hence the good percentage of accidents can be reduced.

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