



# Pothole Detection System Using Image Processing To Avoid Road Accidents

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**Abstract:** We proposed a system that detects the pothole in the roads using image processing. In this paper we use water shedding based segmentation to find the places that doesn't have a flat surface or has a hole. The image preprocessing is based on the difference of gaussian bilateral filtering and clustering based segmentation. Arduino with an attached camera is used. The attached camera captures the pictures of the road and checks for the pothole. Potholes have become a major reason for the road accidents. It's usually after rainy season or due to accidents that these potholes occur. Leaving them unattended can cause damage to the vehicle and also people may be injured. Hence in this paper we have created a system that detects the potholes in the road and acquires the location. The location is either sent as a message through gsm or updated in the webpage (iot) for the public to access and keep themselves updated about the road conditions.

**Index Terms -** GPS,GSM,iot,Arduino.

## I. INTRODUCTION

India tops in the most populated countries with more than 1.2 billion people residing here. India has the 2<sup>nd</sup> biggest road networks among all the other countries. 2050524 miles, road network ,59183 miles for national highways, 122 miles for expressways, 81956 miles for state highways, 290650 miles for major district roads and 1646630 miles for rural and other roads. The national highways are for long distance and to connect between the cities while the state highways are common roads that connect the state.

India ranks 51<sup>st</sup> in the quality of roads. Roadway are the major way of transportation in India. Its responsible for carrying almost 80% of the people across the country. The last decade has led to a rapid increase in the automobiles. Hence the number of issues related to road has also increased. One of the major issues that causes road accidents are potholes. They lead to traffic congestion, vehicle damage and even death of the people riding the vehicle. Potholes can also cause damage to the goods that are being carried along the long-distance roads.

Potholes are developed automatically due to heavy rain or overload of the automobile mobility. Most of the road accidents are caused due to the potholes. The potholes are left unattended by the government and hence the road keeps getting worse. There isn't any regular monitoring of the roads and hence the roads aren't laid off properly again.

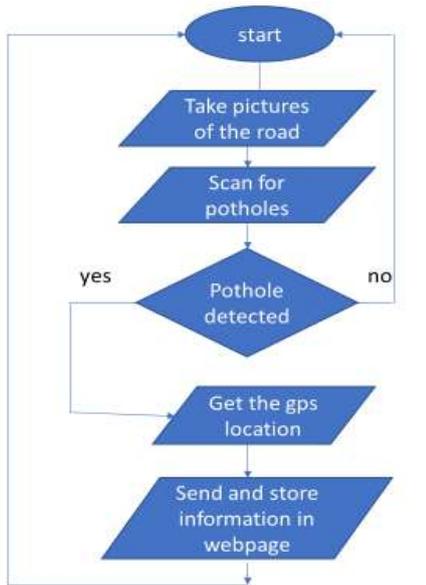
## II. PROPOSED SYSTEM

Our proposed system consists of a camera attached with Arduino that would capture the picture of the roads. The captured images are sent to the Arduino using ZigBee transmitter. The received result is then processed using image processing. The system gives a message if the pothole is detected or not as an output. Three modules have been incorporated in the software section. If the pothole detected is small it only gets updated in the webpage, if the pothole is very big and can cause potential damage then the GPS location is sent to the mobile number as well as it is updated in the webpage. The software uses water shedding method of image processing to see if there is any deviation in the flat surface. If the captured image is not a flat surface the area that deviates from the flatness is showed in black color. The location is sent as SMS to a registered mobile number of any government official and updated in a webpage which can be accessed by the public.

### III. OBJECTIVE

The main aim of the project is to reduce road accidents due to potholes. The stored data can be used for renovation of damaged roads by the respective authorities. It also aims to help maintenance of roads. The system can also help the legal authorities to investigate accidents. To Keep the driver updated about the potholes and for ease of movements of high load trucks and ambulance.

### IV. METHODOLOGY



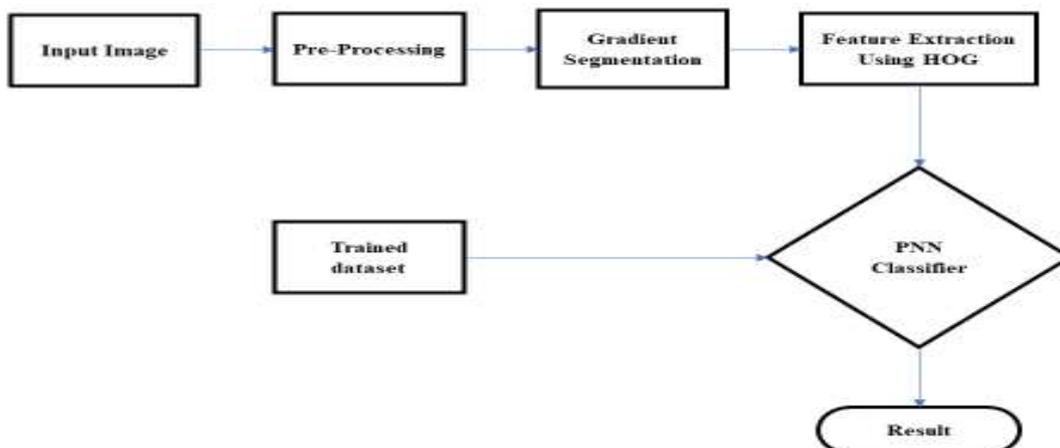
The above figure shows the method by which the decision for a pothole is detected. If the pothole is detected the message is sent and the data is updated in the iot.

### V. SYSTEM OVERVIEW

- **Software**

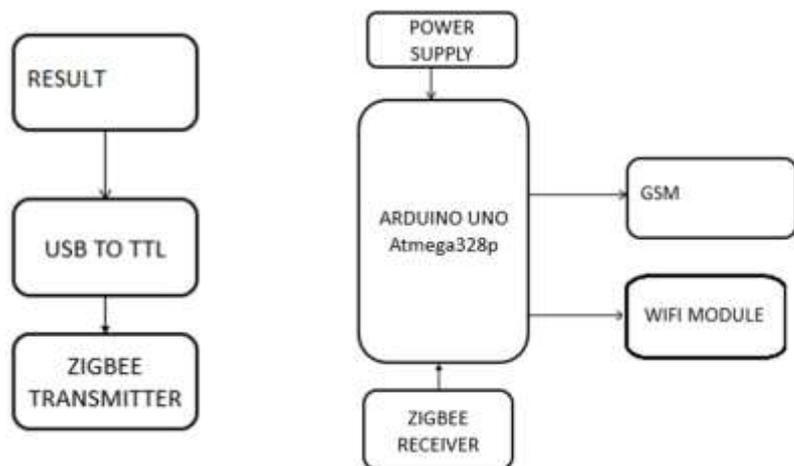
MATLAB has been used in the system.

The image is preprocessed and preprocessed image undergoes gradient segmentation. In this we get to know in what direction is the image growing. In our case the pothole has a



deviation downwards with respect to the flat surface. PNN use a parzen window along with a non-negative kernel function to estimate the probability distribution function (PDF) of each class.

- **Hardware**



The hardware consists of a ZigBee transmitter and receiver.

The image from the software is given as the result to the Arduino through the ZigBee.

The Arduino checks for the condition of the pothole and decides whether to send a message to the registered mobile number or to update in the website

## V. CONCLUSIONS

The system takes an image and detects the pothole. If the pothole is detected it decides if the pothole is big or small. If the pothole is small the data is updated in the webpage, if the pothole is big the data is sent to the webpage and message is sent to the registered mobile number

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