# Real time pothole detection technique using image processing and dimension estimation

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***Abstract*—T Here we propose design of 'Pothole detection System' which assists the driver in avoiding pot-holes on the roads, by giving him prior warnings. Warnings can be like buzzer if the driver is approaching a pothole, or driver may be warned in advanced regarding what road has how many potholes. This system is divided into three subsystems. First is sensing subsystem which senses the potholes encountered by it, about which it did not have the prior information. The pothole repair in India is mostly done by labour work which can also call a manual patching. The time required to fill required is high in manual method and wastage of material is high. The pothole filling process required for each season due to environmental changes and traffic density in India. The wages charges and routinely repair made roadways busy for maintenance continuously for year. This all problems lead to design the system which can automatically detect, analyze dimension and then automatically fill or patch the hole on road surface. By using the system with image processing based pothole detection the accurate dimension will be available and by using the available dimensions the filling material will be absolutely required deposited in pothole and it will be pressed. The system can reduce the material wastage, time requirement and wages charges. The need is to automate the whole system to increase accuracy and to make reliable system.**

***Index Terms*— automatically, dimension, patching, pothole, road surface, sensing , wages.**

## I. INTRODUCTION

A pothole (sometimes called a kettle and known in parts of the Western United States as a chuckhole) is a type of disruption in the surface of a roadway where a portion of the road material has broken away leaving a hole. Most potholes are formed due to a fatigue of the road surface. As fatigue fractures develop they typically interlock in a pattern known as crocodile cracking. The chunks of pavement between fatigue cracks are worked loose and may eventually be picked out of the surface by continued wheel loads thus forming a pothole.

The formation of potholes is exacerbated by low temperatures as water expands when it freezes to form ice and puts greater stress on an already cracked pavement or road. Once a pothole forms, it grows through continued removal of broken chunks of pavement. If a pothole fills with water the growth may be accelerated, as the water "washes away" loose particles of road surface as vehicles pass. In temperate climates, potholes tend to form most often during rainy spring months when the sub grade is weak due to high moisture content causing sinkholes and by corroded sewer pipes.

## II. PAVEMENT DISTRESS TYPES

1) The Cracking
   a) Longitudinal cracking
      i) wheel path longitudinal cracking
      ii) joint reflection cracking
      iii) edge cracking
   b) Transverse cracking
   c) Fatigue cracking
2) Potholes and patching
   a) patch deterioration
   b) potholes
3) Surface deformation
   a) Rutting
   b) Shoving
4) Surface defects
   a) Bleeding
   b) Polished aggregate
   c) Ravelling
5) Other distresses
   a) Separation

***Potholes cause and repair methodology***

"A pothole is any pavement defect involving the surface or the surface and base, to the extent that it causes significant noticeable impact on vehicle tires and vehicle handling. All potholes are the result of the interaction of water and traffic on

pavement. Most are found on local road and street systems: 80% of the nation's roads are local roads and are more apt to have "just grown" rather than being planned from the start and are much more likely to have water, gas and other utilities underneath. [1]"

**FIG.1** A pothole caused by fatigue failure

## III. PROPOSED SYSTEM

The proposed system acquires potholes images through camera. As the acquired images would be taken under different environmental conditions, various noise filtering techniques would be employed followed by appropriate edge detection algorithms like Canny and Zero cross to identify the boundary of the pothole in the image. After the target area is determined in the image, its dimensional information like area, size and volume would be determined. For this, as the images are taken from different elevations and angles, the top view of the pothole image would be identified from the available image. Orientation could be changed using transformation algorithms like affine transforms. This would be followed by applying appropriate scaling factors to facilitate the area calculating process. After detecting the dimensional information the positioning system activates and after accurate positioning the filler starts to drop material as calculated.

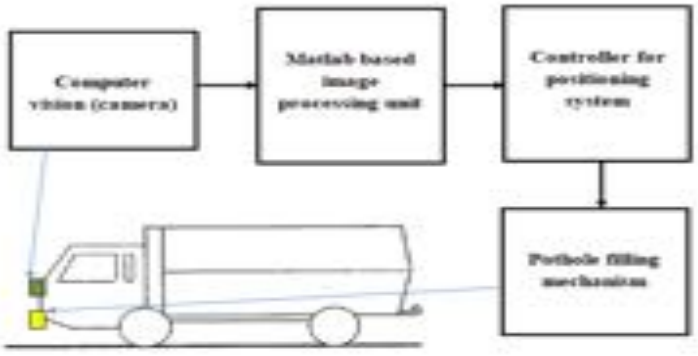


**FIG.2** Proposed system

A vision system of the pothole being images would be used of pothole repair was needed to take images repaired. These video to automate the repair process. The imaging of the pavement surface and pothole had to be handled under a variety of lighting conditions. The automatic system had to recognize potholes as well as oddly shaped or colored defects on the pavement. The system would have to create the necessary information to run the remote manipulator under automatic control, and also help the operator monitor the repair process through a TV monitor.

This system would fill the prepared cavity with selected and proven materials, under automatic control, to achieve a dense patch having a level surface that would last years. It had to be low maintenance and accommodate variations in materials, application temperatures, oddly shaped potholes of virtually any depth from 1 inch to 6 inches (2.5 to 15 cm). An objective is the system should use low-cost materials that could be easily obtained, and be adaptable t**o** new materials under development in the industry.

The truck base had to allow for substantial material storage and weight, easy mobility in repair situations, excellent visibility for the operator and flexibility in design features to accommodate the various repair equipment modules that would have to be mounted.

## IV. IMPLEMENTATION OF SYSTEM

**FIG.3 Implemented system of pothole repair**

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## V. RESULTS

Table 1 Result

| Side | position | X axis | Y axis | Resultant image |
|---|---|---|---|---|
| L | S | 434 | 91 |  |
| L | E | 418 | 420 |  |
| R | S | 190 | 63 |  |
| R | E | 150 | 404 |  |

## VI. CONCLUSION

The advanced version of automatic pothole identification and filling system gives a economical and reliable system for pothole identification, dimensional analysis and accordingly position the filler to drop material used to pavement on pothole. It will remove the labour cost, reduces time and also plays a role for emergency repair after damage due to environmental effects.

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