Pothole and Traffic Detection

using AI and Proximity Sensors

### A Project Work

*Submitted in the partial fulfillment for the award of the degree of*

# BACHELOR OF ENGINEERING

in

**Information Security**

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**DECLARATION**

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**Abstract**

This project was primarily designed as a minor project, as its title “POTHOLE AND TRAFFIC DETECTION using AI and Proximity Sensor” suggests, is an attempt to develop software that is not only simple software but it’s an approach to create much more complicated software like these.

This programs basically collects the pothole and traffic data through various inputs whether image or video and the AI generates the results which is stored in the database.

**Acknowledgement**

Although, this project was an effort of me but it would not have been possible without the support of elders and friends. First of all, we would to thank our teacher Dr. Vipin Tiwari for their useful suggestion and encouragement. I am extremely grateful for their warm support. Without their critical analysis and timely suggestions this project would not have been a success. Their suggestions and comments have been most helpful for the development of the program and they deserve a significant part of the credit that goes to this program. We would like to thank them for sharing their ideas and knowledge without much of problem.

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# Gantt chart

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| February | February | March | April | May | May |
| Create environment for python project with installing libraries | Start with basic project | Addition of traffic detection | Introduction detection through live video | Assembly of hardware things | Presentation of the project |

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# INTRODUCTION

Road defects, such as potholes and cracks, are becoming an increasingly significant problem for

roads around the world. They present a hazard for all road users, causing considerable vehicle damage. Total 3,564 road accidents occurred in India due to potholes in the year 2020, which is 1, 211 accidents less than last year, the government informed Parliament on Thursday.Consequently, the damage induced by potholes has resulted in expensive lawsuits and damage claims. Despite the large government investment made in maintaining and repairing road infrastructure, few people are satisfied with the quality of roads where they live or work.

Maintaining high-quality road infrastructure is challenging for numerous reasons, including harsh weather, unexpected road loads, and inconsistent wear and tear. As road damage and normal wear are highly unpredictable, an infrastructure maintenance program is only as effective as its associated monitoring program. For instance, traditional pothole detection methods utilize dedicated inspection vehicles to conduct routine checks. This is expensive, and many local authorities presently face significant budgetary constraints, resulting in less frequent inspections that are only able to cover limited portions of road networks. Meanwhile, the popularity and ubiquity of smartphones provide an opportunity to collect data from crowds. The built-in accelerometer and global positioning system (GPS) can measure the road surface quality and detect potholes.

We propose a conceptual framework for an automated pothole detection system using proximity sensors.

# LITERATURE REVIEW

Existing methods for the monitoring of road conditions using mobile devices are mainly based on camera observations and vibration detection. Vision-based methods rely on mobile devices mounted on a driving vehicle to capture pictures of the road surface, and automatically analyse the road information contained in the pictures through image analysis algorithms. For example, the Video-based Pavement Distress Screening (VPADS) system detects road distress by applying an automatic data processing workflow to video data. Large image datasets of road surfaces were built by Maeda et al and Ochoa-Ruiz et al. for the effective detection of road damage using deep learning algorithms. In vibration-based methods, accelerometers and gyroscopes are the most commonly used sensors, as they are sensitive to shocks induced by road anomalies (e.g., potholes and bumps), along with the GPS, which is used to record location. In this paper, proximity sensors are the main focus of our research. Many methods have been used, which can be divided into the following four categories:

1. Proximity sensor
2. Tensorflow
3. Data base
4. Machine learning together

with feature engineering. The use of clustering results from various users has become an effective postprocessing approach that significantly improves the successful detection rate and reduces the false positive rate of result gathered and stored in the database.

### Literature Review Summary

Table 2.1: Literature review summary

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Year and citation** | **Article Title** | **Purpose of the study** | **Tools/ Software used** | **Comparison of technique done** | **Source (Journal/ Conference)** | **Findings** | **shortcoming** |
| 2020 | An Automated machine-Learning Approach for Road Pothole Detection | Detect potholes on the road | Machine learning libraries  accelerometer  Android phone for data collection | Holes detection using accelerometer | journal | Acceleration charts | No additional hardware is used |
| 2017 | IOT based pothole detection system | Detect potholes on the road | ARM 7 development board  GPS module  Vibration sensor  accelerometer | Using IOT for potholes detection and data collection | journal | IOT based software for storing data | Various apps used for the result |

# PROBLEM FORMULATION

The problem of the potholes in the roads create a great chaos in the area itself. Not only it effects the way of living but also effect the financial condition of the authorities. Potholes along with speed bumps have been a cause of worry for motorist for a long time. Most of the accidents happen due to potholes and bumps. The aim of the project is to identify the road surface by classifying it into pothole, speed bump and normal road based on image data. This work can be beneficial to alert the driver and tune the suspension to make the ride more comfortable based on road preview using a camera. To get rid of the all these problems, we have proposed a cost-efficient method to detect potholes with good precision. The proximity sensor used has the better performance for pothole detection and also cost efficient

# OBJECTIVES

The proposed work is aimed to carry out work leading to the development of an approach for potholes present in the road The proposed aim will be achieved by dividing the work into following objectives:

* A pothole-detection approach using smartphones is proposed and verified via experiments including a series of data-processing methods.
* The performance for different feature domains is analysed and compared with regard to the time required and the pothole-detection accuracy. The strengths of various classifiers are examined and applicable scenarios for the classifiers are suggested.
* The performance of the proposed method for datasets generated from different types of roads is assessed to evaluate its universality and robustness. The pothole-detection capability of our method is better than that of most previously reported methods.
* The collected data will be stored as database and can be shared with the municipal corporations for further maintenance of the roads .

# METHODOLOGY

The following methodology will be followed to achieve the objectives defined for proposed research work:

1. Detailed study of Bumps and Potholes Detection on the road will be done.
2. Installation and hand on experience on existing approaches of Bumps and Pothole detection will

be done.

1. Relative pros and cons will be identified.
2. Various parameters will be identified to evaluate the proposed system.
3. Comparison of new implemented approach with exiting approaches will be done.

In the proposed system, advanced sensor system is used to track and update the potholes on the road. Proximity sensor is used to find the difference between the pothole and speed bumps. The sensor will detect the unusual changes the vehicle. they are determined by three parameter xyz. Along with this a vibration sensor is used which also finds the potholes if the vehicle is vibrated more than the threshold level. The threshold level is fixed beforehand. Both these sensor values are fed to the Arduino and the GPS sensor updates the coordinates where exactly the potholes are present. This data is sent into the web server through IOT for the Road transport officials to take necessary action. Using the information road condition is predicted and prioritization is done to take the necessary steps.

Show result and

Data storage

**Figure 5.1** steps to be done

Data acquisition

Data

processing

# Conclusion and Discussion

# Output

# 

Result Fig1

# 

Result Fig2

# 

Result Fig3

# 

Result Fig4

# Conclusion

# Highlights

# Pothole detection is precise as, various libraries are used for the detection of potholes.

# Reduce road accidents.

# Pitfalls

# Range of Proximity sensor is less so, it can only identify traffic nearby.

# Hardware setup is expensive.

# 

# Future Scope

# The data collected through are project can be shared with municipality to ease there work with road maintenance.

# Our project can be physically used by individual for their safety purpose.

# REFERENCES

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