Road Pit Notifier

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Abstract : *One of the major problems faced by developing countries is the maintenance of road condition. Road infrastructure for the society is very important because majority of road accidents takes place due to bad condition of road like pits. Pits are caused due to poor quality and badly maintained roads. The constant movement of the overweight vehicles like trucks is also responsible for these ill roads. These ill quality roads will cause severe damage to the vehicles in terms of tyre and most important thing is the accidents which are caused due to this. An optimal system should be developed to monitor the road condition and analyses for future work. We propose an innovative method to prevent these hazards by using the advanced sensor system. The sensors will be attached to vehicles and from vehicles the data's obtained from sensors and the location obtained by the GPS are transferred to road transport authority by IOT where officials take necessary actions. Using the data's obtained more damaged area can be prioritized and damage control can be reduced.*

Keywords: *raspberry pi; ultrasonic-sensor; GPS; IOT; Pits.*

I. INTRODUCTION

India is a fastest developing country after china. Although India is doing exceptionally well in certain field, they majorly lack in road ways. Roads are the dominant means of transportation in India today. However, most of the roads in India are narrow and overcrowded with poor surface quality and road maintenance needs are not satisfactorily met. Identification of pavement distress such as pits not only helps drivers to avoid accidents or vehicle damages but also helps authorities to maintain roads. According to the Road Accident Report (2018) published by the road transport and highways ministry, while 4,726 lives were lost in crashes due to humps, 6,672 people died in accidents caused due to pits and speed breakers. Fig. 1 shows condition of roads with killer pits. To address the above mentioned problems, an effective solution is needed that collects the information about the pits and also helps to road construction department .By using these mechanism we can improve safety, efficiency and comfort.

Fig 1.Condition of road

II. Literature Survey:

[1] Title:Road Condition Detection Using Smartphone Sensors: A Survey

Authors: Gunjan Chugh, Divya Bansal and Sanjeev Sofa,

Advantages:-The location of abnormal road condition can be detected and saved in open source traffic data center in the future.

Disadvantages:-

1)Continuos Internet access required.

2) Data should be gathered before applying.

The reasons for extending research in this field are, 1) It will ensure safety and comfort to various road users; 2) Smooth roads will lead to less vehicle damage and government investment. Thus, it is goal of the project to develop system which are able to detect road conditions using low cost sensors based application and also reduce the level of road crashes in urban area and along the major transport corridors.

[2] Title:- Real Time Pit Detection using Android Smartphones with Accelerometers(IEEE 2011)

Authors:- Artis Mednis , Girts Strazdins , Reinholds Zviedris , Georgijs Kanonirs,Leo Selavo

Advantages:-

1) 90% of real world data is used.

2)Pit detection algorithms for deployment on devices with limited hardware/software resources

Disadvantages:-

1)7% pit clusters were not detected by any of used algorithms.

2) When the speed of the vehicle is low then the pits in there will not be detected.

For ensuring road condition and surface quality, it should be monitored continuously and repaired as necessary. Various low cost sensors can be used for collection of such data. The paper is describing to develop a coordinate approach and solution to problems through the delivery of notification to road construction department.

Problem Statement: Detection of bad road conditions such as pits, bump, steep and on the road. Therefore, proposing a system by which the government official will get a feedback alert if the pit still exists in spite of the correction action.

The main objective of system is to improve the road safety and contribute to the achievements of national and local targets on fatalities and injuries resulting from the road crashes.

III. Proposed Work:

In the proposed system, advanced sensor system is used to track and update the pit on the road. UV sensor is used to find the difference between the pit and speed bumps. This vehicle is in the custody of the Government officials. The vehicle is mounted with the ultrasonic detector using IOT concept. The Ultrasonic Sensor is attatched at the downer part of that vehicle. The distance is calculated by the ultrasonic pulse to travel a particular distance. Let's assume the some default XYZ value (distance).When the vehicle is on the road, everytime sensor detects the distance between sensor and road surface. If there is plain surface then the distance between road and sensor remains same. But when the distance between road surface and sensor is getting increased then we came to know that the pit is found.

GPS sensor updates the coordinates where exactly pits are present. This data is sent into the server through IOT for the Road Construction Department to take necessary action. An action plan is prepared by the official and accordingly says after a span of 15-20 days the pit inspection will move around the same area to inspect if there are any pits. The government official will get a feedback alert if the pit still exists in spite of the correction action. There is no manual intervention form the driver of the vehicle. The task of the vehicle driver is to drive across the city taking the route identified by the government official.

Hardware And software Components:

Hardware Requirements:

- GPS Device
- Ultrasonic Sensor

Software Requirements:

- Raspberry Pi
- Desktop Application
- Thing speak Server

IV. System Architecture:

The interaction of the various modules are been shown in the fig2.

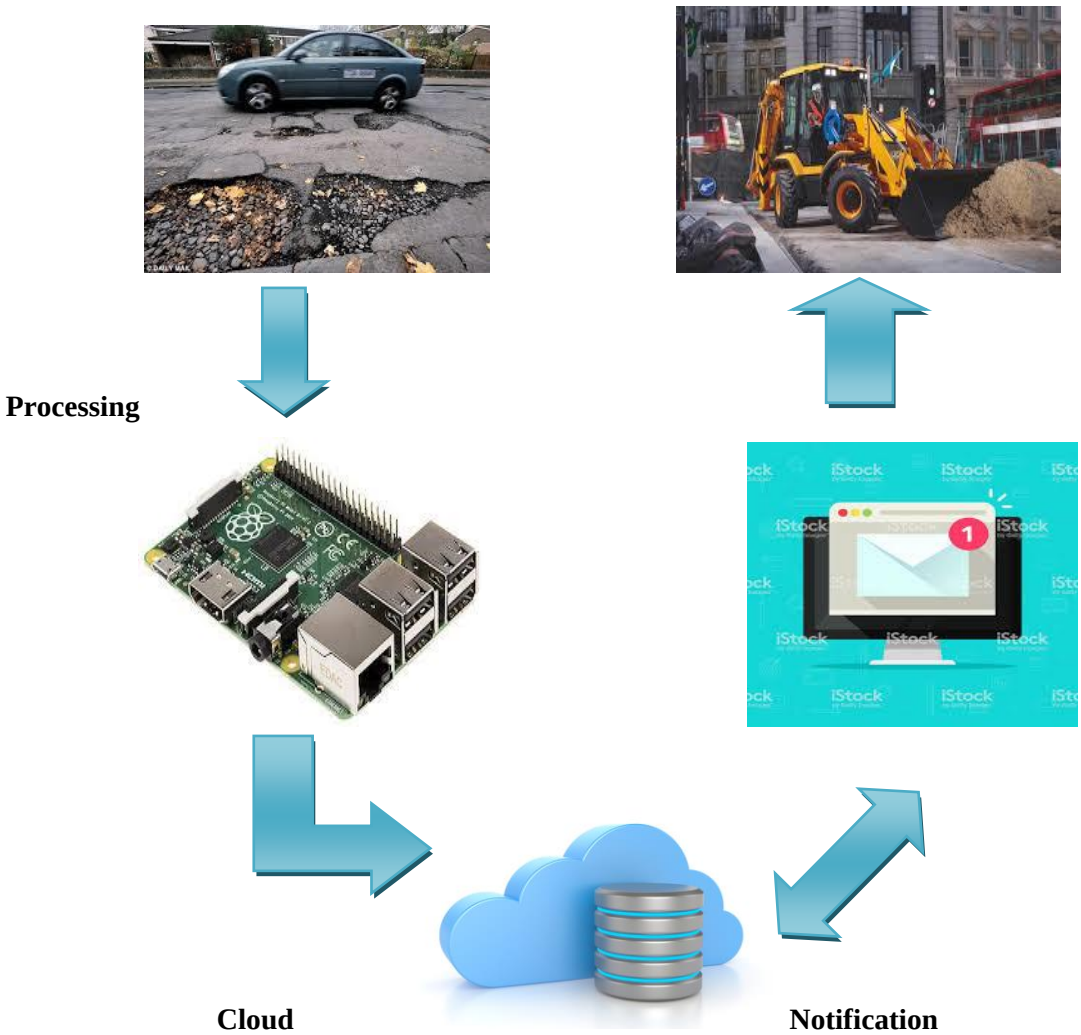

Fig2.System Architecture

Flowchart:

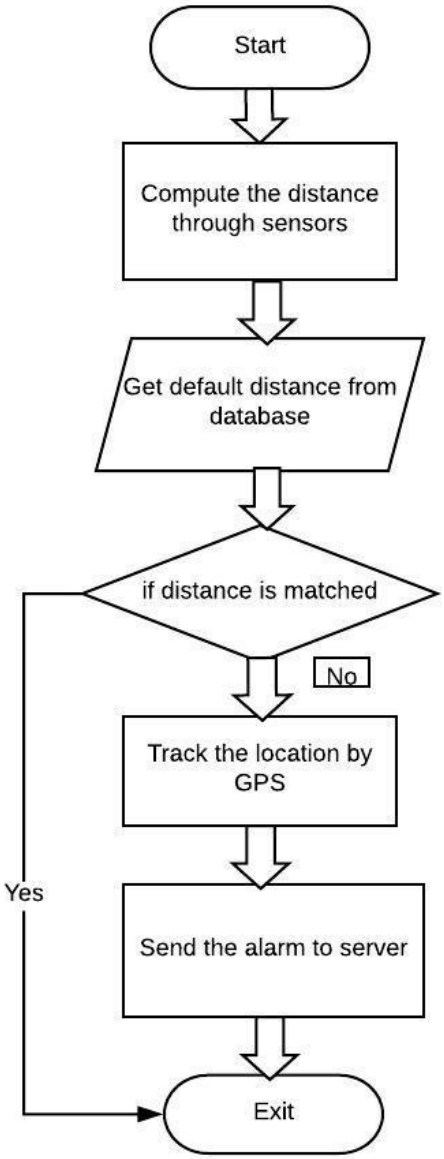

Fig3.workflow of application

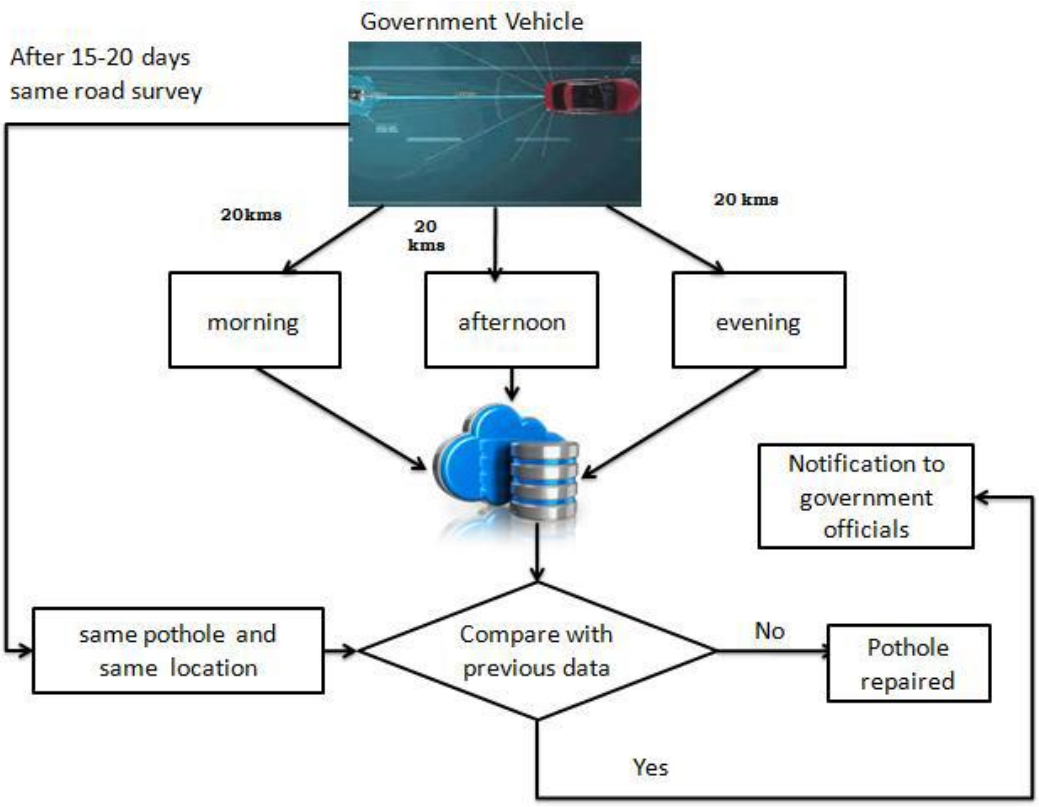

Fig4.Remainder functioning model

Conclusion:

According to the real time road conditions evaluation the abnormal road condition can be detected and saved from accidents. As with traditionally where human workers personally check for road condition can be avoided and make it easier and automatic while a vehicle passes through a pit. Identifying the pits with the help of sensors would be useful enough for road management to operate and implement at low cost. Once transport authority receives the data prioritization is done and the most affected area is recovered first and also notifies the location of the roads which are in verge of severe damage. Ultimately to recover bad road condition as soon as possible. The road conditions can be improved and there will be comfort for the people.

Future Scope:

The system can be made useful as a part of smart city campaign. Also, applying IOT based techniques in classifying data can help the system to adapt to changing factors like nature of the road and vehicle type the users use. And the data collected can be sent to the road construction department so that they can take care for improving the road conditions.

Reference:

1. Syuan-Yi Chen1, Annie Shih2 and Chun-Yi Hsiao,"Road condition Detection Device Using Arduino Sensing Module and Android Smartphone ",2015 International Conference on Consumer Electronics-Taiwan (ICCE-TW)
2. ArtisMednis,GirtsStrazdins,ReinholdsZviedris,GeorgijsKanonirs , Leo Selavo,"Real Time Pit Detection using Android Smartphones with Accelerometers",Digital Signal Processing Laboratory Institute of Electronics and Computer Science R& D Center for Smart Sensors and Networked Embedded Systems ,2009