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Smart Crater Detection And Information Sharing Using IOT

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Abstract - These hurdles cause vehicle damage and also have caused a number of accidents in the past that make up to a considerable amount and should be given a thought about. This paper proposes a cost-effective solution that provides timely alerts to the drivers regarding potholes or humps. The proposed system can be divided into three sub-units: the sensing sub-unit, the server sub- unit and the user subunit. At the sensing sub-unit, an ultrasonic sensor is used to detect potholes and humps, whose location co-ordinates are retrieved by the GPS receiver. This data is stored to the database, which is the sever sub-unit. At the user sub-unit a hardware module is set-up that provides timely alerts to the drivers regarding potholes and humps.

***Key Words*:** *potholes or humps ,ultrasonic sensor ,GPS receive*

1.Introduction

Roads indirectly contribute to the economic growth of the country and it is extremely essential that the roads are well built and strong. India is home to several bad roads beit the metropolitans, the cities or the villages. Since India is a developing nation there is a constant demand for good quality infrastructure, transportation and services. But since India is a huge country with quite a sizable population this problem still has not been addressed in totality. Over the past few years, there has been a large increase in vehicle population. This increase in vehicle population has led to increasing road accidents and also traffic congestion. According to Global Road Safety Report, 2015 released by the World Health Organization (WHO), India accounts for more than 200,000 deaths because of road accidents. These accidents can be due to over speeding, drunk and driving, jumping traffic signals and also due to humps, speed- breakers and potholes. Hence it is important to collect information regarding these poor road conditions and distribute the same to other vehicles that in turn help reduce accidents caused due to potholes and humps.

1.1 Objectives

The objective of our proposed system is to detect the potholes on the road and also to detect the depth of potholes in centimetre in ultrasonic sensor. The pothole on the road causes serious harm to driver's safety therefore due to implement all the safety measures, we have proposed which detects real time location latitude and longitude using GPS. Driver's safety maybe improved with the establishment of real time pothole detection system for generating log report in Google sheet. The proposed system captures the geographical location coordinates such as longitude and latitude, time and depth of the pothole.

2. Literature Survey

In view of proposed dissertation work concerned, following few of the researchers have done their experimental study and investigated results which have been review as follows.
B. G. Shivaleelavathi, Veeramma Yatnalli, Chinmayi, Yamini V. S, Spoorthi Thotad [1], the system presented in this paper provides solution for intelligent detection of potholes and humps to aid transport vehicle or car drivers in avoiding accidents and provide information to the municipal officials to take action of maintenance of such roads. The system uses camera and ultrasonic sensor to detect potholes and humps. It makes use of the GPS for sending the location of potholes and GSM for sending the SMS alerts to registered mobile numbers. The hump detection is also displayed on the LCD panel to aid the drivers in the car, thus providing alerts to drivers. Controlling device used is Raspberry Pi. The system acquires

the geographical position of potholes using Wi-Fi and transmits it to authorities to take corrective measures.

Rahimraja Shaikh, Patil Pallavi S, Saraf Priyanka S, Khan Aabid A [2], the significance of this paper is to provide the best utilization of our system to protect the users from accidents by sending the information to the authorities which will simply maintain the roads which will thereby reduce the number of accidents and hence cause no damage to humans nor vehicles. Authors have used ultrasonic sensors for measuring the depth & height of the road surface. The data which are sensed by the sensors include the depth of the potholes & height of the hump & geographic location which is to be already stored in the database. This information serves as a valuable source to the government authorities i.e PWD office and vehicle drivers via GSM.

Mahesh Jala, Shubham Kapate, Prathamesh Lakhan, Ajay Chauhan, Assist Prof.Varun Mishra [3], This project discusses methods that have been developed and proposes a cost effective solution to identify the potholes on roads and provide timely action to avoid accidents or vehicle damages. Ultrasonic sensors are used to identify the potholes and obstacles on the road. When the pothole is detected its depth is displayed on the LCD. The developed system will serve as a useful approach to detect the potholes in the roads and maintenance of it in an automated way. The entire design is composed of 3 main sub-systems Design of robotic cover, sensor modules and interfacing of transceiver circuit with PC for transmitting the controls to therobot. The mechanical design of the robot consists of wheels controlled by the DC motor. It is a helpful approach for the government authority. The use of robots significantly expands the potential of surveillance systems

Stepheena Joseph, Mr.K.Edison Prabhu [4], In this paper, authors have proposed a system which will detect the potholes on the road and save the information in the server and reduce the vehicle speed if needed. Due to the rains and oil spills potholes are generated which will cause the accidents. The potholes are detected and its height, depth and size are measured using ultrasonic sensor. The GPS is used to find the location of pothole. All the information is saved in the database. This timely information can help to recover the road as fast as possible. By controlling the rate of fuel injection we can control the rotation of the drive shaft by means of an IR Non- contact tachometer. This helps to reduce the vehicle speed when pothole or hump is detected. Hence the system will help to avoid road accident.

Rajeshwari Madli, Santosh Hebbar, Praveenraj Pattar, and Varaprasad Golla [5], 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 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 (cloud). This serves as a valuable source of information to the government authorities and vehicle drivers. 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 flash messages with an audio beep. The model proposed in this paper serves 2 important purposes; automatic detection of potholes and humps and alerting vehicle drivers to evade potential accidents. The proposed approach is an economic solution for detection of dreadful potholes and uneven humps, as it uses low cost ultrasonic sensors. The mobile application used in this system is an additional advantage as it provides timely alerts about potholes and hump.

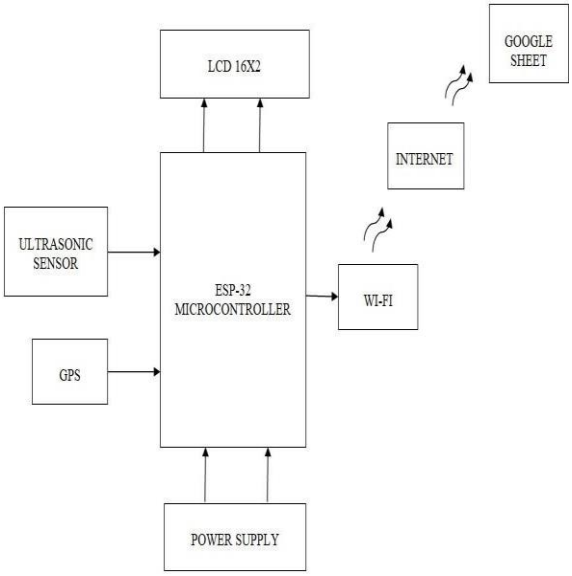
3. Problem Statement

One of the increasing problem roads face are worsened road conditions. Potholes, formed due to heavy rains and movement of heavy vehicles, also become a major reason for traumatic accidents and loss of human lives. Also because of bad road conditions fuel consumption of vehicles increases, causing wastage of precious fuel. Therefore, there is a need to develop a Pothole detection system that aims at collecting information, sending and storing it to the PWD and warning the driver about the uneven roads and potholes in its path

3. 1 Summary

Indian roads have speed breakers to control the vehicle's speed. The speed breakersare not distributed uniformly and are of incorrect heights. If regular maintenance of the road is neglected, it results in huge portholes and results in accidents, fuel consumption of vehicle increases and deteriorates the economic growth of the country. So, it becomes important to get information of these bad road conditions, gather and dispense them to the vehicles, to warn the drivers. Potholes and humps are detected using ultrasonic sensors and their information like location is provided to the authorities with the help of GPS and alerts the driver regarding the bumpy roads and potholes on its path.

4. Design and Modeling



The architecture of the proposed system is shown in Fig. 3.1. It consists of 3 parts; microcontroller module, server module and the mobile application module. Microcontroller module is used to gather information about potholes and their geographical locations and this information is sent to the server. Server module receives information from the microcontroller module, processes and stores in the database. Mobile application module uses information stored in the server database and the entry is made in Google sheet via Internet.

5. Hardware and software requirement

5.1 ESP-32 Microcontroller

ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. ESP32 is highly-integrated with in-built antenna switches, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 adds priceless functionality and versatility to your applications with minimal Printed Circuit Board (PCB) requirements. ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO.

Fig: ESP-32 Module

5.2 Ultrasonic Sensor

JSN-SR0T4 ultrasonic distance measurement module can provide 50cm-450cm non- contact distance sensing function, ranging accuracy up to 2mm; module includes the transceiver of an integrated ultrasonic sensor and control circuit.

Test distance = (high time * speed of sound (340 m/s)) / 2.

The module is triggered after the distance measurement, if you cannot receive the echo (the reason exceeds the measured range or the probe is not on the measured object), ECHO port will automatically become low after 60 ms, marking the end of the measurement, whether successful or not. LED indicator, LED non-power indicator, it will receive the signal after the module will be lit, then the module is working.

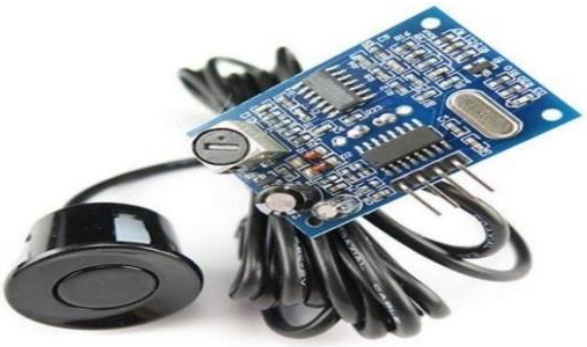


Fig: JSN-SR04T Ultrasonic Sensor

5.3 PS Module

The antenna is connected to module through ufl cable which allow for flexibility in mounting the gps such that the antenna will always see the sky for best performance. This makes it powerful to use with cars and other mobile applications.

The Ublox gps module has serial TTL output, it has four pins: TX, RX, VCC and GND. You can download the u-center software for configuring the gps and changing the settings and much more. It is really good software.

5.4 LCD 16x2

It can be configured to drive a dot-matrix liquid crystal display under the control of a 4 or 8 bit microprocessor. Since all the functions such as display RAM, character generator, and liquid crystal driver, required for driving a dot-matrix liquid crystal display are internally provided on one chip, a minimal system can be interfaced with this controller/driver.

6. Advantages

- location tracking of potholes
- Maintains record using latest technology and entry on Google sheet
- Defines exact depth of the potholes.
- Easy to use and convenient as well.
- Economical and having good accuracy.

7. Applications

- For vehicles on Highway roadways
- For vehicles on roads in rural areas
- For vehicles on roads in city

8. CONCLUSIONS

Thus, we have studied the problem regarding the potholes on roadways and proposed asolution using microcontroller which will detect the potholes on the road and save the information in the server and reduce the vehicle speed if needed. Due to the rains and oil spills, potholes are generated which will cause the accidents. The potholes are detected and its height, depth and size are measured using ultrasonic sensor. The GPSis used to find the location of pothole.

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