IoT based Automatic Detection of Pot Holes and Speed Breaker Mapping

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Abstract: **One of the prominent problems in developing countries is maintenance of roads and streets. Well maintained roads contribute a most portion to the country's economic condition. Identification of pavement distress such as potholes and humps not only help drivers to avoid accidents or vehicle damages also it helps authorities to look after the roads. our paper discusses potholes and humps detection method and more efficient way which was developed and proposes a cost-effective solution to identify potholes and humps on roads and provide timely alerts to drivers to avoid accidents, life loss. Ultrasonic Sensors are used to identify potholes and humps speed breakers and the proposed system captures and saves the geographical location coordinate of potholes and speed breakers using GPS receiver. The sensed-data will includes pothole depth, height of hump and geographic location, which is stored in the database (cloud). This serves as a prominent source of information to the Government authorities and to vehicle drivers. An android app is used to alert drivers so that they can take some precautionary measures to avoid accidents. Alerts are given in the form of a messages with an audio beep.**

Keywords: **IoT, Ultrasonic Sensor, Raspberry Pi, GPS Module.**

1. Introduction

India, the most inhabited Country within the World and a quick growing economy, is thought by mammoth network of roads. Roads are the dominant means that of transportation in Asian nation nowadays. They carry virtually ninety % of country's traveler traffic and sixty-five % of its freight. moreover, most of the roads in Asian nation are slim and full with poor surface quality and road maintenance desires don't seem to be satisfactorily met. despite wherever you're in Asian nation, driving could be a breath-holding, multi-mirror involving, doubtless life threatening affair. Over the last 20 years, there has been an incredible increase within the vehicle population. This proliferation of vehicles has semiconductor diode to issues like holdup and increase within the variety of road accidents. Pathetic condition of roads could be a boosting issue for holdup and accidents. Researchers are operating within the space of holdup management, Associate in Nursing integral a part of transport space networks, that is that the want of the hour now a days.

2. Problem Identification

Roads in Bharat unremarkably have speed breakers in order that the vehicle's speed is controlled to avoid accidents. However, these speed breakers are inconsistently distributed with uneven and pseudoscientific heights. Potholes, shaped thanks to serious rains and movement of serious vehicles, conjointly become a serious reason for traumatic accidents and loss of human lives. consistent with the survey report "Road Accidents in Bharat, 2011", by the ministry of road transport and highways, a complete of one,42,485 folks had lost their lives thanks to fatal road accidents. Of these, nearly 1.5 per cent or nearly two,200 fatalities were thanks to poor condition of roads. Figure one portrays the condition of roads with killer potholes. to deal with the on top of mentioned issues, a value effective resolution is required that collects the knowledge concerning the severity of potholes and humps and conjointly helps drivers to drive safely.

With the projected system an endeavor has been created to endorse drivers to chase away the accidents caused thanks to potholes and raised humps. The remaining sections of the paper ar as follows: emphasizes on the connected work that has been done and goes on within the field of detection of potholes and humps. Section III discusses the assorted elements employed in the projected system. Section IV describes the design and implementation of the projected system. Experimental results of the projected work ar bestowed in Section V. Section VI talks concerning conclusion and future scope.

3. Methodology

A. Working principle

The architecture of the proposed system is shown in fig. 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 humps 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 provides timely alerts to the driver.

B. Microcontroller model

This module consists of 4 components, namely, PIC 16F877A microcontroller, ultrasonic sensors, GPS receiver and GSM modem. Ultrasonic sensors are wont to measure the space

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between the automotive body and therefore the paved surface and this information is received by the microcontroller. The distance between automotive body and therefore the ground, on a smooth road surface, is the threshold distance. Threshold value depends on the ground clearance of vehicles and can be configured accordingly. If the distance measured by ultrasonic sensor is greater than the threshold, it is a pothole, if it is smaller, it is a hump otherwise it is a smooth road. The GPS receiver captures the location coordinates of the detected pothole or the hump and sends messages to the registered mobile SIM using GSM modem. This registered mobile SIM is present on the android device that acts as server. The messages sent embrace data regarding depth of the chuckhole or height of the hump and its location coordinates.
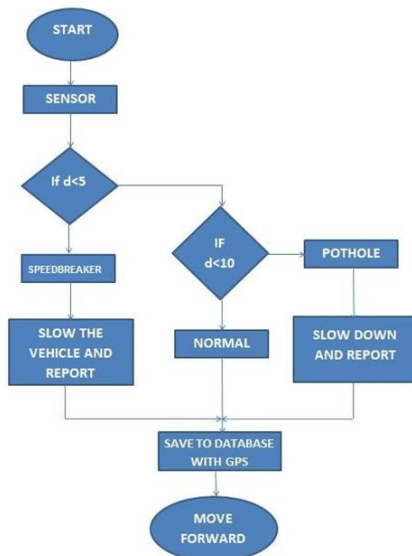
C. Architecture of the proposed system

Fig. 1. Program flow of the system
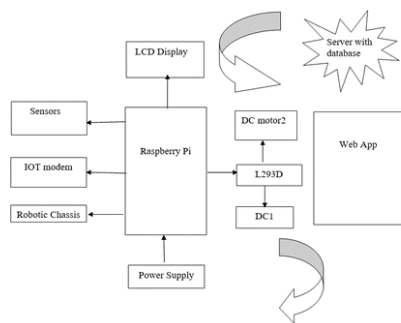
D. Block diagram

Fig. 2. Block diagram of the model

E. Server module

This module consists of 2 parts; the android device and also the DB. It acts as an intermediary layer between the microcontroller module and the mobile application. The server module is implemented as an android application that runs on a device and is responsible for reading messages sent by the registered mobile SIM present in the microcontroller module. It

processes the contents of this message and stores it within the info (cloud). Integrating sensor networks with cloud and Internet of Things, it is possible to allow broader access to sensor data.

F. Mobile Application Module

This module is enforced as Associate in Nursing robot application that's put in on the vehicle driver's itinerant to produce timely alerts concerning the presence of potholes and humps. Figure shows the workflow of this application. The application continuously runs in the phone background. It initial captures this geographic location of the vehicle then accesses the locations of potholes and humps keep within the server information. The distance between the vehicle location and also the pothole location keep in information is computed. If the gap between the 2 is inside a hundred meters, Associate in Nursing alert message pops au fait the mobile screen. This message is attended with Associate in Nursing audio beep in order that the motive force will differentiate it from different flash messages. Do not confuse "imply" and "infer".
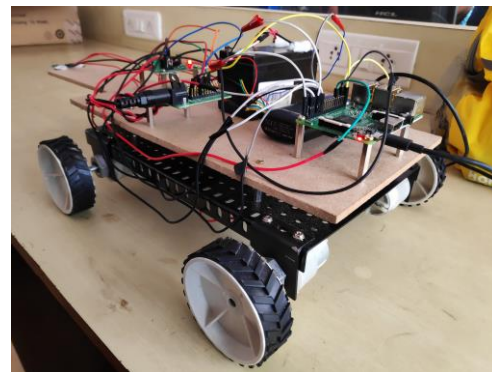

Fig. 3. Model of proposed system

4. Conclusion

The proposed system basically serves two purposes it automatically detects the humps and potholes and sends the information regarding this to the vehicle drivers so that they can avoid accidents. This is the cost effective solution for detection of humps and potholes. This system helps us to avoid dreadful potholes and humps and hence to avoid any tragic accidents due to bad road conditions. The information can also be used by the government authorities for the maintenance. The system can be further improved by providing voice messages to alert the driver.

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