Road Irregularities Detection and Driver Alert System

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Abstract— Significant steps have been made towards driverless cars in the last couple of years. Nowadays car’s often possess cameras. They are able to alert the driver in the event of a not signalized lane change, follow lane markers, Because of numerous factors like exceptional climate conditions and vigorously stacked vehicles and different variables the streets are for the most part harmed. To monitor these lopsidedness and damages of the street we are going to make a module that is equipped for finding the potholes and speed breakers in the street dependent on the values read by ultrasonic sensor and afterward utilizing an on-board Wi-Fi module to transmit the area of the street anomalies that are controlled by utilizing the GPS module. All these modules are interfaced utilizing microcontroller. The information that is gathered is moved to the cloud stage. Here the information is spoken to in type of plots. The information gathered is given to java script reader to represent these locations on the map. This guide format can be utilized in Infotainment gadgets in automobiles which alarms the driver. To distinguish speed breaker and potholes, ultrasonic sensors are utilized and we are also utilizing a worldwide situating framework recipient (GPS collector) for distinguishing proof of topographical area directions of the identified potholes and speed breaker. The information which is detected by the ultrasonic sensors incorporates land area, the tallness of speed breakers and profundity of potholes, which is spared in the nearby and cloud database.

Keywords— Ultrasonic sensor, GSM module, GPS receiver, Microcontroller.

1.INTRODUCTION

Speed breakers are commonly laid for the wellbeing of the people on foot in private zones and school zones to control the speed furthest reaches of the vehicle, along these lines maintaining a strategic distance from mishaps. Be that as it may, nowadays, numerous quantities of unapproved speed breakers are laid pointlessly, which don't keep the standard size proposed by National Highway Authorities. Speed breakers are normal in creating nations like India, China, Pakistan, and so on the grounds that sign sheets like "stop", "yield" and "speed limit" and so forth. It won’t work because of absence of traffic requirement assets. Despite the fact that there is proof that speed breakers diminish speed related mishaps, there are additionally circumstances causing mishaps and serious wounds. Driver carelessness, the speed of the vehicle, low perceivability at evenings will bring about intersection the speed breaker in more prominent speed.

Potholes, which are grown naturally because of substantial rains and running of over-burden cars, likewise become a most significant purpose behind expanding the potential for punctures, haggle harm, awful mishaps. Due to the quickly increments in the quantity of street accidents, loss of human lives additionally builds step by step. The "Street Accidents in India in the time of 2016", given by the report of the service of street transport and roadways, the nation recorded at any rate 4,80,652 mishaps while 4,94,624 people groups are harmed in 2016 [1]. The all out number of 1,50,785 individuals lost their lives on account of risky street mishaps, the given no. suggests that consistently roughly 413 individuals kicked...
the bucket in 1317 mishaps. Furthermore, these numbers additionally propose that in 55 mishaps around 17 passing's happened because of street mishaps consistently, and almost percent of the absolute loss of life was because of the terrible state of streets.

**FIGURE 1.1 Potholes on road**

Sometimes, when a pothole is so severe, or your car is not equipped to handle the blow, it will cause you to lose control of your car. These lead to car accidents that, many times, have caused wrongful deaths. Motorcycle drivers are at special risk of injury if they ride over a pothole. Having just two wheels on the ground and a lower weight than cars, motorcycles are ill-equipped to handle potholes.

Motorcycle accidents caused by potholes are very deadly. Cars and trucks are also at risk of getting into an auto accident after running over a pothole. With motorcycles, however, the chance of getting into a serious accident when going over a pothole is greatly increased and possibly deadly.

To keep a track of these unevenness and damages of the road we are going to make a module that is capable of finding the potholes in the road based on the variations in accelerometer and then using a on-board Wi-Fi module to transmit the location of the road irregularities that are determined by using the GPS module. All these modules are interfaced using microcontroller. The data that is collected is transferred to the cloud platform. Here the data is represented in the form of plots [2]. The data collected is given to javascript reader to represent these locations on the map. This map template can be used in Infotainment devices in automobiles which alerts the driver.

**II. LITERATURE SURVEY**

It is critical to gather data with respect to these poor street conditions and appropriate the equivalent to different vehicles that thusly help to diminish the mishaps caused because of potholes and mounds [3]. The architecture of this proposed system consists of three parts: Sensing unit, Server unit and User unit, which helps in detecting the humps and speed breakers on roads.

The proposed framework essentially fills two needs: it naturally distinguishes the potholes and bumps and sends the data with respect to this to the vehicle drivers, so they can stay away from mishaps [7]. This is a savvy answer for discovery of potholes and mounds. This framework is successful even in the stormy season when streets are overwhelmed with downpour water just as in winter during low perceivability.

It suggests the two strategies which are answerable for gathering the information about the potholes, mounds and speed breakers those are vision based and vibration based. In Vision based procedure, the camera-based sensor is utilized to identify and examine any inconsistencies of the streets like potholes, bumps, and speed breakers. The Pictures which are caught by the camera based sensor are dissected by the picture preparing calculations which requires more force and focal handling time. In vibrant based
A technique, an ultrasonic sensor uses to detect potholes and speed breakers. The vibrations measured by the ultrasonic sensors while the car going through the uneven roads is detected and sends the alert message about the unevenness of the road to the driver.

Speed breakers are commonly laid for the security of the people on foot in private zones and school zones to control the speed furthest reaches of the vehicle, along these lines maintaining a strategic distance from mishaps [8]. Be that as it may, nowadays, numerous quantities of unapproved speed breakers are laid superfluously, which don't adhere to the standard size proposed by National Highway Authorities that lead to accidents. This empowers to build up an Android application that utilizes the information created out of the current sensors in the Smartphone to alarm the client with respect to knocks and awful streets.

The android administration goes about as a foundation to Google maps and gathers information on the event of speed breakers or awful streets. What's more, an alarm is given to the driver with the goal that they can pick the backup course of action or they can be alert around then.

III. PROPOSED SYSTEM

The proposed framework comprises of four units namely Node-MCU: EP8266 mobile application unit, GPS: NEO6MV2, ThingSpeak. These four units work autonomously. Microcontroller unit gathers all the data about the potholes, protuberances and speed breaker alongside its topographical area. Communication unit gives web availability and furthermore gathers directions of the pothole and disperses the information to different units. Cloud units get all the information Lastly, the mobile application unit utilizes the information and offers data to the driver.

![Architecture of proposed model for Detection and driver alert system about road irregularities](image)

The irregularities in the road are detected using accelerometer. Many accelerometers are present but Ultrasonic sensor is most efficient in terms of cost and performance. The Ultrasonic sensor used here is HC-SR04. Ultrasonic sensors are utilized to recognize the speed breakers and potholes alongside their statures and profundities respectively. GPS is utilized to discover the area of potholes and speed breakers.
[6]. The information hence gathered is sent to cloud stage, where the information is additionally spoken to on maps. The drivers can utilize these maps as a ready framework to dodge mishaps that happen because of potholes and speed breakers [4]. Ultrasonic sensor detects the irregularities using the following technique:

The set threshold is compared with the instantaneous values of sensor data and the potholes and humps are detected. The data from the ultrasonic sensor is stored in the variable ‘distance’

\[
\text{Duration} = \text{pulse In (ECHO, HIGH)};
\]
\[
\text{Distance} = (\text{duration}/2) / 29.1;
\]

Here the threshold is set as 16cm. The Speed breaker and humps are detected using condition:

distance < 9.2cm

The potholes are detected using condition: distance > 22.5cm

The data which is to be given to cloud platform is from the accelerometer i.e, Ultrasonic sensor. The sensor measures the distance between the road and the vehicle base and sends the data to microcontroller. The microcontroller gathers the information from accelerometer and thinks about the information to standard to discover the potholes and speed breakers. This information is then sent from controller to ThingSpeak stage utilizing on-board Wi-Fi module. The data from controller is collected in ThingSpeak platform and stored in form of tables and represented in plots. Here the data from the platform is taken to locate the potholes and speed breakers on a map. The data in ThingSpeak platform is user accessible and can be edited. The GPS data from sensor is sent to cloud platform using node MCU. The location is represented in form of Latitude and Longitude separately.
FIGURE 1.4 Pin out Diagram for proposed model for detection and driver alert system about irregularities of road

The above figure represents the location data of irregularities detected in the road using our system. The field 1 represents the latitude details of the irregularities i.e. Potholes and Speed breakers and the field 2 their respective longitude details. This data can be used by the R&D Transport and road department to develop the conditions of the roads and create safe transport conditions and can reduce the accident rate [5]. Also, they can be accessed and changed anytime by set authorities. The data in the ThingSpeak cloud platform can be periodically updated and the data in the google maps can also be changed accordingly.

RESULTS

From the proposed system for detection of irregularities and driver alert system we have created a module that uses an ultrasonic sensor to detect the road irregularities and can be used to create an alert for the user by marking the location on google maps using JavaScript coding. The result of the system is shown as below.
FIGURE 1.5 Data of location of potholes and speed breakers in cloud platform

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CONCLUSION
This work proposed an early admonition framework that can alert the driver ahead of time when the vehicle is moving towards speed-breaker and potholes. From the proposed framework for identification of inconsistencies and driver ready framework made a module that utilizes a ultrasonic sensor to recognize the street anomalies and can be utilized to make an alarm for the client by denoting the area on google maps utilizing javascript coding.

References


