

IOT based Potholes and Drainages Detection System

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Abstract—Accidents owing to potholes has become an alarming problem in today's life. The first step to solve this problem requires, designing a device embedded on the vehicle which can continuously scan the road surface for identifying potholes, alerting the driver in time and enable the driver to avoid the pothole. The importance of the road infrastructure for the society could be compared with importance of blood vessels for humans. The major problems in developing countries are the maintenance of roads. To ensure road surface quality it should be monitored continuously and repaired as necessary. The optimal distribution of resources for road repairs is possible providing the availability of comprehensive and objective real time data about the state of the roads. The data in the system can be made available to the general public as well as municipalities and road maintenance agencies. Awareness of the location of potholes will help drivers to avoid those roads and being more careful while driving on the same roads. The paper is describing a custom map system for road irregularity detection using Android based smart-phones.

Identification of pavement distress such as potholes and open drainages not only helps driver to avoid accidents or vehicle damages, but also helps authorities to maintain roads.

Keywords—Potholes, Pavement, humps, Smart-Phones

1. INTRODUCTION

Number of vehicle on the roads has increased enormously in the last decade. India being a developing country, construction and development of infrastructure is still in progress. This ever growing number of vehicles combined with the lack of infrastructure makes the road difficult to drive upon eventually leading to accidents. This paper proposes a pothole detection system which aims at prior warning to the drivers about the uneven roads and potholes on the way. Roads are most significant part of the

Country. Good road plays important role in transportation sector like transporting, traveling, import, export, etc. It has effect on the standard of driving and transportation that increase the event level of entire country. In priority of roads maybe a huge draw-back for the vehicle still as drivers.

The economy can depend upon transportation; however, the most of the roads in India are slim and cram-full with poor surface quality. Road maintenance are not satisfactory. The traffic conditions in developing countries are more complicated due to varied road conditions, a heterogeneous mixture of vehicles and chaotic traffic. To avoid road accidents it'll necessary that to enhance road quality however as per the norms of government in India. Roads in India unremarkably have speed-breakers in order that the vehicle's speed will be controlled to avoid accidents, owing to our system we tend to also have in definable potholes that created like as hot once of completion of the road. It's a significant reason for traumatic accidents and loss of human lives. Consequently, road evacuation and chuckhole navigation system are important solutions to improve accidents and shield vehicles from injury due to bad roads.

In the perspective of "Internet of things", numerous devices and objects will be connected to the Internet. Each individually provides data, information, or even services. The devices providing things can be personal objects we carry around such as smart phones, tablets, and digital cameras. Our daily environment, home, vehicle, or office connected through a gateway device can also provide "things". The Internet of Things can be viewed as a gigantic network consisting of sub networks of devices and computers connected through a series of intermediate technologies.

This paper discusses previous chuckhole detection strategies that are developed and proposes a cheap answer to spot the potholes and humps on roads and supply timely alerts to drivers. Machine learning is employed to seek out the shortest path among all the ways that goes to your destination. During which the map can find the potholes and open drainages in our path. The database MySQL is employed for information. An automaton application is employed to alert drivers in order. that preventive measures be taken to evade accidents. Alerts are given in the forms of messages with an audio beep.

II. LITERATURE SURVEY

R. Fan, U. Ozgunalp, B. Hosking, M. Liu, proposed the concept in this paper like present a robust pothole detection algorithm that is both accurate and computationally efficient. A dense disparity map is first transformed to better distinguish between damaged and undamaged road areas. To achieve greater disparity transformation efficiency, golden section search and dynamic programming are utilized to estimate the transformation parameters.

Rajeshwar Madli, Santosh Hebbar, Praveenraj Patar, G. V. Prasad are the authors that stated a stereo vision based pothole detection system is proposed. Stereo vision can provide information on the size of the pothole, without the need for using high cost specialized laser scanners. A disparity calculation of algorithm, which is used for map generation which results in detection of potholes from the fitted quadratic road surface. The system produces the size, volume and position of the potholes which allows the pothole repair to be prioritized according to its severity.

Byeoung-ho-Kang and Su-il-choi propose the concept to sensing potholes by using 3D laser method. It is a sensing method which uses light pulses to ascertain the surface of earth. The drawback in this method is, it is highly affected by heavy rain, fog, etc. Also does not work well in lathered reflections. The operating cost is high. It requires high end hardware is required. The 3D laser checking is one of the outstandingly flexible and productive advances for precisely catching extensive arrangements of 3D facilities.

This method uses laser pulses to detect the irregularities in broad surfaces

Arties Mendes, Grits Strazdins, Leo Selavo propose the concept of Real Time Pothole Detection using Android Smart-phones with Accelerometers. This paper is describing a mobile sensing system for road irregularity detection using Android OS based smart phones. Selected data processing algorithms are discussed and their evaluation presented with true positive rate as high as 90% using real world data. The optimal parameters for the algorithms are determined.

Kana Azhary, Feerd Murtaza, Muhammad Herboon Mohammed and Hafeed Adman Habit state a new approach of finding and localizing the potholes based on computer vision in aerial pavement images. Histograms from the input images are reclassified using naïve bayes classifier using normalized graph cut segmentation scheme. This experimentation showed 67% accuracy on localizing the potholes from the pothole images.

III. METHODOLOGY

In this methodology, we actualize potholes identification system is a system that goes for notice to the driver about the uneven roads and potholes in its way. We consider the diverse manners by which objective of the framework can be accomplished. We legitimize the techniques that picked in

these undertakings and afterward we give insights concerning the working of the diverse sub.

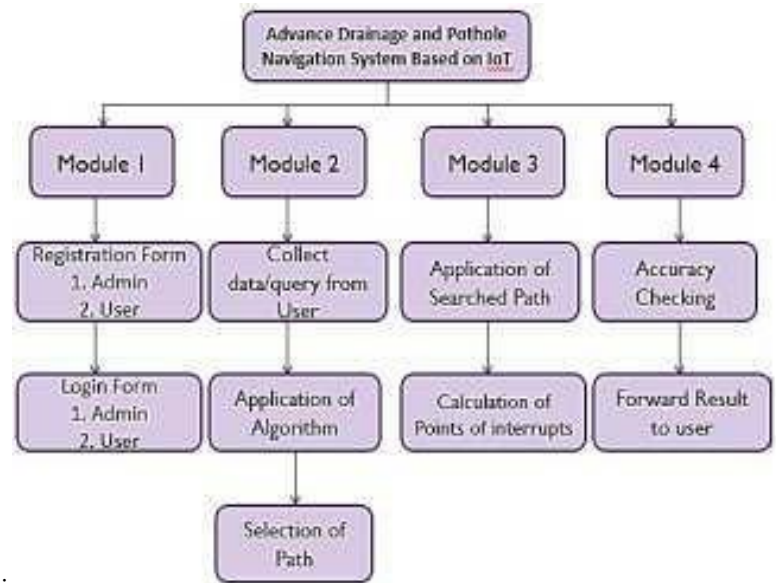


Fig. 1. Architecture

The architecture of the proposed system is shown in figure. It consists of 4 parts; registration and login module, custom map module, weather API module and the mobile application module. Custom map module is used to gather information about potholes and drainage and the geographical locations and this information is sent to the user. Weather API module detects weather information from the particular area. All potholes and drainage and weather API information processes and stores in the database. Mobile application module uses information stored in the all the modules server database and provides timely alerts to the driver in message through.

A. Registration and login:-

We can start with first with registration and then login. So that the admin and user both of will register and login in custom map then admin and user will start the custom map.

B. Custom Map:-

This module consists of three components, firstly in custom map we will collect the query or data from user means where to problem in user to find the potholes and drainage so we will solve the problem. Custom maps with custom markers, lines, colors, polygons, and images. Custom maps with custom markers, lines, colors, polygons, and images are used. It gives the ability to create and share their own custom maps and use properties like zoom, pinch, rotate, etc. To explore, it can highlight your stored locations with custom colors and elements.



Fig.2: Custom Map

we will give the result and android app to used to the user.

C. Weather API:-

In weather API Module we will detect the weather in particular area firstly search the root and then we will detect the weather. Calculate the interrupt points during this weather detecting time. The Yahoo Weather API allows developer to integrate current weather information for any location into third-party applications. Available information includes the next 5-days forecast, wind, atmospheric conditions, precipitation, sunset time, astronomy conditions, and many.



Fig.3: Weather API

D. Support Vector Machine:-

Support Vector Machine (SVM) algorithm we can use to find the potholes and drainage and random forest algorithm is used to backup plan. Third component we will set destination and then we can select the path. SVM is used for supervised, in machine learning, SVM are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis.

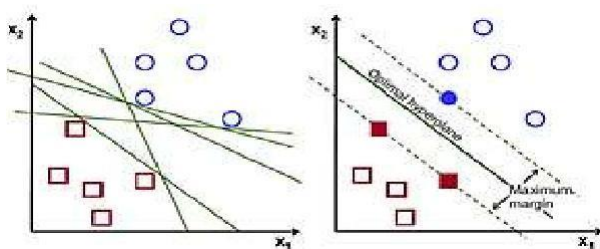


Fig.4: SVM Supervision

E. Mobile Application Module:-

We will make mobile application module. In this application all modules information stores and process in database. This module can check the accuracy like all module are working or not. The all type of problems we can check and solve these problem and then finally

F. Android Application:-

An android app is to be developed for this software application. That runs on the android phone. Also try to develop an app for a other OS. Smartphone or tablets PC are required for it to get an easy access.

IV. ALGORITHMS

The following are the efficient algorithm for pothole detection Navigation System Based on IoT.

A. Custom Map Algorithm:-

Step1: Start

Step2: Declare the path.

Step3: Fetch the Path By using SQL

Step4: If user Select path

If short distance > long distance

Display a short way.

Else

Return step2.

Else

If long distance > Low traffic

Display long way.

Else

Return step2.

B. SVM Algorithm:-

Step1: Start

Step2: Declare ways.

Step3: Show the drainage and by using SVM Algorithm.

Step4: Display the warning alert message by using JavaScript.

Step5: Show Custom Maps.

Step6: Stop.

V. AWARENESS

To increase knowledge and awareness among all vehicles driver to avoid the various types of road accident. In a night time, we can't see the potholes and drainage on road, cause of light problem. Also in daytime, sometimes we can't see the potholes and drainage because of speedy vehicles. To avoid this problem, we develop this app. By using custom map, we can identify all the drivers and we can minimize the number of accident in all over the India as well as in world.

As per ancient record of the road accident in very few years ago, most of the road accident reasons are due to the potholes, drainage and the very fast speed vehicles. Especially in India, every day most of the accident in twenty to thirty-five age group people. So we make the custom map to detect the potholes and drainage and it sends the message to driver and alert the driver through the beep, so that he can see the ahead for the potholes or drainage.

VI. FLOWCHART

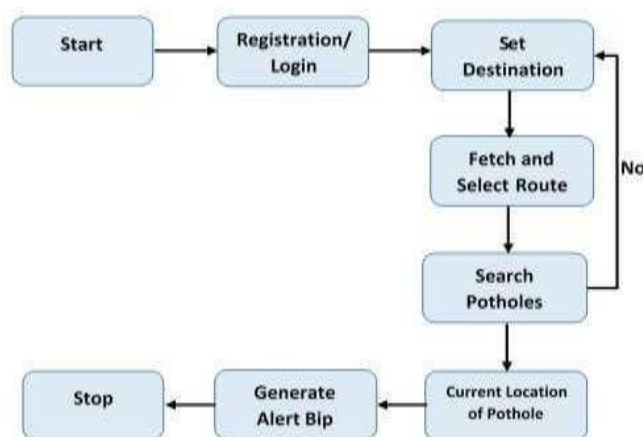


Fig.5: Flow chart of proposed system

VII. LIMITATIONS

1. It is easy to detect pothole and drainages on road.
2. Easy to find out current road information.
3. In form about traffic and accidents by using navigation system.
4. It is very helpful to respected company like NHAI (National Highway Authority of India) for re-planning related to any engineering work of road.

VIII. ACKNOWLEDGEMENT

To develop a "Advanced Drainage and Potholes Navigation System by using IoT". This system using quick response to user and quickly notification to user from custom map. Detect the potholes and decrease the accident.

IX. CONCLUSION

The model proposed in this paper, serves two important purposes; automatic detection of potholes and bumps and alerting vehicle drivers to evade potential accidents. The proposed approach is an economic solution for detection of dreadful potholes and uneven bumps, as it uses low cost ultrasonic sensors. The mobile app used in this system is an added advantage as it provides timely alerts about potholes and bumps. The solution also works in rainy season when potholes are filled with muddy water as alerts are generated using the information stored in the database. We feel that the solution provided in this paper can save many lives and ailing patients who suffer from tragic accidents.

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