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DESIGN AND IMPLEMENTATION OF INTELLIGENCE SYSTEM FOR POTHOLES DETECTION USING LABVIEW

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ABSTRACT

Vehicles are an important way of transportation all over the world. There are many cases of road accidents every day in the world. Such accidents are the main reason for traffic jams on road, consequently resulting in a loss of valuable time. One of the main problems in developing countries is the maintenance of roads. Well maintained roads contribute a serious portion to the country's economy. Identification of pavement distress like potholes not only helps drivers to avoid accidents or vehicle damages. The frequency of road accidents is extremely high which causes tons of injury to human life and valuable properties. The number of accidents is extremely high in hilly and fog affected areas. Many road accidents are caused by a collision between vehicles due to the inability of the drivers to gauge the perimeter of their vehicles and the other reason is unawareness of nearby vehicles. This project introduces a GPS based system that actively and continuously sends vehicle location coordinates (latitude/longitude) to the LabVIEW, which processes/analyses data from all such vehicles and predicts potential collision and sends back alert, to the vehicle to raise visual/sound alert.

Keywords: *Potential Collision, Accidents, Potholes, GPS, LabVIEW.*

I. INTRODUCTION

India the second-most populous country in the World and a quickly growing economy is understood to possess a gigantic network of roads. Roads are the primary means of transportation in India today. They carry nearly 90 percent of the country's passenger traffic and 65 percent of its freight. However, a large percentage of roads in India are narrow and congested with poor surface quality and road maintenance needs are not satisfactorily met. No matter where you're in India, driving is a breath-holding, multi-mirror involving, potentially life-threatening affair. Over the last 20 years, there has been a tremendous increase in the vehicle population. This proliferation of vehicles has led to problems like traffic jams and an increase in the number of road accidents. The pathetic condition of roads

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is a boosting factor for traffic jams and accidents. Researchers are working within the area of traffic congestion control, an integral part of vehicular area networks, which is the necessity of the hour today.

Roads in India normally have speed breakers in order that the vehicle's speed is often controlled to avoid accidents. However, these speed breakers are unevenly distributed without proper standards. Potholes are formed due to heavy rains and the movement of heavy vehicles, which also become a serious reason for traumatic accidents and loss of human lives. consistent with the survey report "Road Accidents in India, 2011", by the ministry of road transport and highways, a complete of 1,42,485 people had lost their lives thanks to fatal road accidents. Of these, nearly 1.5 percent of nearly 2,200 fatalities were thanks to the poor condition of roads. This project introduces a GPS based system that actively and continuously sends vehicle location coordinates (latitude/longitude) to the LabView, which processes/analyses data from all such vehicles and predicts potential collision and sends back alert, to the vehicle to boost visual/sound alert.

II. EXISTING SYSTEM

In the existing system techniques are used in the entire road traffic detection system, it uses a mobile sensing system for the road detection using Android OS based smart-phones. Selected data using processing algorithm 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 as well as recommendations for the algorithms are determined as well as recommendations for their application.

Primary data from the accelerometer is collected using a Lynx collar device which is modified in way to collect the required data on a road with various potholes. MansOS based software was used for raw accelerometer data acquisition and transmission through USB interface to a laptop computer.

After the acquisition of the initial data set, a search for potential event related features will be performed.an algorithm is obtained using visual tools and searching for similar pattern which will be notified in the android phone.

2.1 LIMITATIONS OF EXISTING SYSTEM

The existing system even though, has been proven to be a very efficient system it does have some shortfalls.

1. The system does not have accurate detection of potholes since it is based on algorithm.
2. The system does not give real time update of any new potholes formed since it uses pre acquired data.
3. The detection of potholes is notified in smartphones which is not safe to use while driving. So, it's not driver friendly.

In order to overcome the shortfalls of the existing system, we propose a system with real time detection using ultra sonic sound and LabVIEW to monitor the data.

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III. PROPOSED SYSTEM

The proposed system introduces a GPS based system which actively and continuously sends vehicle location coordinates (latitude/longitude) to the LabView, which processes/analyses data from all such vehicles and predicts potential collision and sends backs alert to the vehicle to raise visual/sound alert.

This system of pothole detection methods that have been developed and proposed is a cost effective solution to identify potholes on roads and provide timely alerts to drivers to avoid accidents or vehicle damages. Ultrasonic sensors are used to detect the potholes and the information will be updated in the LabView. If any car travels in the same location, the potholes wherever present in the road will be intimated to the corresponding vehicle from the LabView.

The system consists of a SMPS which converts 230V AC to 12V DC and that 12V DC will be converted into 5V using a regulator which is connected to a PIC16F887 Pic microcontroller. A pot is fixed in order to change the location and LabVIEW is connected using CH340 cable.SRF005 ultrasonic sensor is used to detect the pothole.

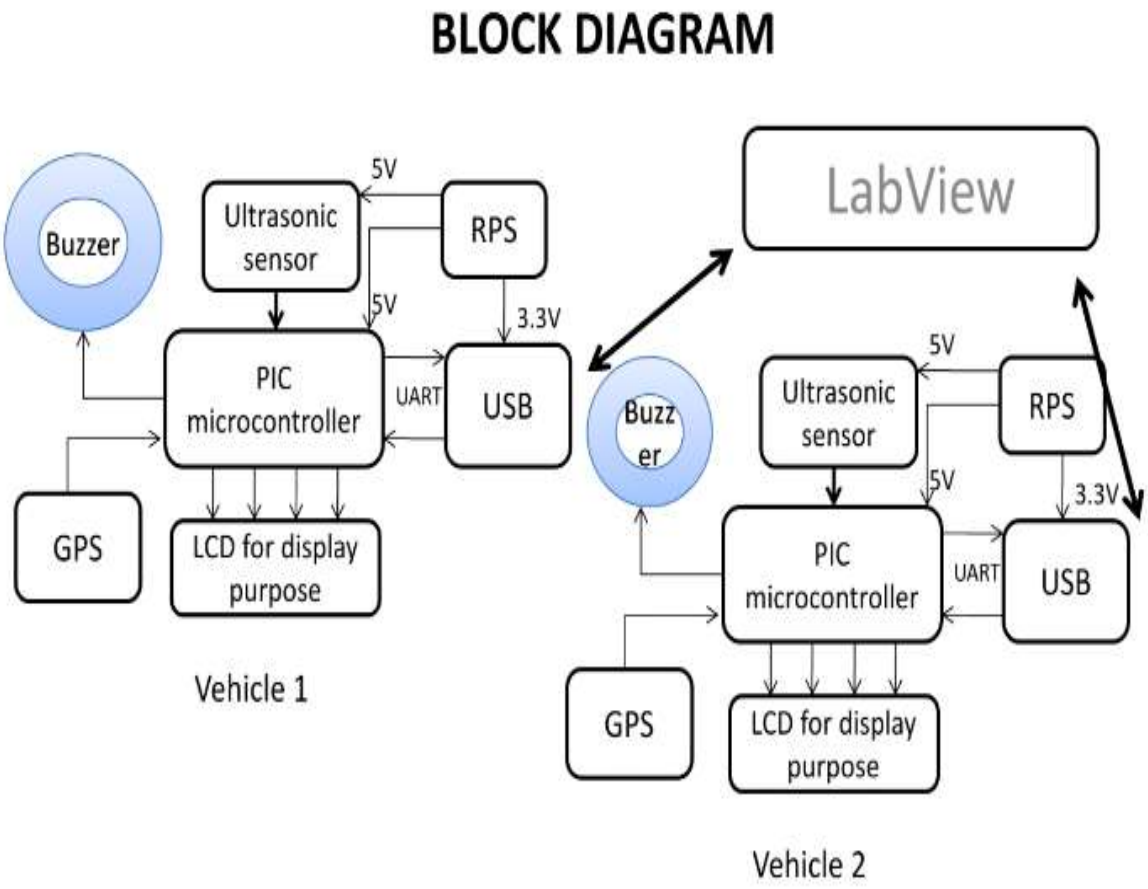

Fig.1 Block Diagram of Intelligence System for Potholes Detection Using LabVIEW

There will be 2 vehicle modules which has similar setup.5 locations will be fed L1, L2, L3, L4, L5. The pot will tuned to the location needed from L1 to L5. When any one of the vehicle detects potholes through ultrasonic

sensor SFR005 where the vibration signals will be sent and received the collected data will be incorporated in the microcontroller which is being programed to alert the driver using the buzzer sound. Once the pothole is detected from vehicle 2 the buzzer is will turned on and the location the chicle and the distance will be displayed on the LCD screen.

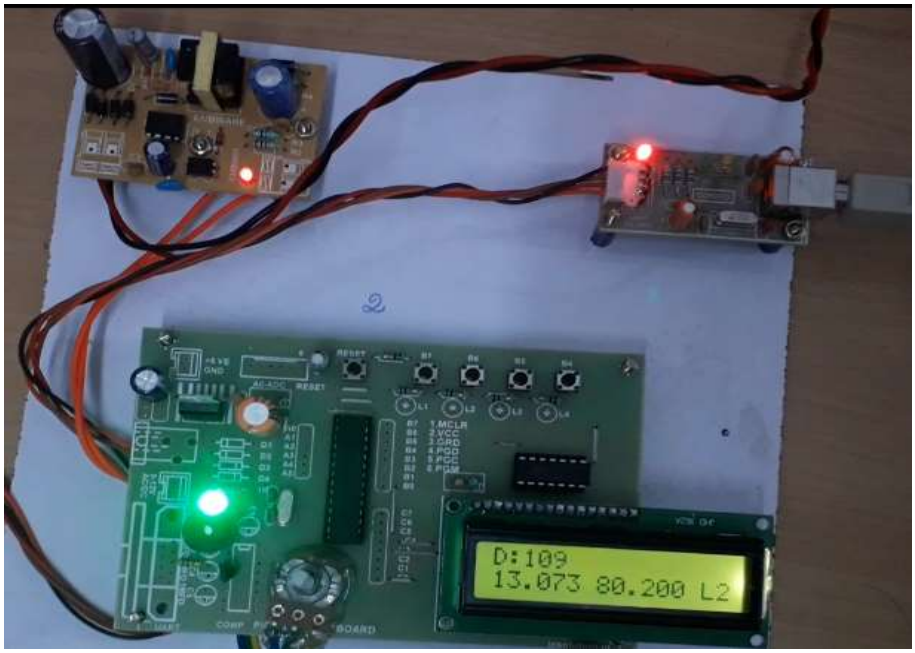

Fig 2 Hardware Implementation of Intelligence System for Potholes Detection Using LabVIEW

Once the location is detected from the sensor it will be processed to the LabVIEW program will display the location that the vehicle one is present, let's take L2. When the vehicle 1 starts moving and touches either the location L1 or L3 the potholes location will be notified to vehicle 1 through buzzer and will be displayed on the LCD screen.

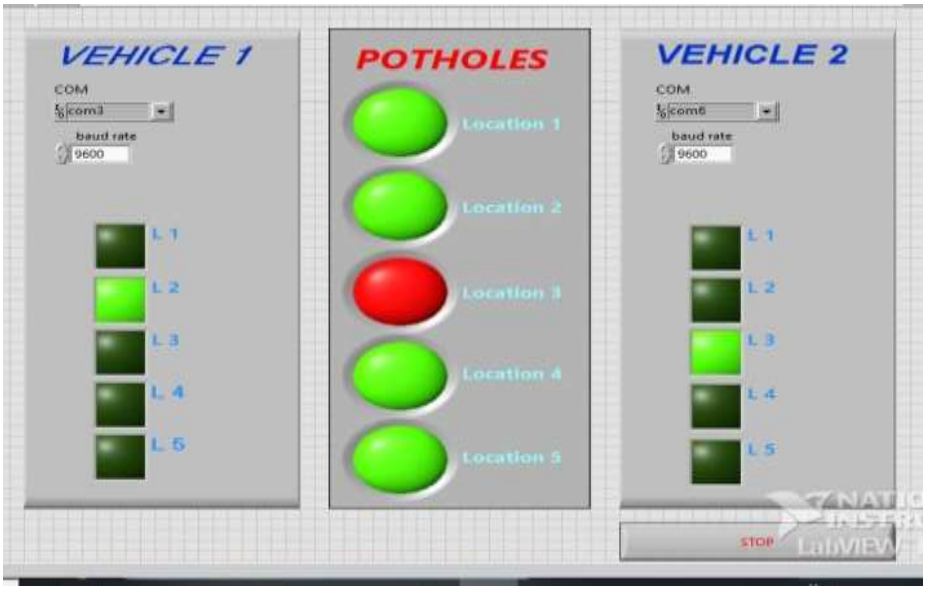

Fig 3 LabVIEW Front Panel of Intelligence System for Potholes Detection

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The system has multiple advantages such as:

- Due to automation the human efforts are reduced and it also will lead to decreased number of errors.
- It gives the forecasting information on the affects of the end user which will lead to better results.
- The system will have accuracy since it is based on live information and not on algorithm.
- Minimalistic design and cost effective since only few components are used.
- It will be able to detect both potholes and humps with the help of ultrasonic sensor.
- It is less time consuming as most of the process is automated.
- It is very user friendly since it has a simple design which can be used be everyone.

The detection of potholes can be implemented for various purpose.

- Detection of pothole data can be used for the surveillance of the road safety and quality measures.
- It can be used in day to day life in common vehicles which will inform them about the potholes and lead them to safer path.
- It can be used for detecting potholes even during rainy season.

IV. CONCLUSION

The model proposed in this project 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. It provides timely alerts about potholes and humps. 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 project can save many lives and ailing patients who suffer from tragic accidents. The proposed system considers the presence of potholes and humps. However, it does not consider the fact that potholes or humps get repaired by concerned authorities periodically.

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