Detection and Identification of Potholes Using Microcontroller

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Abstract- *One of the major problems in developing countries is maintenance of roads. Well maintained roads contribute a major portion to the country's economy. Especially the accidents of two wheelers have been proved extremely hazardous.Our idea focuses on development of prototype which comprises of microcontroller, UV sensor and WIFI Modem that processes to alert the two wheeler driver using an interface by developing a software application in android.*

***Indexed Terms-** UV Sensor, PICMicrocontroller, WIFIModule, PS.*

I. INTRODUCTION

With the increase in world's population, there has been increasing load on the infrastructure. Roads have been flooded with the vehicular traffic. It has become increasingly difficult to manage this traffic. India is considered one of the fastest developing countries as of today. India's road network is gigantic, giving it a thought about the condition of the roads. Roads indirectly contribute to the economic growth of the country and it is extremely essential that the roads are well built and strong.

Roads are normally placed with speed breakers that are used to control the speed of the vehicle. But these speed breakers have been a cause of accidents because a definite dimension is not followed throughout. Likewise, potholes are formed due to oil spills, heavy rains and also due to movement of heavy vehicles. These bad road conditions are troublesome to especially two wheeler's, affect the quality of driving and also consumes more fuel. Hence, in this paper we have proposed a system for two wheeler's that would notify the drivers regarding any hurdles such as potholes and humps and this information can be used by the Government to correct these roads effectively.

II. MAIN IDEA

Most existing vision based pothole detection systems uses 2D images and require high resolution cameras. Owing to high resolution cameras, the cost of thesystem increases significantly. Moreover, the processing of images obtained require time for analysis. This system also requires image enhancement. In this project, we propose to use an ultrasonic sensor for pothole detection (two wheelers). The ultrasonic sensor measures the distance in analog format which will then be converted to digital format using ADC. The geographical coordinates of the pothole's location obtained through GPS and its depth will then be collected and stored as data in the developed android app. This system is durable and accurate. It can also be used over a wide range. The overall cost of the system is considerably cheap. The size also is conveniently small.

III. METHODOLOGY

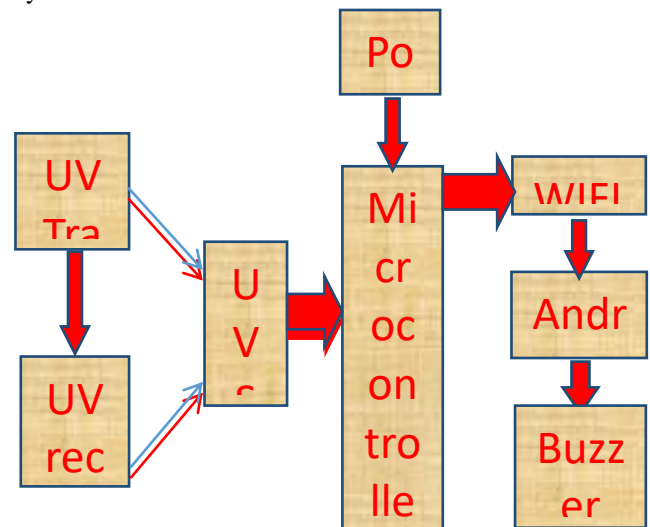This section shows the overview of the proposed system.

Fig 1.1: Flowchart of system.

The UV sensor comprises of UV transmitter and UV receiver. This Ultrasonic Sensor continuously measures the distance between it and the road. When there is a pothole, the distance increases and it is detected by the sensor. The PIC Microcontroller is interfaced with UV sensor which acts as brain of system. Further, the Microcontroller will send a buzzer as well as voice message to the mobile through a WIFI module. Thus it will alert the driver. Also the data comprising of depth of pothole detected and its geographical coordinates will be collected in the database of mobile by developing an Android application.

IV. Hardware components

1. PICMicrocontroller (PIC16F877A):-It is one of the most renowned and cost effective microcontrollers in the industry. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology.
2. Ultrasonic sensor: The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module. Ultrasonic sensor module provides 2cm - 400cm non-contact measurement function and the ranging accuracy can reach to 3mm.
3. WIFI Module (ESP8266):- The WIFI module will transmit the information to the user mobile.
4. Power supply: A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load.

V. Software requirements

1. The PIC microcontrollers is programmed by the embedded C language or assembly language by using appropriate dedicated software.
2. An Android app is required to be developed in order to create a database of the potholes detected. This database will have detailed potholes history along with its coordinates (which

would be received from GPS) which would help the user to manipulate in future course of action.

VI. FUTURE SCOPE

On a larger scale, we can enhance this prototype for the betterment of the society. The locations that were detected by the vehicles will be stored in a database. This database will give us the depth and the exact location of the pothole in any given area. The municipal authorities can access this data and get the locations of the potholes that were detected. Furthermore, they can check the severity of the pothole by analyzing the depth that was recorded in the database. They can send the assigned personals to repair the pothole in that given area. This will ensure safer roads and smooth navigation of traffic.

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