DETECTION OF POTHOLES AND HUMPS

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Abstract- *Now a days many automobile companies are working on projects in the field of vehicular intelligence. They are working in the direction of providing driver with relevant information about the potholes and humps on the roads. In this paper, we propose a arduino based module used for Pothole Detection and Warning System which assists the driver in avoiding potholes on the roads by giving prior warnings. The system consists of ultra sonic sensors placed on the exterior of the vehicle for broadcasting data, which alerts the driver by raising an alarm and displaying the distance on the display (lcd panel).This will help the drive to take major decisions on going left or right. Avoiding any major damages or accidents.*

Key Words: Ultrasonic distance sensor, Breadboard, threshold distance, Buzzer, Arduino Uno

1. INTRODUCTION

In this couple of decades, the automobile industries have put tremendous effects to make the vehicles much safer and reliable. All the efforts have only one similar type of goal and that is to reduce the number of accidents, and one of the major reasons of accidents are potholes. A pothole is defined as irregularities on the surface of the road. With the climate change such as heavy rain and other factors like cheap quality of material used, poor maintenance of road leads to the increase of the potholes. Humps, which are usually laid on the road to reduce the speed of the vehicles can also damage the vehicles if the driver is not attentive enough. Here, we will make a prototype model which wil help the driver of the vehicle to avoid or reduce speed when the pothole or hump is in its proximity.

This is done by alerting the driver of the vehicle by a buzzer. We will be using ultrasonic sensors to detect pothole or hump because in rainy season or at night time they are not clearly visible. If not all at least few accidents can be avoided using this.

2. RELATED PROJECTS

There are number of researchers who have worked on detecting the potholes as well as humps using different methods. Pothole Detection and Inter Vehicle Communication [1].In this they build a robot vehicle which will detect the potholes and then transfer this information to the near by vehicles. They will detect potholes with minimum depth of 1 inch and will share this information to the other nearby vehicles within 100 m range using Zig Bee module. Obstacle Detection Using Ultrasonic Sensor for a Mobile Robot[4]This is a obstacle avoidance project using Ultrasonic Sensor for mobile robot using Arduino Uno. Development and Analysis of Pothole Detection and Alert based on Node MCU[3].This project deals with the detection of potholes using Ultrasonic Sensor and then after detecting it will send its location via mail to a road Development Authorities. The location is shared using GPS and IFTTT server. Role Of Ultrasonic Sensor in Automatic Pothole and Hump Detection System[5].In this they detect the potholes and humps and save this information in server and will try to reduce the speed of the vehicle. GPS is used to find the location of the pothole.

3. TECHNICAL COMPONENTS OF THE PROPOSED SYSTEM

In this we will study about the used in this model to detect the potholes and humps.

A.   Arduino Uno

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the
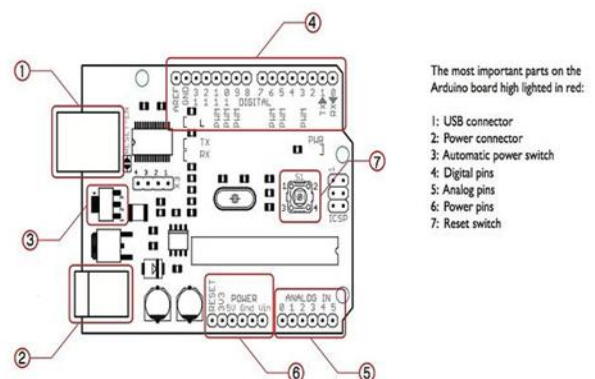

Fig 1.Arduino structure

Microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

B. Ultrasonic Distance Sensor

The HC-SR04 **ultrasonic distance sensor** uses SONAR to determine the distance of an object. There are only four pins on the HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground).
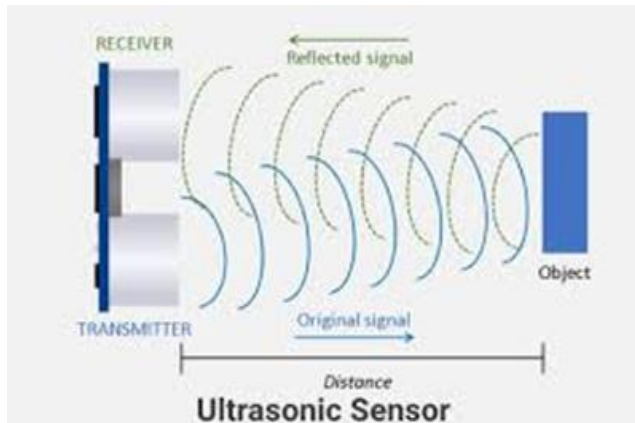

Fig 2. Working of a Ultrasonic Sensor

Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor. 4. Ground. This pin is connected to the Ground of the system.

C. LCD Display

-This is a basic 16 character by 2 line Alphanumeric display used for projects. It shows black text on Green background. It utilizes the extremely common HD44780 parallel interface chipset.

D. Buzzer

Buzzer is used to add the sound feature. It is light in weight.

Good performance, general purpose musical buzzer are commonly used in alerting / alarming circuits, kids toys etc.. This buzzer is used as an external buzzer which operates in wide range of voltage (3V to 12V). Most commonly used buzzers operates in at 9V & 12v. They have long life, stable performance, High Quality with the SOT plastic package.

E. Breadboard

Breadboard is a way of constructing electronics without having to use a soldering iron. Components are pushed into the sockets on the breadboard and then extra 'jumper' wires are used to make connections.

F. Potentiometer

Potentiometers also known as POT. They are nothing but variable resistors. They are used as they can provide a variable resistance by simply varying the knob on top of its head.

4. PROPOSED MODEL

To implement this project we are using Ultrasonic Sensor .We need two Ultrasonic Sensor one for pothole detection and one for hump detection.

Block diagram of the project is giving the brief idea about the components used and how the components are connected so that it will help us to detect the potholes and humps on the road.
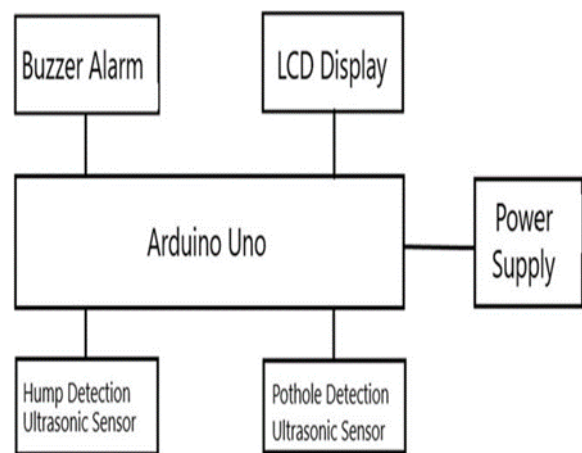

Fig.3 Block diagram

The block diagram of the project shows the all the hardware connection needed for the whole circuit to work.

The block diagram contains all the components needed such as **Arduino Uno**, two Ultrasonic Sensors(one for hump detection and one for pothole detection),a LCD Display to show the distance between the hump and the vehicle or pothole and the vehicle, the Buzzer to alert the driver, and the ,most important is Power Supply to make all the hardware work.
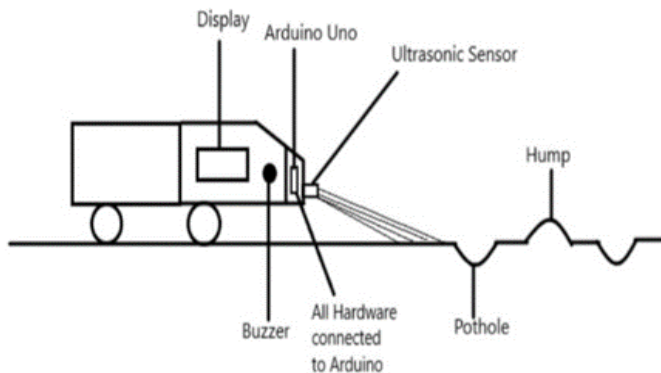
fig.4 working of Project

Figure 4. shows the working of the model.

The sensors will get activated only when the car is started as is in motion.

After that it will detect the potholes and humps and will display it on the LCD screen and if the pothole is large it will alert the driver with the buzzer.

For Potholes Detection Using Ultrasonic Sensor

1. After the activation of Ultrasonic Sensors the 'Trig' pin of the Ultrasonic Sensor will transmit the signal and 'echo' pin will receive the signal.

2. If it takes longer time for the signal to be received by the 'echo' pin of the Ultrasonic Sensor then there is pothole i.e. if the distance is greater than **threshold distance**.

For Hump Detection using Ultrasonic Sensor

•   Ultrasonic sensor will measure the distance between the hump and the vehicle.

•   The distance measured is compared with the set threshold. If the distance is lesser than the set threshold it will detect it as hump.

•   The distance will between the hump and the vehicle will be seen on the LCD screen and alert the driver about the same simultaneously.

5. CONCLUSION

Research on the Pothole and Hump detection in real time using Ultrasonic Distance Sensor was successfully done.

Components are bought and set up successfully.

6. REFERENCES

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