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SMART ROADS: POTHOLE AND SPEED BUMP DETECTION SYSTEM USING IOT TECHNOLOGY

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ABSTRACT-Several automakers are now working on projects aimed at making automobiles intelligent. Serious attempts are being made to provide cars with correct information regarding road fissures and impediments. This study demonstrates an Arduino-based module for pothole tracking and alerting systems. The module provides messages to drivers ahead of time to help them avoid potholes on the road. The ultrasonic sensors are located outside the car and are part of the data transmission system. It informs the motorist with an alarm and displays the distance on an LCD screen.This increases the likelihood that people may make critical decisions such as turning left or right, which could result in serious injuries or events.
Key Words: Ultrasonic distance sensor, Breadboard, threshold distance, Buzzer, Arduino Uno

I. INTRODUCTION

In recent decades, the auto industry has made great progress in making cars safer and more reliable. Because potholes are a major source of accidents, all efforts are focused solely on reducing the number of accidents. To put it simply, potholes are any bumps or holes on the road surface. Potholes get larger as roads are not effectively maintained, rainfall increases due to climate change, and other factors such as the use of low-quality materials exacerbate the situation. If a driver fails to pay attention to speed bumps, which are normally installed to help traffic flow, they risk damaging their vehicle. In this step, a test model will be created to enable drivers notice when potholes or humpbacks are approaching and slow down accordingly.

This is accomplished by activating an alarm to alert the person inside the vehicle. There will be ultrasonic monitors installed to detect potholes and humpbacks, which are difficult to notice at night and when it rains. This can prevent nearly all accidents, if not all of them.

II. RELATED PROJECTS

Many specialists have devised various methods for finding craters and humps. Finding potholes and communicating with other drivers [1].To accomplish this, they create a robot capable of detecting obstructions and communicating this information to neighboring cars. Using a Zig Bee module, they will alert other automobiles within a 100-meter radius to the presence of craters with a minimum depth of one inch. Obstacle Detection for Mobile Robots Using Ultrasonic Sensors[4]In this Arduino Uno project, an ultrasonic sensor is utilized to help a mobile robot avoid obstacles. The usage of Node MCU to detect potholes, transmit notifications, and conduct research [3].An ultrasonic sensor is utilized to identify defects in this creation. The location of a discovered pothole is notified to the personnel in charge of road development via email. The position is transmitted via GPS and the IFTTT server. The automatic pothole and inclination detecting gadget uses ultrasonic sensors [5].Identification tags on speed bumps and craters transmit data to the server and attempt to decelerate the vehicle. To locate the hole, GPS equipment is utilized.

III. TECHNICAL COMPONENTS OF THE PROPOSED SYSTEM

The way this approach detects gaps and other issues is intriguing.

Arduino Uno

It includes an ICSP header, a power port, a USB connection, six analog inputs, a 16 MHz crystal oscillator, fourteen digital input/output pins (six of which can generate PWM outputs), and a reset button. It includes everything you need to back up

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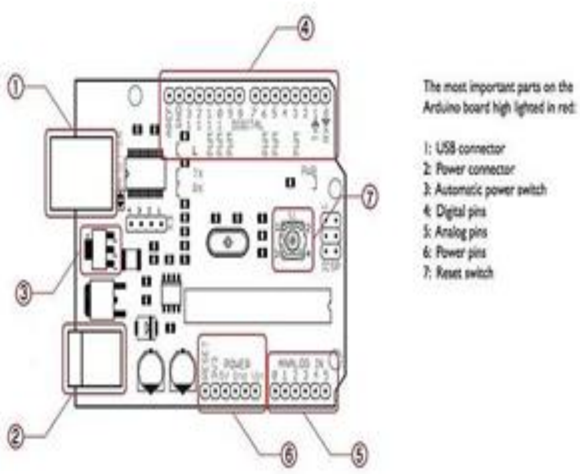

Fig 1.Arduino structure

Connect the microcontroller to the PC via USB. You can power the device with either an AC-to-DC adaptor or a battery.

Ultrasonic Distance Sensor

The HC-SR04 ultrasonic distance tracker uses SONAR to determine how far away something is. The HC-SR04 has only four ports: GND (ground), VCC (power), Trig (trigger), and Echo (receiving).

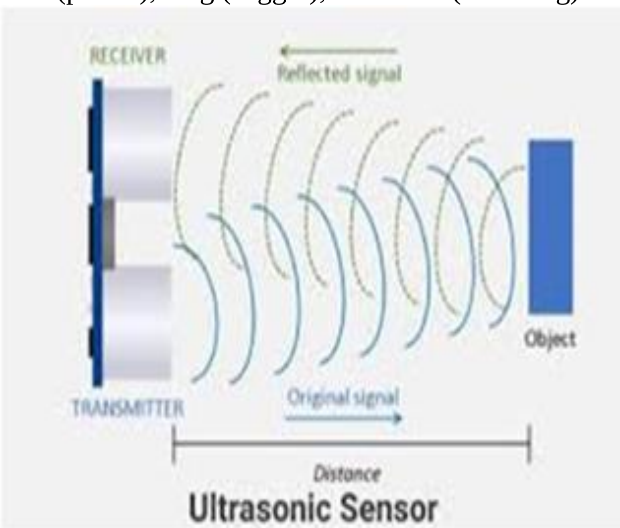

Fig 2. Working of a Ultrasonic Sensor

An output port is an echo pin. The elevation of this pin corresponds to the time it takes for the US wave to return to the sensor. 4. Belowground. This connector is used to connect the machine's ground.

LCD Display

This simple two-line display with sixteen characters and numbers is suitable for project use. It features a green background with black text. It makes use of the widely used HD44780 parallel interface chipset.

Buzzer

Use an alarm to create noise. It has a reasonable weight.

High-performance general-purpose melodic buzzers are commonly employed in alarm systems, children's toys, and other similar situations. This outdoor alarm can work with voltages ranging from 3 to 12 volts. Buzzers are most commonly used at 9 and 12 volts. They always perform the same manner, are of the best quality, and come in SOT plastic packaging.

Breadboard

A soldering iron is not required when creating circuits on a breadboard. Extra lines dubbed "jumper" are used to connect components after they have been plugged into the breadboard's sockets.

Potentiometer

Potentiometers can also be referred to as POTs. In this situation, they are simply replaceable resistors. People utilize them because a knob on the top of the caps may be twisted to adjust the level of resistance.

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IV. PROPOSED MODEL

Ultrasonic sensors are assisting us with our research.There should be two sound sensors: one for humpback whales and one for potholes.
The project's block plan provides a brief explanation of the components and how they relate to one another, making it easier to identify difficulties and issues along the process.

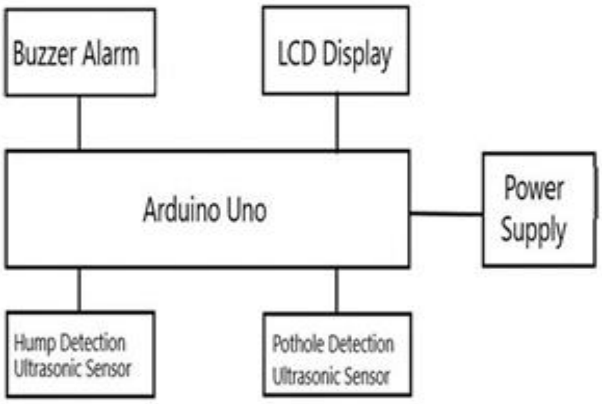

Fig.3 Block diagram

The project's block diagram depicts every hardware link required for the circuit to function as a whole.
The block diagram includes an Arduino Uno, two ultrasonic sensors (one for finding hump and one for finding potholes), an LCD display that shows how far away a hump or pothole is from the automobile, a buzzer that alerts the driver, and, most significantly, a power supply to operate the electronics.

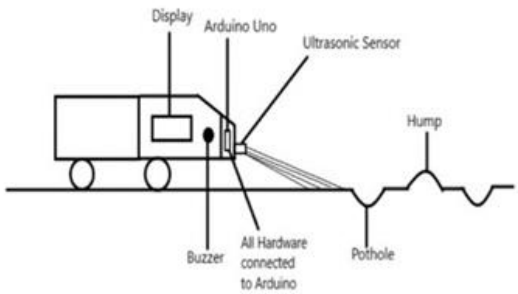

fig.4 working of Project

- For the sensors to function while in motion, the vehicle must be started.
- Following that, any bumps or holes will be detected and displayed on the LCD. If a crater is particularly large, an additional warning will sound to alert the driver.
- So defects can be detected using an ultrasonic sensor.
- When the ultrasonic devices are powered on, a signal is delivered from the "Trig" pin and received at the "echo" pin.
- If there is a hole or the distance exceeds the benchmark, the ultrasonic sensor's "echo" pin receives the signal slower.
- Putting in an ultrasonic sensor to detect humps.
- The car's distance from the ridge can be determined using an ultrasonic sensor.
- On the other hand, the observed distance is contrasted with a predetermined limit. If the distance falls below a particular threshold, it will identify the item as a bulge.
- An LCD panel will display the distance between the car and the slope at the same time.

V. CONCLUSION

The use of ultrasonic distance sensors for real-time detection of potholes and ridges proved effective.The items are purchased and properly installed.

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