IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Automatic Obstruction Detection

Kranthi Singam[1 a)], Dhiman Debnath[1 b)], Moyilla Viswas Kumar[1 c)] Prashant Bagde [2 d)]

1 School of Mechanical Engineering, Lovely Professional University, Phagwara, Punjab, India.

2 Associate Professor, School of mechanical Engineering, Lovely Professional University, Phagwara, Punjab, India.

Abstract:

With the advancement in automobile vehicles, automobile industries are heading forward with different upgrades in its technology, which includes a main factor that is safety. So, now a days according to the scenario of road condition all over the world the roads are not totally safe for the two wheelers due to the presence of unwanted potholes as well as invisible humps and speed breakers, especially during the monsoon season potholes as well as humps are sometime not visible because of water blockage in the road. So, our device may be a solution for this type of problem faced by the two-wheeler riders. Using the sensor that can be able to detect the obstruction and warn the rider in advance, so that he can make decision in advance. In this paper we have proposed a circuit that include an ultrasonic sensor which works on an Arduino based module.

1.INTRODUCTION:

Currently one of the major and common problem of our country is the inappropriate drainage network, which is getting worst day by day. So due to these challenges common peoples are suffering in several ways.[1] On those days the two wheeler are possessing some significant problems from the speed breakers, pot openings, and from damage or broken road due to the rain water collected in the road. What are potholes for this the answer is that the potholes are the ones which develop on to any nature of road surface distress or the holes caused on an asphalt pavement that's in depth approximately more than 150 mm . Potholes appear on the road top layer mainly because of the high presence of water dropping from the clouds during the rainy season in the asphalt soil structure and this potholes are also caused because of the heavy vehicles with heavy goods stops in the heavy traffic due to this the pressure increases and forms the potholes. After the rains the Potholes are substantially developed on the roads surface in winter and spring, and the main reason is because water frequently penetrates the top layer and undergoes more down on the asphalts surface during these seasons. So all at once the major problem is the tasks solving the problems in road conservation and also the spotting of potholes.[2] This operation of spotting and identifying the potholes is generally done through manual human eye visual check, where testified engineers check recorded pictures of pavements that are captured using cameras or professional road assessment vehicles The assessment of road surface repair is one of the important task to guarantee and utilize their usability and give maximum safety for the public.[3] Potholes are and can be a seriously concern to the drivers safety and also it concerns the road efficiency. Many researchers and transportation experts have worked and also they attempted to develop the required and appropriate pothole-maintenance systems. There are two most popularly used road surface materials for road pavement are concrete and asphalt. Concrete roads are the ones which is more modern Ly used as they are largely durable when in compared to asphalt roads. Although concrete road surfaces have the advantage of last longer, renewing them is more complicated as they are hectic work to rework on them and costly too. openings or cracks can not only be fixed but also there's entire boards Moreover the paving of the asphalt roads are less costly that means when these roads or compared to the concrete they are very cheap.[3] The main advantages of the asphalt roads are that they provide more of a smooth and comfortable ride to the rider and also provide greater safety because the asphalt roads provide more better traction and also better slip resistance then concrete roads. The asphalt roads also are very good and ideal for country or rural road pavements because of there easy construction and also there good conditions. The one of the main advantage of the asphalt roads are that they are And also the best advantage of the asphalt roads when compared to concrete roads are they can be fixed easily and the time takes is very less and replacing entire pavements is easy in less traffic areas. But the main disadvantage is that the asphalt roads have only about 10 years of lifetime and the asphalt roads must bear laid which means that they must be maintained regularly and they need to be changed more often than the concrete roads this also includes when normally cracks are any small holes can cause huge damage to the loads. Face Deformation means that are resemblant to rutting and results from fragility in one or farther

layers of the pavement. Decomposition is analogous to potholes caused by the advanced breaking up of pavement into small loosened fractions and face faults, analogous to ravelling caused by disgraces during structure analogous to insufficient adherence between the asphalt and total particulate accoutrements So, to overcome the problems of the potholes there are many researchers who came up with devices of making the sensor to make the possibility of with that to identify the potholes in the roadways which are not visible to our eye because of water blockage or any unknown things near them. Problems working in a design which will act as a motorist's alert whenever there's a Speed breaker, potholes or damaged road ahead in the stormy days or whenever the road is blocked with the water gathering. There's a number of researchers who have worked out on detecting potholes as well as humps utilizing distinguishable methodologies. Pothole spotting and inter-Vehicle Communication [3].

So, to overcome the problems of the potholes this project that this group have come up with the idea of making the sensor to make the possibility of with that to identify the potholes in the roadways which are not visible to our eye because of water blockage or any unknown things near them. But with the help of ultrasonic sensor and Arduino based module.

1.1 RELATED PROJECTS:

There's a number of researchers who have worked out on detecting potholes as well as humps utilizing distinguishable methodologies. Pothole spotting and inter-Vehicle Communication [3]. In this, they assemble a robot vehicle that. will descry the potholes and also transfer this information to the near vehicles. They will discover potholes with a minimal depth of 1 inch and will partake these facts with the other neighboring vehicles within 100 m range utilizing the Zig Bee module. Obstacle spotting utilizing Ultrasonic Sensor the researchers used this for a Mobile Robot [4] This is an obstacle avoidance design using Ultrasonic Sensor that has been mounted on for a mobile robot using Arduino Uno. Some researchers had made some development and Analysis on this serious case of Pothole Detection and Alert grounded which is utilized on Node MCU [5]. This design deals with the discovery of potholes using an Ultrasonic Sensor and also later detecting it'll shoot its position via correspondence to road Development Authorities. The position is participated using GPS and IFTTT garçon. Part Of Ultrasonic Sensor that is used in the Automatic Pothole detection and the same used for the Hump Detection System [6]. In this, they descry. the potholes and humps and save this information in the garçon, and will try to reduce the movement or the speed of the automobile vehicle. GPS is used to find the position of the pothole.

2. TECHNICAL COMPONENTS OF THE SYSTEM THAT ARE USED

2.1. MICROPROCESSOR (ARDUINO UNO)

The microprocessor is a processor that functions as a central processing unit on one combined circuit or more than one multiplex absorbed circuit. (7) The microprocessor can be used for many works together, timepiece-driven, register-hung, digital combined circuit that can be used as double data as input purpose it according to instruction stored inside the memory, and gives answers as work. Microprocessors holds two conditional sense as well as consecutive digital sense. Microprocessors work are the sensors that run on numeric as well as symbols which stands in the double numeric system. The integration in whole CPU onto a solo or numerous intertwined circuits which reduced amount of processing power. Integrated circuit are the bones that are delivered in large numbers with the help of largely automated processes, that are performing at a less unit price. Single-chip processors increase trust ability due to multitudinous lower electrical junctions might fail. As microprocessor systems enrich, the cost of making chip which have lower factors erected on a semi-conductor chip of the similar size generally remains the same as per Rook's law. Before the use of the microprocessors, people used small computers which are used to have been erected using racks of circuit boards with multitudinous medium and small integrated circuits. Microprocessors mixed this into single or numerous large size ICs. (8) The Arduino UNO used as the microcontroller for the proposed project and it has an open microcontroller board grounded on the Micro chip ATmega3285p microcontroller and manufactured by Arduino. Technical specifications of the Arduino uno are the Microcontroller used is Microchip ATmega328P where its operating Voltage is around 5 Volts and the input volt is about 7 to 20 V. Digital I/O Pins: 14 of which 6 provide PWM output. The Arduino's has Analog Input Pins of 6 which they have DC Current per I/O Pin 20 mA and DC Current for 3.3V Pin is 50 mA. Flash Memory is 32 KB of which 0.5 KB used by bootloader and the clock speed is 16 MHz. The length is 68.6 mm and width is 53.4 mm and it weighs around 25 g

Fig 1

2.2 ULTRASONIC SENSOR

It is a component that helps to sense any objects or any feels of things like sound, water, light and other required commanded things. As this project is made to sense the obstructions like the potholes and the bumpers. So there are different kinds of sensors that can sense the obstructions that are ahead on the asphalts or on the concrete roads. The type of sensors are like the proximity sensors, capacitive sensor, inductive sensors and also the ultrasonic sensor.

The main idea of using the ultrasonic sensor is because of its best features that help this detection. The main advantages of ultrasonic sensors when compared to other sensors these sensors can sense any type of object that is ahead of the vehicle easily nevertheless the objects color neither the structural surface nor the material of the object.

This ultrasonic sensors detect any kind of the transparent and other items where optical sensor technologies may fail. In this kind of the situation one can consider using the ultrasonic sensors as they have the advantage of sensing difficult surfaces. And moreover the ultrasonic sensors are not at all affected by any different pollutants like smoke and other materials. The main disadvantage of these sensors because of the soft materials as the of materials does not reflect to the sonar waves very well. So this may cause issues for the ultrasonic sensor to detect the observation. Main advantages of the ultrasonic sensor is it consumes less power and it can also be powered by battery, inexpensively. Overall it is not a perfect sensor but it can be used and it is trustworthy.

2.3 RESISTORS

Resistor is a permitting electrical product that have resistance or opposition in flux of current. In closely all kind electrical networks as well as electronic circuits, they might be formed. Opposition is gauged in ohms. A ohm is a opposition that takes place when a power of one ampere goes through a resistor which have one-volt drip in its way stations. Current is commensurate to the voltage around the terminal boundaries. This rate is portrayed. Resistors are used for multitudinous purposes. Numerous samples contain restricting current, voltage, heat, matching as well as loading circuits, control gain, and fixed time is constants. These are available in the market with resistance values in a range of further than nine orders of magnitude. They might be usable as electric chaparrals to spread the kinetic energy from trains or be lower than a square of a millimetre for electronics. [9] Constantly it's a trades between costs, perfection, as well as other conditions. For illustration, carbon mixture is an ancient fashion with a minimum perfection but is still used for a operations where more energy beats do. Carbon mixed resistors has a body with fine carbon motes as well as a non-conductive ceramic material. The carbon film methodology has the better forbearance. These is prepared of an anon-conductive rod which have thin carbon film caste in it. This caste is made with a spiral cut to increase as well as for controlling the resistance value. Essence and essence oxide film is considerably used presently, and have nice parcels for stability and forbearance. Likewise, they are somehow told by temperature variations. They are just like carbon film resistors made with a resistive film in a globular body. The substance oxide film is generally more dependable. Wire wound resistors are presumably the oldest kind and might be used in both high perfection and high power operations. They are made by winding a special substance admixture line, analogous to nickel chrome, around anon-conductive core. They are durable, accurate, as well as it can have truly less resistance value. But that as a disadvantage that they suffer from parasitic reacter at high frequency. For topmost conditions on perfection as well as stability, substance counter resistors is used. They are prepared by cementing a special amalgamation deep freeze- rolled film over a ceramic substance.

2.4 BREADBOARD

This are white in colour mostly and rectangular in shape and has tiny holes which are used to help to insert different electronic circuits or the electronic components are used. The breadboards mostly applicable to use to fabricate any semi soldered objects and this objects cant easly can be reused. A hefty composition of distinguishable Multi coloured types of electronic networks that may be used to prototype by utilising the different breadboards from the remote analogy circuits or also even from the digital circuits to help finishing the whole CPU. The breadboard is employed as a structural base for prototyping electronics. Originally it was a breadboard, a glossy composition of timber utilized for slicing chuck. The breadboard makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with scholars and in technological education. ancient breadboard types did not have this property. A stripboard or Veroboard and similar prototyping published circuit boards

2.5 JUMPER WIRES

Jumper wires are just a simple electronics connector wires. The jumper wires are that which have some basic connector pins at each end of the wires, these connector pins allow them to be used to connect two points to each other without any further mechanical manufacturing process like soldering. There are three different types of the jumper wires one is male to male, female to male and female to female. Jumper wires main applications are they are utilized with the help of the breadboards. The jumper wires most common application is that they are used with different kinds of the prototyping tools which in order helps in making the electrical circuits to change easily and fast.

Fig 2: -Jumper wires (M-F,F-F,M-M)

2.6 BUZZER:

A beeper which is most commonly called as the buzzer. The buzzer is an audio emitting and signaling device which gives a signal in audio for any situations and different kinds of sounds for different aspects. The beepers are of three types either it may be mechanical or an electromechanical, mechanical, and the piezoelectric buzzer. The main applications of buzzers and beepers include in the sounding of the alarm devices, the sound signalling in timers, and sounds when the confirmation of user input in mobiles or the computers such as a mouse click or keystroke.

2.7.1. ELECTROCHEMICAL:

The first buzzer devices were based on the development of the electro mechanical system which is very similar Similar to an electric bell. But in this electronic bell the metal gong is not available plates which produce the sound.Also, a relay may exist interconnected to chip in its own activating current, causing the connections to ring. Frequently the electronic units always be supported with the help of the anchor to a fence or on to the ceiling which helps to operate it as the beeper that helps to sound. And this is also the reason the word or the term buzzer has been evolved as because of the unusual rasping sound that made by the electro-mechanical buzzer.

2.7.2. MECHANICAL:

It is the mechanical electronic usable beeper. A joy buzzer is usually used more and it is one of the best example of the mechanical beeper or the buzzer. The mechanical buzzers are the ones which requires drivers. The other type of the mechanical buzzers are doorbells**.**

2.7.3. PIEZOELECTRIC:

A piezoelectric buzzer is a type of electronic buzzer which works or drives by the electronic circuit which is in the oscillating motion. This type of the buzzer can also be work by the other audio signal sources. This piezoelectric buzzer can also drives by the audio utilized amplifier. This buzzer is which is most commonly or most preferred buzzer that has to be pressed or Or it has the click or the ring or the beep to press and this provide the sound

Fig 3: Buzzer

2.2. LIGHT-EMMITING DIODE (LED)

A light- emitting diode LED is an electronic Use component. Then this Light emitting diode is also a type of the semiconductor light component source which use or which helps to emit a spark pf glow whenever the electricity current overflows in that component. The working of this lights are simple aa the electrons in the led semiconductor will be recombinant with the electrons openings and then in the lights the loosening of the energy happens in the configuration of the photons. This outcome is bayed Electrolux- mine- knowledge. The shade of the light or the illumination which is corresponding to the released energy of the semiconductors led's photons is referenced to by the energy that are demanded by this lights electrons to double-barrelled across the opening of the semiconductors. The uncoloured or the colourless light illumination is achieved in many different or many numerous ways like on semiconductors one can caste the phosphorus on the light emitting device. showing up as applicable electronic factors in 1962, the frontiersman LEDs uttered low-intensity infrared illumination. Infrared LEDs are utilized in outside- regulator circuits, resembling those operated with a broad variousness of consumer electronics. The initial visible-illumination LEDs were of low intensity and restricted to red. new-fashioned The intial LED'S are made up of with very low intensity and this lights are only available in the colour red. But the new-fashioned LED'S are excessively popular because there wide range of the optical, ultraviolet and as well as rhe infra-red wavelengths are high light affair.Beforehand LEDs were repeatedly used as indicator illuminations, substituting remote beaming bulbs, and in seven- constituent exhibits. Recent expansions command delivered colorless- illumination LEDs capable of space lighting. LEDs commands showed to makeshift exhibits and sensors, while their lofty switching grades are workable in evolved dispatches technology. The light is used here is

red in colour because it is the symbol of danger and gives the rider brain a signal. So the light LED'S act as an safety indicator to the driver in this project.

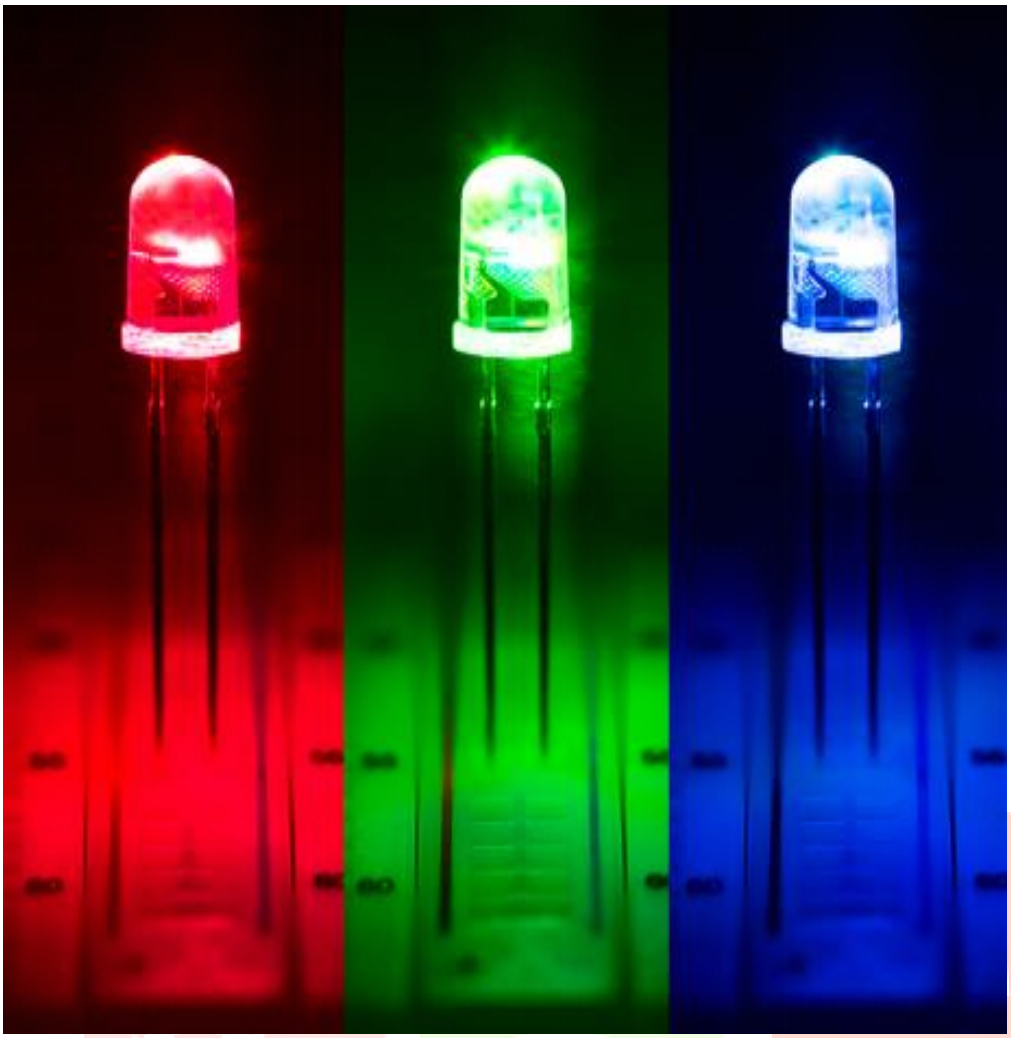

Fig. 4: LED

3. EXPERIMENTAL SET UP AND OBSERVATIONS

As the group are from mechanical background the knowledge knew was very little about electronic components. Then started doing several kinds of experiments with our project materials and at first came to a conclusion that if one want to make a working model that can be fitted in a two wheeler

At the initial stage making of the entire project over a full length bread board but soon we realized that we were just wasting a lot of useful space after making the entire assembled unit therefore we shifted to a half length bread board which was having just the right dimensions for our requirements.

As the project is progressing then that realized the need of a resistor as the project is continuously damaging the leds and decided to use a 220ohms resistor.The project is also equipped with a buzzer so that even the light was not visible to the user he could hear the sound created by the buzzer very clearly.

To accommodate the cables together an idea of using a mini paper clip rather than using a electrical grade tape because it added to its aesthetics. To glue the Arduino unit with the bread board we used double tape as it non messy and was completely safe with electronic components. However the main problem is that to know that the sensor that is used was not that accurate which was not shocking at all as it costed us just very less amount. The other thing is that the field of vision of our sensor was less than 30 degrees approximately.

4.Results

As the sensor is an ultrasonic sensor, which is having less accuracy due to which this can only be applicable up to a prototype level but for further development of this prototype there are many sensors are available in the market as well as some are under development. So, better results or accuracy can be expected in this department of sensor which can replace the Ultrasonic sensor.

The sensor which was used is placed in the mud cover of the two wheeler for better accuracy, which senses the upcoming pot hole or hump/Speed breaker from a distance of 2 meters and gives out an alarming sound to the rider, So that the rider can take some necessary action in advance. This distance of 2 meters can be increased by the help of other sensors or a powerful one for this project only this ultrasonic sensor was available, So, as prescribed this sensor was used for this prototype.

5. Conclusion

After the completion of the project the results that we obtained told us that we are still very naïve to the world of electronics and there are endless new innovation that are waiting to get innovated. However our project essentially told us that if we want to install this in a real two wheeler then we have to get a new powerful sensor and also get our entire assemble unit nanocoated so that it get water and dust proof. We were also able to calculate that if used all the things mentioned in the above line then the price could hike up to a maximum value of Rs10000/-.The project mainly aims to reduce human casualties and there is nothing costlier than a living unharmed human. We as a team might be looking for more innovation in this project by combining it with the engine speed and vehicle suspension control although these things are reserved for the upcoming future.

6. REFERENCES:

[1]. https://www.mdpi.com/1424-8220/15/11/29316/html

[2]. https://www.scitepress.org/Papers/2021/104637/104637.pdf

[3] Shambhu Hegde, Harish V. Mekali, Golla Varaprasad, “Pothole detection and inter vehicular communication”, 2014 IEEE International Conference on Vehicular Electronics and Safety

[4] Joseph Azeta, Christian Bolu, Daniel Hinvi, Abiodun Abioye, “Obstacle Detection Using Ultrasonic Sensor for A Mobile Robot”,IOP Conference Series Materials Science and Engineering .

[5] Etukala Jaswanth Reddy, Padhuri Navaneeth Reddy, Govindula Maithreyi, M. Bharath Chandra Balaji, Santanu Kumar Dash, K. Aruna Kumari, “Development and Analysis of Pothole detection and Alert based on NodeMCU”, 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE)

[6] Stepheena Joseph, Mr.K.Edison Prabhu, “Role Of Ultrasonic Sensor In Automatic Pothole And Hump Detection System”, International Journal of Scientific & Engineering Research Volume 8, Issue 7, July-2017

[7] Furber, S. Microprocessors: The Engines of the Digital Age. Proc. R. Soc. 2017, 473, 20160893.

[8] Intel’s Museum Archive, i4004datasheet. Available online: http://www.intel.com/Assets/PDF/DataSheet/4004_datasheet.pdf (accessed on 10 April 2021).

[9]Panasonic Intellectual Property Management Co., Ltd., Osaka (JP).: Panasonic Intellectual Property Management Co., Ltd., Osaka (JP). Patent No.: US 10, 141, 088 B2 (45) Date of Patent: Nov. 27, 2018.

[10] http://www.freepatentsonline.com/6899560.html