

A System and Method for Detection of Obstacles on Moving Vehicles on Either Side 360⁰



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Abstract-This work provides information to determine the sudden hazardous living or non-living materials in front of vehicles on either side, i.e.180 degree across will indicate the drivers for stopping the vehicles automatically with ANDON and BUZZER. Then the vehicle will automatically turn on either side safely. For Sudden detection of obstacles, specifically waterfall at certain height, rock rolling down, landslides, earthquake, animals, abnormal things and tree fallen on the road 90 degree on either side. ANDON and BUZZER system is for visual indication along with voice monitoring for indication to front and back vehicles. Successful display of distance and identified object will be displayed in the LCD. The mainly used components for this project are the use of preventing and corrective action through ARDUINO MEGA, ULTRASONIC SENSORS, VIBRATION SENSOR SW-420 and LDR MODULE.

Keywords-ANDON and BUZZER, Embedded, Landslides.

Sudden earthquake (or) landslide will be detected. In this Universe, now a days there occur a sudden problem due to act of God such as landslides, rock rolling, fall of Ice bergs, earth quakes on road. To eliminate this problem, we have used different type of embedded devices, which gives prior information, so that not only it gives corrective action but also it gives the preventive action.



Fig.1 : Animals block the moving vehicle

I.INTRODUCTION

Road accidents (RA) are responsible for 1.2 million deaths worldwide each year. RA will become the third largest contributor to the global burden of diseases after Ischemic Heart Diseases (IDA) and depression. So, we conducted retrospective study on road accidents in the hilly and highway areas. The problem of accident is very acute in highway and hilly areas transportation due to sudden moving or stationary objects approaching in front /left/right while driving. We identified landslides, sudden rock rolling, and rainfall on NH-229 on the Bhalukpong road, NH-29 (Connecting Assam and Nagaland) and NH-39 (Dimapur-Kohima). Here, the landslides, cloudburst, rock rolling happens all of a sudden and cannot be predicted, due to which many people lost their lives. It has been also noticed that while driving in NH-29, sudden approach of animals are seen due to which many accidents occur. To find out the sudden waterfall (or) ice burg fall on the road (or) sudden appearance of a huge amount of water with a height over the road at a degree of 90 degree either side(left/right).



Fig.2 : Accident due to Tree-fallen



Fig.3 : Ice Bergs



Fig.4 : Rock Rolling

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II.RELATED WORKS

Anil Kumarjoshi et al. [1,2] proposed that developing countries like India where the hilly regions of north India (Uttarakhand) the accidents are caused due to poor infrastructure and unattended hazardous zones, the total number of road traffic accidents in hilly districts are the second major cause of accidents the main causes were bad weather conditions.



These variables and data were analyzed with the help of International Road Traffic and Accident Data base (IRTAD).

V.Khalil et.al [3]. have stated that the Detection of accidents by using **ultrasonic sensors** is a novel idea which is already presented and proposed that multiple ultrasonic sensors have been used for accident detection in the proposed system .The distance can be measured by using ultrasonic sensors.

A.M. Flynn et.al[4]Ultrasonic (US) sensors are also widely used to measure distances. Thus they have provided a reliable source of obstacle detections. Since they are not vision-based, they are useful under conditions of poor lighting and transparent objects. However, US sensors have limitations due to their wide beam-width, sensitivity to specular surfaces.

III.PROPOSED MODEL& EXPERIMENTAL SET UP

The main purpose of this project is When the vehicle is moving on the road, if any obstacle present in front of moving vehicle, the obstacle is detected by the ultrasonic sensor HC-SR04.The distance from the vehicle at which the obstacle is present, is displayed in the **LCD** and also it gives the indication to the driver by using **ANDON** and **BUZZER**. Thus, Andon & Buzzer system is used for visual indication along with voice monitoring for indication to front and back vehicles.

A) Methods:

Preventing actions from:-

1. Waterfall (or) Rainfall.
2. Ice barge.
3. Sudden appearance of huge amount of water.
4. Rock rolling (or) Rock on the road.
5. Earthquakes (or) Landslides.
6. Animal (or) Abnormal things

B) Hardware design:

The following are the components used for designing:

1. ARDUINO MEGA 2560
2. HC-SR04 Ultrasonic Sensor
3. 16 X 2 liquid crystal display
4. DC Motor
5. Buzzer
6. Arduino Cable

When the obstacles present in front/left/right/ the vehicle will slow down and then stops. If any obstacles are present at the back side of the vehicle, it intimates the driver and the necessary action will be taken by driver to move on to the safe side.

Process:

1. Detection through ultrasonic sensor HC-SR04.
2. Through image processing, identification of an obstacles 90 degree at each other.
3. Signals will be converted into andon and buzzer including voice modulation for back and front vehicles and will display in LCD. Proposed Solution

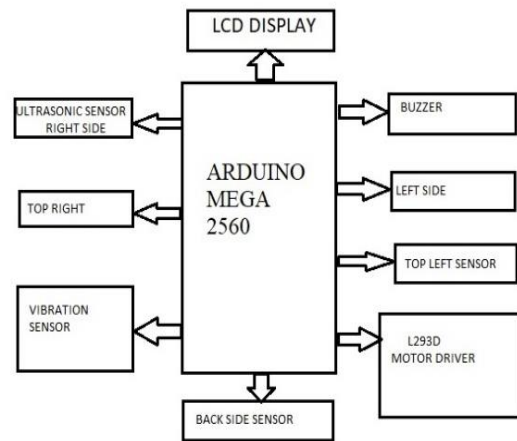


Fig.5 : Block diagram of Proposed Model

ANDON and BUZZER system is for visual indication along with voice monitoring for indication to front and back vehicles. Successful display of distance and identified object will be displayed in the LCD. The Vibrator Arduino detects the earthquake and landslide occurrence after a certain scale. Alternate Solution/Approaches By using Radar sensor, we can increase the distance by which this enables to detect distant objects. By varying the different parameters of the components, we can increase the efficiency of all the components for the use.

C) Novelty of Approach:

Safety & security of human being as well as safety of vehicle (Increase the quality of life). To solve the main problems occurring while driving in hilly areas/highways due to various obstacles in front of moving of vehicles. The data collection was done through query in the concerned transport department for hilly areas and highways as well as visually in accident places. Data collection was also done through e-mail and telephonic contact. The data analysis reveals the main reason for the accidents on the road spotted due to very poor visibility, rain, snow, animals, rock rolling, tree fallen, landslides and sudden earthquakes. After successful study and designing of the model, we found a solution of the problem which has been discussed in the methods and results are suitable for adoption to current market requirement, which prevents from the dangerous public fatal accidents. Thus, we provide not only the safety of human beings but also the safety and security of vehicles.

IV.WORKING PRINCIPLE

When the vehicle is moving on the road, if any obstacle present in front of moving vehicle, the obstacle is detected by the ultrasonic sensor HC-SR04.The distance from the vehicle at which the obstacle is present, is displayed in the LCD and also it gives the indication to the driver by using ANDON and BUZZER. Thus, Andon & Buzzer system is used for visual indication along with voice monitoring for indication to front and back vehicles. When the obstacles present in front/left/right/ the vehicle will slow down and then stops. If any obstacles are present at the back side of the vehicle, it intimates the driver and the necessary action will be taken by driver to move on to the safe side.

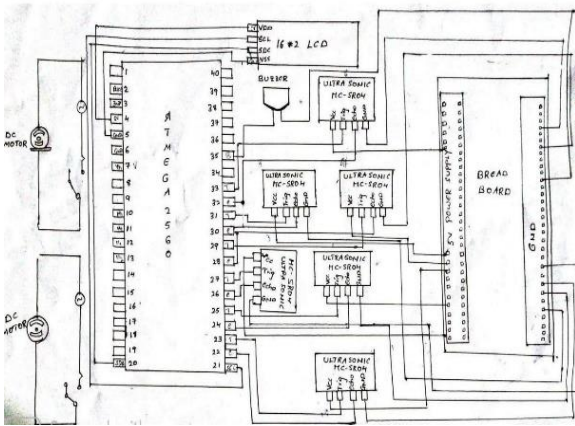


Fig.6: Circuit diagram of Proposed Model MATHEMATICAL CALCULATION TO MEASURE ANGLE OF DEVIATION WITH RESPECT TO ROAD:

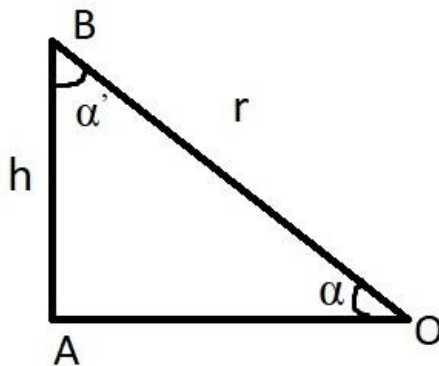


Fig.7 : Road distance with respect to angle of inclination or angle of incidence(α, α')

Let h = height of car
 α, α' = angle of inclination or angle of deviation
 Then from ΔOAB , we get,
 $\sin \alpha = h/r$
 $\alpha = \sin^{-1}(h/r)$

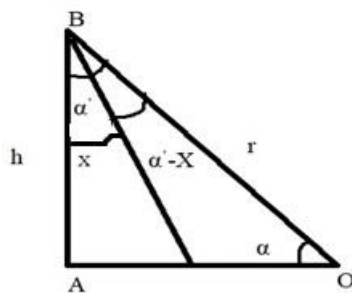


Fig.8 : Change in angle of deviation (α) with respect to road

It is obvious that change in angle i.e. α ,
 New angle = previous angle (α') - X
 for example
 let $\alpha = 30^\circ$ then

α' can be finding by using right angle triangle conditions.

i.e, sum of all angles of triangle = 180°
 $\alpha' = 180 - (90^\circ + \alpha) = 60^\circ$

Finally we get angle of deviation (α') and also r value calculate by using Pythagoras' theorem.

V.RESULT AND DISCUSSION

Figure 9 shows Sudden detection of obstacles specifically waterfall at certain height, rock rolling down, landslides, earthquake, animals, abnormal things and tree fallen on the road 90 on either side. It will not detect bumpers or any other objects until specified. Andon & buzzer system for visual indication along with voice monitoring for indication to front and back vehicles. Successful display of distance and identified object will be displayed in the LCD.



Fig.9 : Detecting the obstacles



Fig.10: Prototype Model

VI.CONCLUSION

The paper attempts to solve the main problems occurring while driving in hilly areas/highways due to obstacles. The data collection was done through query in the concerned transport department for hilly areas and highways. The data analysis reveals the main reason for the accidents on the road spotted due to very poor visibility, rain, snow, animals, rock falling, tree fallen, landslides and earthquakes. The angle of deviation (α') can be change as per the requirements. i.e, As per the road and climatic conditions.



FUTURE SCOPE

To detect step length, angle either 90 or 180 degrees and trench width by using ultrasonic sensors is examined and the reproducibility and accuracy of characteristic parameter detection are also examined by using a simple method called Feasibility. The obstacle can be detected and identified by using ultra sonic sensors. It is suggested that an additional method is needed if we have to advance the field of obstacle detection by using the radar sensors which can detect the distance within range of 100km.



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