Accident Avoiding Car Bumper

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Abstract: A method of preventing an accident using a technology is called ultrasonic. This project is about making cars more intelligent and interactive which may notify or resist user under unacceptable conditions. This project focuses on building a user-friendly vehicle that specializes in detecting intrusions besides doing close range obstacle detection especially bumper in road. night when sudden bumper can be found in highway and driver cannot detect that due to darkness our proposed system initially generate a beep alarm which can make alert the driver for avoiding accident. Automobile safety can be improved by anticipating a crash before it occurs and thereby providing additional time to deploy safety technologies. Warnings can be like buzzer if the driver is approaching a pothole or any obstruction, driver may be warned in advanced regarding what the road entails. Not only that the speed of motor attached with wheel can be controlled automatically after detecting the bumper. Hence accident can be prevented during the happy journey. It will perform the function with the help of infrared sensors more specifically proximity sensor. The project's ultimate aim thus finalized as, one to build a general, easy-to-use and versatile system that can prevent fatal accidents.

Keywords: Ultrasonic sensor, Proximity sensor, Obstacle detection, Edge detection, Infrared sensors,

I.   Introduction:

Speed bumps (or speed bumpers) are the common name for a family of traffic calming devices that use vertical deflection to slow motor-vehicle traffic in order to improve safety conditions. Variations include the speed hump (or speed ramp), speed cushion, and speed table. The use of vertical deflection devices is widespread around the world, and they are most commonly found where vehicle speeds are statutorily mandated to be low, usually 40 km/h (25 mph), or 8 to 16 km/h (5.0 to 9.9 mph) in car parks. Disadvantage of these speed bumps are: (a) Slow response time of emergency vehicles (b) May divert traffic to parallel residential streets (c)Possibility of increased noise and pollution for residents living immediately adjacent to the speed bumps. (d)Can cause damage to some vehicles, increase traffic noise. Most of the accidents in India can be accounted by two main reasons first being the dangerous road conditions and second main reason being driver distraction. Vehicles will require new exterior pre-collision detecting sensors to create an electronic awareness at the time of root travelling. Pre- collision detecting sensing may well have the most impact in reducing injuries from night-time accidents involving impaired drivers. However, the advanced safety features enabled by Preclusion detecting sensing will provide a significant benefit in all cases of lack of street light,

foggy weather, or driver distraction. We can use bumper detection technology with the help of proximity sensor as well as infrared. A low range obstacle like bumper can be detected by the vehicle using its infrared sensing techniques implemented in front of the chassis of the vehicle and it can be executed by Arduino based microcontroller system. We can also detect sudden change of flat surface and avoid the accident from the edge of drain, river

II.   Working Principle of Infrared Sensor:

IR sensor basically consist an IR LED and a Photodiode, this pair is generally called IR pair or Photo coupler. IR sensor work on the principal in which IR LED emits IR radiation and Photodiode sense that IR radiation. Photodiode resistance changes according to the amount of IR radiation falling on it, hence the voltage drop across it also changes and by using the voltage comparator (like LM358) we can sense the voltage change and generate the output accordingly. The placing of IR LED and Photodiode can be done in two ways: Direct and Indirect. In Direct incidence, IR LED and photodiode are kept in front of one another according to the figure1, so that IR radiation can directly falls on photodiode. If we place any object between them, then it stops the falling of IR light on photodiode.
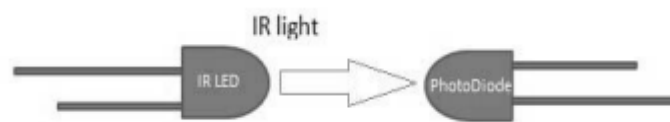

Fig.1 1R LED and Photodiode

III.   Working Principal of Proximity Sensor:

A proximity sensor is an electronic sensor that can detect the presence of objects within its vicinity without any actual physical contact. In order to sense objects, the proximity sensor radiates or emits a beam of electromagnetic radiation, usually in the form of infrared light, and senses the reflection in order to determine the object's proximity or distance from the sensor
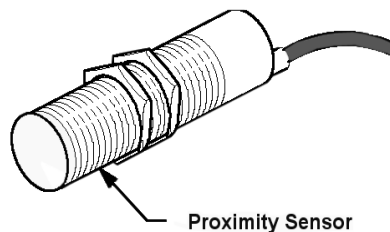

Fig.2 Proximity Sensor

IV.   Ultrasonic Sensor:

Pin Number	Pin Name	Description	HC-SR04
1	Vcc	The Vcc pin powers the sensor, typically with +5V	
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.	
3	Echo	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.	

Ultrasonic Sensor - Working

As shown above the **HC-SR04 Ultrasonic (US) sensor** is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

$$\text{Distance} = \text{Speed} \times \text{Time}$$

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,

V.   Motor Speed control after detecting bumper:

Motor Speed Control Circuit is primarily a 555IC based PWM (Pulse Width Modulation) circuit developed to get variable voltage over constant voltage. The method of PWM is explained here. Consider a simple circuit as shown in figure below
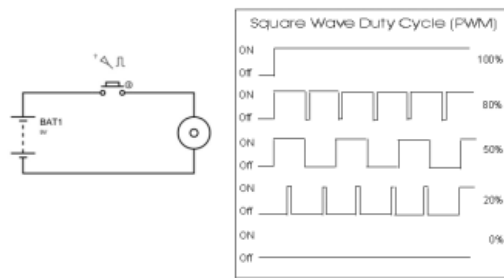
Fig.3 Cycle Motor Speed

If the button is pressed in the figure.3, then the motor will start rotating and it will be in motion until the button is pressed. This pressing is continuous and is represented in the first wave of figure-3. If, for a case, consider button is pressed for 8ms and opened for 2ms over a cycle of 10ms, during this case the motor will not experience the complete 9V battery voltage as the button is pressed only for 8ms, so the RMS terminal voltage across the motor will be around 7V. Due to this reduced RMS voltage the motor will rotate but at a reduced speed. Now the average turn on over a period of 10ms = Turn ON time/ (Turn ON time + Turn OFF time), this is called duty cycle and is of 80% (8/(8+2)). In second and third cases the button is pressed even lesser time compared to first case. Because of this, the RMS terminal voltage at the motor terminals gets even decreased further.
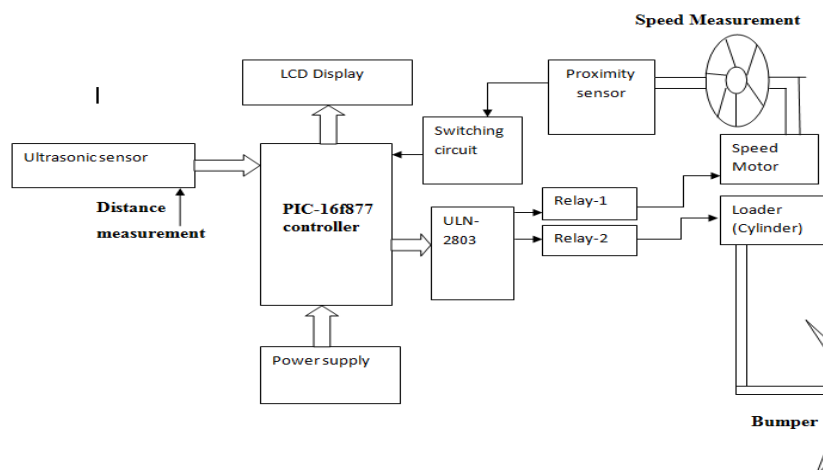
VI.   Circuit Diagram:

Fig.4 Circuit diagram

VII.   Working Procedure:

As this system is used at the time of emergency during work. In normal travelling of vehicle this system can be switched of with the help of a switch and it will not affect the normal working of the vehicle When any obstacle, human, animal or vehicle comes in front of the vehicle then the installed ultrasonic sensor senses the obstacle. The range of distance between the vehicle and obstacle is variable. This range is varied according to the density of vehicles or humans on road. The received signal by ultrasonic sensor is provided to the control unit. When any obstacle, humans,

animals or vehicle is came in front of the vehicle then the installed sensor senses that obstacle. The range of distance between the vehicle and obstacle is variable. This range is varied according to the density of vehicles or humans on road. The received signal by sensor is provided to the control unit. The control unit then activates the Relay. When relay will ON that time loader (Cylinder) activate. The pneumatic force provides forward motion to the Bumper and it also retracts the bumper slowly reducing the impact. Hence, when the external body is kept safe, there will be no chance of internal damage.
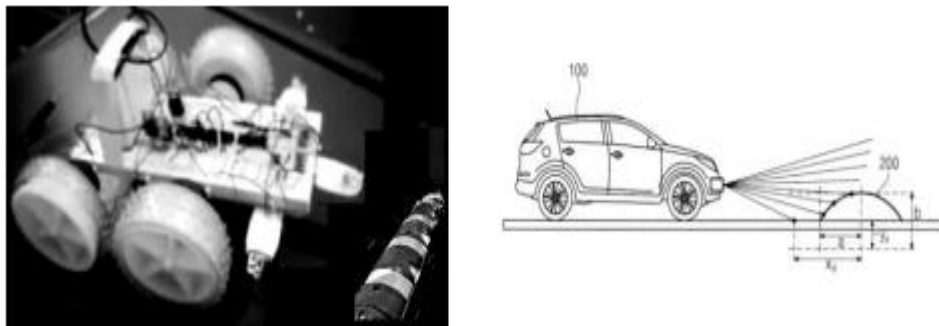
VIII.   Results:

Fig.5 Result

IX.   Conclusion:

Behind the designing of this system, our main aim is to improve the technique of prevention of accidents and also reducing the hazard from accidents like damage of vehicle, injury of humans, etc. This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We have gained practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. In conclusion remarks of our project work, we have developed an "ACCIDENT AVOIDING BUMPER" which helps to achieve low Impact damage. We are proud that we have completed the work with the limited time successfully. We have done the project to our ability and skill making maximum use of available facilities and we are able to understand the difficulties in maintaining the quality. We have also observed that the prototype manufactured is working with satisfactory conditions and our work is able to achieve all the objectives which are necessary.

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