

A Review Study on Road Safety under Low Visibility and Modern Technologies Used To Decrease the Road Accidents

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Abstract— In this study we have expressed the safety risk for low visibility on roadways and tunnel. Stormy or rough weather or smog causes fog/smoke, heavy rain & high winds also affect every visible road by disturbing visibility conditions, driver's behavior, visibility distance etc. However, they affect traffic safety and traffic flow rate. Visibility is weak for the driver and reduction in visibility due to fog or other weather conditions such as heavy rainfall is an advanced factor that affects road accidents. An experimental prospect of visibility and understanding vehicle's responses, when the visibility falls below the range of driver's visibility criteria, may be helpful in reducing the chances of accidents under low visibility conditions. According to this, to improve road safety under low visibility conditions it is necessary to improve driver's mental & physical behavior under such unfavorable conditions. Hence, the objective of this research is to discuss the factors affecting accidents in low visibility conditions, and examine whether the driver depends upon warning messages displayed on the changeable message signs (CMS) and variable speed limit (VSL) signs able to visible during foggy conditions, for roadways; freeways and two-lane roads.

Keywords: changeable message signs (CMS), variable speed limit (VSL), Road Safety, Road Accidents

I. INTRODUCTION

Most of the road accidents occur when the visibility conditions are poor or the driver is unable to apply brakes on time. This may happen during winter and rainy seasons, when the visibility drops to zero due to fog and heavy rainfall, respectively. Other such situations providing inadequate visibility may be in hilly terrain, where even nearby vehicles may not be directly seen. In all such situations, an accident avoidance system can play a crucial role in preventing vehicle collisions. This paper explains in detail the implementation of an accident avoidance system designed using ultrasonic vehicle collisions and saving people's lives apart from avoiding damage to the vehicles. There are some systems available for avoidance of sensors and some hardware devices which can be installed in all poles on the road. Its features, like image processing makes it possible to travel in extreme weather conditions. The effect of fog on both crash occurrence and severity has become a major concern in the traffic safety field. The reduced-visibility conditions that are caused by fog result in a shorter sight distance and a longer stopping sight distance. Driving in bad weather condition seems to be impossible task as it reduces a visibility and Fog being one of the most difficult weather conditions that driver many people face. Fog has the potential to reduce visibility significantly, so it is critical that drivers stay focused on the road in order to stay safe. Sadly, Fog-related accidents cause

more than 500 fatalities each year. Poor visibility of object or vehicles in Fog Condition May leads to accidents, so identifying vehicle in Fog seems to be very important task to save many lives. The visibility range thereby describes the longest distance at which a black object of adequate size can be observed towards the horizon. In France 2011 it was estimated that 47% of total fatalities were caused due to night driving. Moreover, accidents rate in night is increases by a scaling factor of 1.7 as it is compared with day time. The main reasons for this are poor visibility, speed and drowsiness

To avoid this problem intensity of high beam headlights is kept low in Fog, as Fog causes dispersion of light. So advancement has to be seen in this regard to automate the system and as well as to increase or maximize the visibility in bad weather. Adverse effect of sensors weakness, particularly cameras made bad effect on the vision applications of the vehicle thus resulting in failure of ADAS. In particularly unfavorable conditions like fog or rain are major considerations. Firstly, they affect the safety of the driver by reducing his visibility. Secondly, they reduce the efficiency of camera based system as they change image quality thus making it inefficient. To ensure the self-sufficiency of the vehicles with more security the vehicle should have find and maintain a distance from vehicle in any ranges, during day and night. This project major focus will be on the making the vehicle driving safer and self-governing. This framework is utilizing LiDAR for object detection and ranging using laser light pulses, Ultrasonic sensor and two Microwave RADAR's which uses Doppler Effect to produce velocity data about objects at a distance and to detect the motion of body movements. All of these sensors are grouped together for better performance. These sensors recognize the animal, vehicle, human and any of the objects and moreover it is indicated as notice to the driver.

II. LECTURE REVIEW

A. Review study on road safety under low visibility Mr. Akshay M. Nandurkar, Prof. Kalyani P. Nichat * G.H. Raisoni University, Amravati, Maharashtra,

This paper was intended to get an overview of road safety in India. It provides evidence on factors responsible for injuries, trends of fatalities, various adverse effects as well as about control and prevention of road traffic accidents.

B. Review study on road safety under low visibility 1Amandeep Singh 2Dr.Hemant Sood 2015

For the purpose of road safety, interconnection between motorized vehicles, drivers and road construction, and the driver conduct's fit or variations with the motorized vehicle and infrastructure features in some provided surroundings

and specific traffic conditions have been investigated and is still going on.

C. Review study on road safety under low visibility HANY MOHAMED RAMADAN HASSAN

Consistency of speed cannot be assured by warning systems. A considerable amount of speed reduction by drivers is not recorded until there is drastic reduction in the visibility distance, however ability to maintain lanes across most of the range of visibility distances has been witnessed. Along with the obvious insignificant part of fog in annual road crash summary, a strong cyclic pattern has been noticed in fog related crashes.

III. METHODOLOGY

Imagine you are driving in foggy area and you can't see beyond 10 feet and suddenly you found a Broken vehicle in your way, in this case accidents will happen. Our project may solve this problem and may save many lives. In the proposed system, we have installed ultrasonic sensors and some hardware devices in the pole on the road, if any vehicle is breakdown on road ultrasonic sensor detects motions of breakdown vehicle, nearly poles will give indication in the form of red light and buzzer to the behind vehicle so that it will get alerted.

IV. MODELING AND ANALYSIS

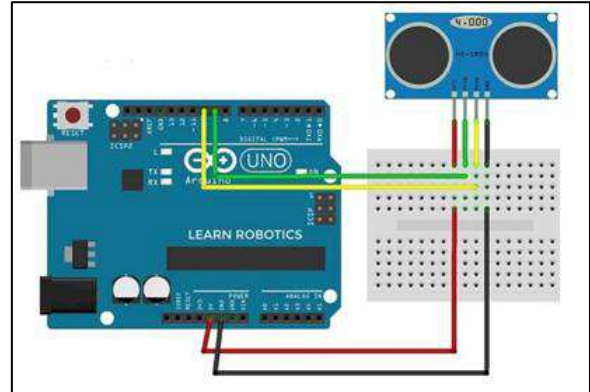
A. Digital experiment regarding Traffic Safety under Low Visibility.

When a vehicle is moving at a desired speed during a foggy weather and after an interval of time due to some circumstance the car broke down and behave as an obstacle on the busy highway. Another vehicle is following the same path and the driver is unable to see the broke vehicle due to low visibility in the foggy weather. Therefore, it is a high risk accident may occur. So to prevent the accident we can do the following measures. Poles are established at an approximate distance of 20 meter, every pole consist of Ultrasonic sensor, Red alert light, Radar sensor, Buzzer etc. multiple circuit would be fitted inside the divider. When any vehicle is broken down on the way and the driver can't observe the vehicle which broken. Immediately the Ultrasonic sensor detect the motion of vehicle and the corresponding red light and buzzer gives the signal of the broken vehicle so as the driver of moving vehicle is able to see the red light and can safely hit brakes at a safe distance, preventing the incident of accident due to low visibility in the foggy weather.



V. ULTRASONIC SENSORS

Ultrasonic sensors are used for blind spot detection. The range of measurements is from 2 cm to 400 cm A short burst of ultrasonic sound is periodically transmitted to the target, which, in effect, reflects the sound back to the sensor as an input. The device then measures the time taken for the echo to return to the sensor and calculates this distance to the target using the sound intensity within the medium. It is the amount of time taken for the sound to travel through the medium and amplitude of the received signal.



VI. ADVANTAGES OF ULTRASONIC SENSOR

- 1) Not affected by color or transparency of objects
Ultrasonic sensors reflect sound off of object, so the color of transparency have no effect on the sensor reading .
- 2) Can Be Used In Dark Environments
Unlike proximity sensors using light or cameras, dark, environments have no effect on an ultrasonic sensor's detection ability.
- 3) Low – cost option
Our sensors start at \$ 29.95 .They come fully calibrated and ready to use .We strive to give a low cost, high quality product suited for specific needs.

VII. CONCLUSION

This paper was intended to get an overview of road safety in India. It provides evidence on factors responsible for injuries, trends of fatalities, various adverse effects as well as about control and prevention of road traffic accidents. In bad weather conditions, especially in Fog it's a great challenge to detect an object. The system can be distracted by many environmental entities such as buildings, tall trees, and pedestrians often prone to deviate the obtained results from actual results. RADARs are often used to detect the objects presence and LiDAR are commonly used as Range finders to determine the distance of an object, whereas when used solely there are some lacking in the quality of results such as LiDAR can't detect objects that are too close but can detect far objects, whereas Ultrasonic sensor will provide accurate reading in short range but fails in long range. So they are often used together to overcome one's disadvantage with other. In comparison with other approaches, the benefit of this approach is to utilize the multiple sensor data to detect the object or vehicle in advance and for safe driving. By using different sensors simultaneously, the user can be able to become aware of the object presence and take relative actions

and can avoid accidents or collisions in fog. In this model we are achieving this by using the efficient RADARs with the combination of low cost Ultrasonic sensor and LiDAR. Cost is one of the key factors in designing any technology. Since the proposed model study incorporates it cuts the cost of the model by a significant amount. Main aim is to equip all the vehicles and not just cars with this system so that accidents can be avoided and in some cases, better routes can be chosen while driving, in case there is a traffic jam ahead of them and hence lots of time can be saved. The proposed system is highly appropriate for driving in hilly areas where there are hard turns and in areas where the visibility drops to zero due to fog or heavy rains.

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