AUTOMATIC SPEED AND AUTO LIGHT BEAM CONTROL SYSTEM FOR GLARE PREVENTION IN VEHICLES

PROJECT REFERENCE NO.: 40S_BE_1192

COLLEGE : SHRIDEVI INSTITUTE OF ENGINEERING AND TECHNOLOGY, TUMAKURU
BRANCH : DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
GUIDE : MR. HARISH L.
STUDENTS : MS. VIDHYASHREE K.C.
           MS. SUMA R.
           MS. KAVITHA S.J.
           MS. VIDHYASHREE B.S.

Keywords: Sign Board, Vehicle Headlights, Humps

Abstract:
Driving support systems aid in improving the road safety. There are various safety measures on the road like traffic signals, sign boards and humps to avoid possible accidents. To control the speeding in motor vehicles on busy and accident prone areas a device is mandatory to avoid vehicle accidents due to over speeding. Commonly road humps are laid at service road junctions. Speed humps are used in locations where very low speeds are desired and reasonable. The aim of this project is to develop automatic vehicle system that detects and indicates the presence of road humps to the driver to avoid accidents. It also detects and reduces the speed of the vehicle based on the sign board reorganization present along the road side for safety purpose. This project also presents the design and development of an automatic automobile headlight switching system. Headlights of vehicles are inherent for night driving. These bright headlights which assist the driver for vision, while driving at night, pose a great threat to the other road users coming in the opposite direction. The bright light of the vehicles causes a discomfort in the form of a glare to the oncoming driver. As a rule in night driving, every driver is expected to switch their headlights from high beam to low beam once they spot an oncoming vehicle within 150 metres in order to reduce the glare, but this practice is hardly adhered to. This is one of the major causes of accidents during the night, as the opposing driver will not be able to see the road clearly due to the brightness of the oncoming vehicle's lights. This automatic headlight switching system switches the high beam lamp to low beam as soon as it senses a vehicle approaching from the opposite direction and switches it back to high beam when the cars pass each other.

Introduction:
India, the second most populous Country in the World and a fast growing economy, is known to have a gigantic network of roads. Roads are the dominant means of transportation in India today. However, most of the roads in India are narrow and congested with poor surface quality and road maintenance needs are not satisfactorily met. No matter where you are in India, driving is a breath-holding, multi-mirror involving, potentially life threatening affair. Roads in India normally have speed breakers so that the vehicle’s speed can be controlled to avoid accidents. However, these speed breakers are unevenly distributed with uneven and unscientific
heights. According to the survey report “Road Accidents in India, 2011”, by the ministry of road transport and highways, a total of 1,42,485 people had lost their lives due to fatal road accidents. Of these, nearly 1.5 per cent or nearly 2,200 fatalities were due to poor condition of roads. To address the above mentioned problems, a cost effective solution is needed that collects the information about the severity of potholes and humps and also helps drivers to drive safely. In the proposed work, an attempt to achieve the detection of humps is made through a single image. The camera is fixed at low height to the moving vehicle and the image is captured at a constant time period[1]. This saves memory by storing only the images instead of video and then generating the video from the single image to view the details on the road before reaching the hump and act accordingly, only when need arises.

Our universe is filled with different kinds of rules or laws such as physical laws, environmental laws etc. Similarly we have created a set of traffic rules, to guide the people travelling and to regulate the traffic flow. Some of these traffic rules are indicated using the sign boards positioned by the sides of the roads. There are different kinds of sign boards used such as stop sign, speed-limit sign, warning sign and guide sign. These sign boards are designed in such a way that by looking at them the driver could extract the information from it. The driver requires all kinds of information while travelling. A driver does multiple tasks while he is driving such as, monitoring the road path ahead, observing the vehicles around him, constantly checking the blind spots, indicating the lane changes and keeping in track with the traffic rules. Thus the driver is overburdened while driving. The speed limits on the freeways and other city roads are different. The work zones have different speed limits. In some locations speed limits are different for day timings and night timings. So in order to follow the traffic rules the driver has to look for the speed limit signs located by the sides of the roads. If the vehicle is equipped with the automatic speed detection system it would detect the speed-limit signs, recognizes them and displays the speed limit information right in front of the driver. This system would also be helpful to warn the driver if he is driving much faster than the assigned speed limit. By interconnecting the speed detection system and the cruise control system, the cruising speed could be automatically chosen[2].

The requirement of headlight is a necessity during night travel. The same headlight which assists the driver for better vision during night travel is also responsible for many accidents. The driver has the control of the headlight which can be switched from high beam (bright) to low beam (dim). During pitch black conditions where there are no other sources of light, high beam is used while on all other cases, low beam is preferred. In a two-way traffic, vehicles ply on both sides of the road, so when the bright light from the headlight of a vehicle coming from the opposite direction falls on a person, it glares him for a certain amount of time, causing disorientation to that driver[3]. This discomfort will result in momentary involuntary closing of the driver’s eyes. This fraction of distraction is the prime cause of many road accidents at night. This prototype reduces this problem by actually switching the bright headlight of the vehicle to low beam automatically when it senses a vehicle at close proximity approaching from the other direction and switching it back after the vehicle passes. The entire working of the dimmer is an electronic circuitry arrangement which senses and switches the headlight according to the required conditions.

**Problem statement:**
The different factors of roads that contribute in accidents are

- **Drivers:** Over speeding, rash driving, violation of rules, failure to understand signs, fatigue and alcohol.
- **Vehicles:** Failure of breaks or steering, tyre burst, high intensity headlights and overloading.
Road Conditions: Potholes, damaged road, eroded road merging of rural roads with highways, diversions and illegal speed breakers.

Weather Conditions: Fog, snow, heavy rainfall and wind storms.

Glare during driving is a serious problem for drivers. This is caused due to the sudden exposure of our eyes to a very bright light; the bright headlights of vehicles in this case. This causes a temporary blindness called the Troxler effect, a major reason for night accidents.

Solution to the problem:
Preventive measures for accidents:

- Education and awareness about road safety.
- Strict Enforcement of law.
- Engineering
  a) Vehicle design  b) Road infrastructure

The driver should actually turn down the bright lights immediately to avoid glare to the other person which is hardly done. Hence, came the idea for the design and construction of an automatic headlight dimming prototype circuit. It allows the driver to use high beam light when required and automatically switches the headlight to low beam when it senses a vehicle approaching from the opposite side, and switches it back to high beam when the approaching vehicle passes. In this project we are also going to detect and indicates the presence of road humps to the driver to avoid accidents. It also detects the traffic sign boards which are placed along the side of the roads and also by detecting the speed limit traffic sign board we can control the speed of the vehicles in school zone, hospital zone. Thus the implementation of this device in every vehicle in future will not only avoid accidents but also provide a safe and a comfortable driving.

METHODOLOGY:

**Figure 1.1: Block diagram for sign board detection**

**Figure 1.2: Block diagram for humps detection**

- Image Acquisition
- Automatic Speed Detection
  - Speed Sign Detection
  - Speed Sign Recognition
- Display the Speed-limite
- MC
  - Control the speed
- Image Conversion RGB to Gray scale
- Noise reduction
- Edge Detection
- Image Transformation
- Humps Detected
Figure 1-1 shows the global view of the automatic speed detection system. A camera mounted on the rear view mirror of the vehicle is used to capture the traffic scenes that appear in front of the vehicle. Each traffic scene is processed in real-time using the proposed algorithm to detect the speed-limit sign board present in it and to extract the speed-limit information from it. The extracted speed-limit information is displayed on the dash board of the vehicle and it is given to the cruise control to limit the speed.

Figure 1.3: Block diagram for auto light beam control.

Figure 1.3: shows a block diagram of auto light beam control. Automatic high/low beam system is a system which can switch between high and low beam automatically in response to the detection of light from the oncoming traffic light.

Results:

Figure 1: Normal driving conditions
Figure 2: Automatic change over to low beam
Figure 3: Edge detected image
Figure 4: Output displaying hump present on the road
The above figure shows the output “HUMP” when there is a hump present on the surface of the road which is displayed in front of the driver.

![Figure 5: Shows the sign board present along the side of the road](image1)

![Figure 6: Output displaying the extracted character of the sign board](image2)

The above figure shows the processed output “SCHOOL ZONE” which is present in the template and the output is displayed.

**Conclusion:**

This method will automatically switches the headlight of the vehicle from high beam light to low beam light during night time whenever any vehicle approaches opposite in the same lane and it prevents glaring effect which is caused due to high light beam during night time and also it detects and indicates the presence of road humps to the driver to avoid accidents. It also detects the traffic sign boards which are placed along the side of the roads and also by detecting the speed limit traffic sign board we can control the speed of the vehicles in school zone, hospital zone.