Eco-friendly Anti-collision Vehicle System

[1]Aniket Kulkarni , [2]Pratiksha Kapse, [3]Shradha Somthankar

[1,2,3]Department Of Electronics and Tele-Communication Engineering, Gokhale R. H. Sapat College of Engineering, Nashik, Maharashtra, India.

[1]coolanikul33@gmail.com, [2]prkapse7@gmail.com, [3]2603shradhasom@gmail.com

Abstract - Major road mishaps occur at night on account of curve roads and glare caused from the headlights of incoming vehicles. Night time driving with conventional headlamps is particularly unsafe: only 25% of the driving is done at night but 55% of the driving accidents occur during this period. The existing conventional light system does not provide illumination in the right direction and at the precise angle. Due to this constrain, a need to understand an alternative technology solution. Adaptive front lighting system (AFS) helps improve driver's visibility at night time hence achieving enhance safety. The objective of this work is to design and build an AFS Prototype. From the results, it is concluded that the headlamp swings in horizontal direction by sensing steering angle and vertical by sensing distance between subject vehicle and next vehicle. Accuracy, reliability and availability of the components were few considerations during the conceptualization stage

Keywords: Ultrasonic sensor, LASER, Piezo-electric Sensor, Signal Conditioning, Microcontroller Board.

I. INTRODUCTION

Automobile is most probably the one which significantly changed human life. In the later years after independence the number of vehicles subsequently increased but in the last two decades it spreads drastically in every level of the society hence safety becomes the main concern. Road Accidents account a severe threat to the lives in both ways physical as well as financial, even after digital control of the vehicle. Many people lost their life every year in vehicle collision .We are trying to develop a device which will not only provide driver a safe warning but also automatically actuates the safety switches on stipulated time before unusual situation. All the greatest achievements of the history, Automobile is most probably the one which significantly changed human life. The periodical improvement in the technology gives human race a new height. In the later years after independence the number of vehicles subsequently increased but in the last two decades it spreads drastically in every level of the society hence safety becomes the main concern. Road Accidents account a severe threat to the lives in both ways physical as well as financial, even after digital control of the vehicle. However, due to human avoidance, circumstantial error and negligence accidents occur. Many people lost their life every year in vehicle collision majorly due to drivers' inability to keenly observe the vehicles' vicinity while driving and in traffic condition.

Recently some research were carried out on the anti-collision device using ad hoc wireless network, V2V communication, GPS and Radar implementation but all these efforts were informatory in nature which gives signal to the driver or producing some buzzer/sound only but finally the action will be taken by the driver in which there are chances of the collision. In this paper we are introducing an automatic vehicle anti-collision device Ultrasonic range finder and creating electromagnetic field to repels vehicles This paper work is originally motivated from the local traffic condition of Dehradun (Hilly Areas) specially where slow moving traffic on hilly roads often leads to minor or major accidents. On ascending/ descending a hilly road in traffic sometimes causes accidents while overtaking, sudden braking on turns, and loss of control while ascending on uphill roads. We develop a device which will not only provide driver a safe warning but also automatically actuates the safety switches on stipulated time before unusual situation.

II. LITRATURE SURVEY

The oldest headlamps were fuelled by acetylene or oil and were introduced in the late 1880s. Acetylene lamps were popular because the flame was resistant to wind and rain. The first electric headlamps were introduced in 1898 on the Columbia Electric Car from the Electric Vehicle Company, and were optional. Two factors limited the widespread use of electric headlamps: the short life of filaments in the harsh automotive environment, and the difficulty of producing dynamos small enough, yet powerful enough to produce sufficient current to fuel the new lamps invented by Thomas Edison in 1879. "Prest-O-Lite" acetylene lights were offered by a number of manufacturers as standard equipment for 1904, and Peerless made electrical headlamps standard in 1908. In 1912, our innovative Cadillac integrated their vehicle's Delco electrical ignition and lighting system, creating the modern vehicle electrical system. Control and dip systems emerged but the next major changes in automotive headlight technology was not until the sealed beam headlight was introduced in the 1940s, and that both bulbs and sealed beam units were used by all manufacturers in Europe, Japan and North America through the 1960s. The concept of swiveling headlamps is not a new one. An early innovation in lighting was to vertically tilt the beams high-beam-to-low-beam (dipped) switching dating back to 1917.

Automatic high/low beam system firstly existed in 1952 by general motor called “Autroic Eye” [5]. It was a device on automobiles which used a photo resistor to automatically adjust the headlight beams from “high beam” to “low beam” when encountering oncoming vehicles during night time driving and to switch back to high beam after vehicles had passed. With the advancement in light sources (Halogen lamps being replaced by Hid lamps) the light has become brighter causing increase in glare. Glaring is the discomfort or blindness caused by showering of unwanted lights temporarily It wasn't long before beam height adjustment able to compensate for rear seat occupancy or car loading became available, usually controlled through an internal, typically wheeled, adjustment. More recently, automatic self-leveling has become an increasingly common requirement as the light sources have become brighter and glare has increased. Horizontal swiveling is far rarer in the automotive industry. A first appearance in 1948 was in the Tucker Torpedo that featured an extra steerable headlight in the center of the car. Unfortunately this steering innovation was as short lived as the Tucker Company itself. The idea cropped up again on the 1967 Citroen DS which incorporated a pair of steerable beams. The Citroen Desiree, whilst being one of the most innovative and desirable cars at the time of its launch in 1955, reached the end of its space age design life in 1977. Unfortunately, when the model was discontinued so was the innovation of steerable headlights. Valeo, the world leader in automotive lighting technology and first made intelligent head light system. Valeo developed a technology for lamps, which is called bending lights. The AFS (Adaptive Forward Light System) developed by Opel and Hella include two parts: curve light control and turning light control. Curve light is mainly used at continuous curve whose radius is relatively big. The module of turning light control takes effect when velocity is under 50km/h, so it doesn’t take action in freeway. Horizontal swiveling reemerged in the 21st century courtesy of Lexus, Porsche, Audi, and others. ALC (Adaptive Light Control) system of BWM Company obtains front light adaptive control signal from steering wheel angle sensor, velocity sensor, deflection angular velocity sensor and GPS navigation technology to adjust the horizontal and vertical swing angle.

III. SYSTEM DEVELOPMENT

The microcontroller takes the input from the ultrasonic sensor. If the vehicle is detected by the ultrasonic sensor then it sends the signal to the microcontroller through the amplifier. This signal is then given to drive the motor in vertical direction i.e. upper dipper of light. In this way the direction of headlight can be adjusted automatically. The amplifier is used to increase the strength of the signal.

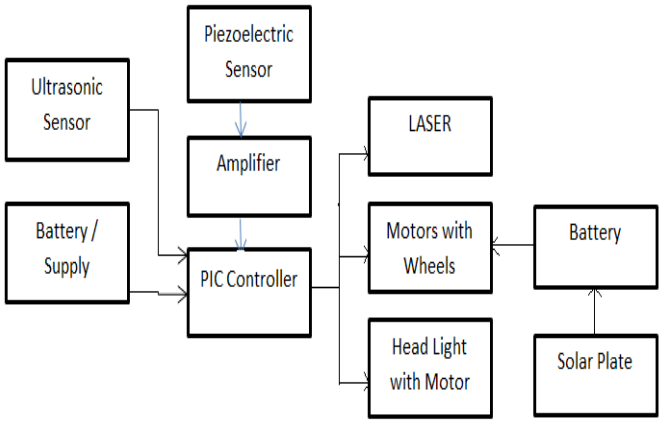

Fig. 1 Block Diagram of System

The output of ultrasonic and piezoelectric sensor is small than it is needed. So output of sensors are given to the amplifier. The piezoelectric sensor is used to control the speed. As the pressure on the sensor increases the speed increases. The laser is operated by a button which is \ assembled inside the vehicle. Whenever the button is pressed, the laser will create a line. Laser is mounted on the back of the vehicle. This will help the behind vehicle to detect the vehicle in front which will avoid collision. If the vehicle encounters with the laser

line then there will be a buzzer which will allow the driver to know the safe distance. Motors are used for wheels as well as for the headlights. The headlights moves in vertical and horizontal direction. Vertical movement is for high beam to low beam of light. And horizontal movement is during the curves. In this solar panel is used to provide power supply. Through solar battery is charged and given to the respective components. In the absence of sunlight, external power supply through battery is provided.

A. Sensor Block

The sensors used are ultrasonic distance sensor and potentiometer as steering angle sensor. It is expected that the position of the headlight will change in accordance with the steering shaft. Therefore the potentiometer, attached with the steering shaft, takes input from steering shaft sends analog signal to the ADC. This helps in horizontal movement of the headlamp. Correspondingly the vertical movement of the headlight is achieved through ultrasonic distance sensor.

B. Actuators

To facilitate movement of the headlamp based on steering shaft, the headlamp is mounted on motors. The actuator used is a servo motors for horizontal motion. The rotating angle for servo motor is 0-180 degree for horizontal. The motor works on 4.5– 6 volts.

IV. Result Analysis

Laser is attached to the back of car and displays a line on the ground for cars behind you to see your car when its foggy out. Similar to the laser bike lane lights that shine lasers to the side of you while you ride your bike to create an imaginary bike lane wherever you are, this takes the same idea and applies it to your car. Perfect for using in super dense fog, a rain, sand, or hail storm, or just at night if you are super paranoid about people rear ending your precious new car. The rear car laser creates just a red line on the ground when used on a sunny day, but when used in fog or deep rain, a red fan shape will be created on its way towards the ground.

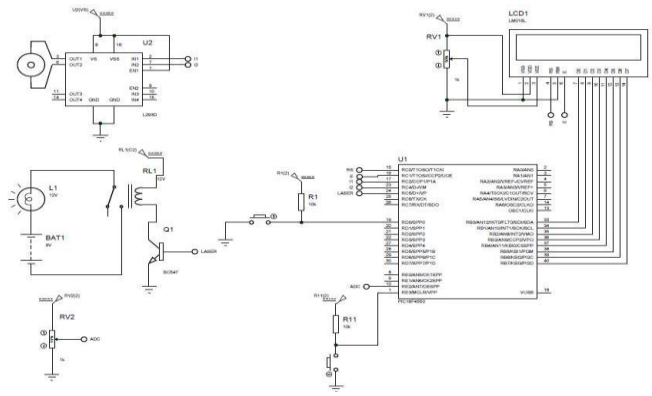

Fig. 2 Circuit Diagram

Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

Fig. 3 Laser

The back of car laser light is installed by mounting it to the rear of your car using the included 3M sticker to an area of your choosing, connecting the power to your back up lights, license plate lights, or brake lights, and then just adjusting the angle of the laser to point at a proper angle.

Fig. 4 Laser Attached Back Side

A static force results in a fixed amount of charge on the piezoelectric material. In conventional readout electronics, imperfect insulating materials and reduction.

V. Conclusion

The Adaptive Front Lighting System is a system which regulates automatically the light distribution of a vehicle. A specific control algorithm is developed for different driving conditions – curve roads and incoming vehicle's. AFS can be formally defined as maintaining a presumptively desired light distribution adapted to the above road environment. The system tested does so by way of input from in-vehicle parameters like steering wheel angle and distance between incoming vehicle and subject vehicle etc.

The horizontal headlight movement through movement of steering shaft and vertical movement of headlamp due to distance between the two vehicles is achieved by the means of AFS system architecture. Few critical design factors considered during inception stage were ease of availability, affordability and reliability of the components use. It is also observed that the system can be accommodated in the current low cost models without major changes. AFS appears to offer potential for a favorable night driving behavior potentially reducing accident risk, compared to standard headlights.

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