

Automatic Turning Headlamp

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Abstract: In today's fast-paced vehicle situation, road safety is of utmost importance. lot of peoples have lost their lives while travelling, because of a road accident. So, we should mitigate such accidents if we want to travel safely. To cater this cause, we hereby, propose an automatic steering controlled headlamp setup. The system will be adopted in any form of four wheel vehicles/trucks or trailers etc. without being an economic burden on for the user. The idea of steering controlled headlamp isn't new, however its ability to turn according to the steering turning angle as well as direction could be a new idea. Many of corporations have developed technologies that incorporate turn able headlight to better illuminate the road, however these technologies are quite costly and continue to be distant from the majority of car owners. So, we felt the necessity of developing a mechanism that incorporates few easy parts like gears, linkages etc. and can be readily fitted onto any steering system without a lot of a design variations.

Keywords: Automotive lighting system, steering system, headlamp, Curved Road, Automotive.

I. INTRODUCTION

Majority of all road traffic accidents occur in darkness and in bad weather condition – a compelling reason to put efforts into developing an intelligent lighting systems with headlamps. The aim is to boost visibility for the driver, thereby achieving a significant increase in road safety and driving comfort. numerous studies on swivel-beam headlamps have shown up to a 30 minutes' increase in the illumination of the driver's gaze point as the vehicle turns into a corner. the extra corner illumination leads to a 58% increase in the driver's ability to recognize an obstacle. The current static headlamp provides illumination in tangent direction of the headlamp without any consideration towards the turning angle of road and the distance between incoming vehicle and subject vehicle. The driver is therefore subjected to insufficient leading to unreliable or incomplete view of the road. It is therefore imperative to study new technology.

II. PROBLEM STATEMENT

The major problem hindering safer and more comfortable driving is the driver and his/her limited reaction time in the according to changing road conditions. An aim of development in active safety is to reduce the reaction time of the driver by improving visibility and thus achieve a significant increase in road safety and driving comfort. Reduced vision increases reaction time which can have fatal consequences. Drivers rely on headlights in the dark and in bad weather for a clear view of the road and to illuminate possible hazards ahead. It is, therefore, of great importance to use available technology to contribute to road safety by improving the visual conditions provided by vehicle headlights. The current system of turning headlamp are complicated and expensive hence making it unavailable for the common masses.

III.OBJECTIVE

The main aim to move the head light on sharp turning in accordance to turn angle and direction. The vehicle should get illumination front view that could help to driver taking turn on hill areas, and also to make the nation with an accident free. The principal objective of this development is to provide an improved system and method for steering controlled headlights turning with a non-significant increase in the steering effort incorporating a mechanism for easy working the whole system. It is so designed that it can be easily implemented in the available vehicles and at a very small price. If the improved design will be costly then it will add unnecessary cost to the system and it will remain out of reach of the masses. Furthermore, we have tried to ensure that the mechanism proves to be simpler and compact which requires lesser space by using linkage instead of direct meshing with the gears.

IV.METHODOLOGY

The objectives are achieved by designing a model for the left and right movement of headlights. For this, we made addition of simple pinion and four bar system to existing rack and pinion mechanism of existing steering system. When we give input to the steering wheel, the pinion attached to the steering column rotate accordingly. The rotation motion

of the steering column is converted into linear motion using rack and pinion. We use pinions mounted at the ends of the rack to provide input for headlamp to turn horizontally. This pinion act as input link of four bar mechanism to turn the headlamps. Thus, the input from steering rack itself is used to turn the headlamp according steering wheel movement hence eliminating use of sensor or complicated mechanism. Thus, we get the corresponding result in angle turning. Different iterations were done for better angle turning and better visibility by elimination of blind spot.



Fig:1 Automatic Turning Headlamp Setup

V. CONSTRUCTION AND WORKING OF AUTOMATIC TURNING HEADLAMP

A. Construction:

In this system, we have mounted two Extra pinion P1 and P2 on rack as shown in figure. Two connecting link are mounted between each headlight and each pinion. Connecting link are pivoted on the pinion and other end is mounted on the link connected fixed to headlight mounting plate. Here the angular motion is transferred to headlamp for desired movement of headlamp. headlamp base mounting plates are pivoted on two vertical rods to have an angular movement.

Components:

i. Headlamp

A headlamp is a light system in the front of a vehicle to light the road ahead. although it's common for the term headlamp to be used, headlight is the term for the device itself, whereas headlight properly refers to the beam of light produced and distributed by the device. Here in respect to automobile the headlamps are important part in term of automobile safety. The lighting system of a car consists of lighting and signaling devices mounted or else integrated to the body of vehicle and in some cases the top of a car. These lights the road for the driver and will increase the visibility of the vehicle, permitting other drivers and pedestrians to see a vehicle's presence, position, size, travelling direction and the driver's moment concerning direction and speed of travel and vice versa.

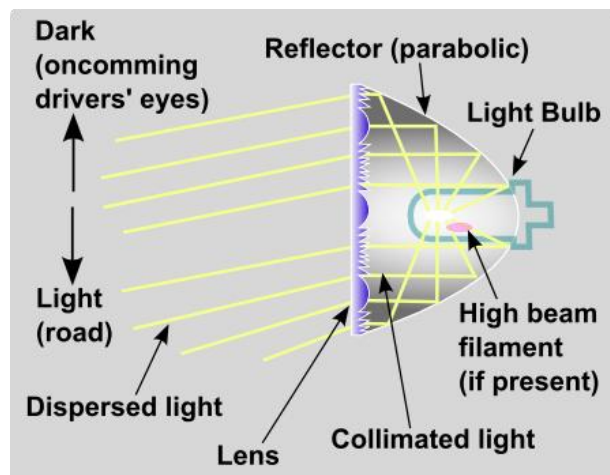


Fig:2 Automobile Headlamp

ii. Steering column:

The automotive steering column is a shaft that is primarily meant for connecting the steering wheel to the steering system or transferring the driver's input force from the steering wheel. One end of column has steering wheel connected to it while another end has pinion attached to it.

**Fig: 3 Steering Column****iii. Steering Wheel:**

A steering wheel could be a sort of steering management in vehicles and vessels (ships and boats). The wheel is that a part of the mechanism that's manipulated by the driver; the remainder of the mechanism responds to such driver inputs.

iv. Rack And pinion:

A rack and pinion could be a sort of linear mechanism that contains a try of gears that convert movement motion into linear motion. A circular gear i.e., pinion engages teeth on a linear "gear" bar i.e., the rack; rotational motion of the pinion causes the rack to maneuver relative to the pinion, thereby translating the rotational motion of the pinion into linear motion. Here we tend to use three pinion and a rack to get our objective.

**Fig:4 Rack and pinion****v. Tie Rod: -**

The tie rod is part of the steering mechanism in a vehicle. A tie rod is a slender structural rod that is used as a tie and transmits input from rack to the wheel assembly. The tie rod consists of an inner rod end and outer rod end.

B. Working:

When we give input by turning the steering wheel, the pinion attached to the steering column rotate with it. The rotation motion of the steering column is converted into linear motion using rack and pinion. We have two pinions P1 and P2 mounted at the ends of the rack to provide input for turning of the headlamp. This pinion act as input link of four bar mechanism to turn the headlamps. As the pinion rotates due to motion of the rack it pushes/pulls the connecting link thereby, turning the headlamp which is mounted in base plate with link that acts as output link.

VI. MERITS

- Easy construction.
- Low cost mechanism
- It provides safety of driver and vehicle.
- It reduces accident risk
- This system improves the visibility thus improving the response time of vehicle braking to keep safe distance between two vehicles.

VII. DEMERITS

- Cost increase due to additional components.
- Not useful when vehicle will be come at back side.

VIII. CONCLUSION

This system can be used for turning headlight according with steering movement at low cost and low risk of failure as the system is completely mechanical. This system helps to move headlights left or right as per requirement along with the turn and can help to reduce accidents at night on sharp turning and hilly areas. Main aim is to improve the prevention technique of accidents and also reducing the hazard from accidents like damage of vehicle, injury of humans, etc. is achieved by this system. We observed that our work is able to achieve all the objectives which are necessary. By implementing this project, we can reduce risk of accident in cars by giving similar kind of safety available in high end cars at low cost. Thus, we will reduce initial cost of cars and also provide better safety. We can further improve this system by using steer by wire method in turning headlamp and thus improving cost, packaging ability and efficiency.

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