

# Design and Fabrication of Adaptive Headlight System

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**Abstract** - The highest fatal traffic accident rate occurs on curve road at night time. In most cases, the late recognition of object in the traffic zone plays a key role. This fact point to the importance of the role of automobile forward lighting. In order to provide enhanced night time safety measures, this work aims to design and build a prototype of steerable headlight by adapting a adaptive static headlight with every close eye on cost and reliability. Components that are easily available in the market and suitable for developing a steerable headlight system were tested. Different kind of tests were done on critical parts of the system in order to determine its accuracy, its response time, and system impacts. Finally the result acquired from the various tests will be discussed. Any findings and changes that should be made are discussed and may be useful for future development.

**Key Words:** Prototype, Steerable headlight, Reliability, Adaptive headlight

## 1. INTRODUCTION

Conventional headlight systems incorporate fixed direction lamps, with higher or lower beam configuration which is not suitable to night driving as they do not properly illuminate the road during turning or gradient travel of vehicle. Hence there is a need of such system which will give global positioning of head lamp in minimum time.

The adaptive headlight system enables to position the headlight in any global position in minimum path travel using a single motor and low cost automation. Project aims at design, development test and analysis of the path generation mechanism. Preventive and active safety of road vehicles is one of the top priorities in car design and development nowadays. Passive and active safety systems have been developed in R&D activity to produce vehicles that will perform at the highest level of safety and ensure comfortable driving under various conditions. Moreover, researchers have been trying to develop preventive and active safety systems that will actively support driving safety using today's advanced mechatronic systems.

Lighting in modern vehicles has been steadily improving in the last decades. Modern technology provides new light sources and more powerful optical systems. With current sensors and control equipment, advanced dynamic lighting

systems are possible. The Adaptive Headlight System (AHS) is the outcome of engineering efforts in developing the next generation lighting systems not only for drivers but also for all other road users. AHS is introduced in order to prevent a possible accident from happening by increasing the visibility at night. AHS automatically adjusts the light to match the direction of travel. That enables the driver to react more quickly because he/she will see the road ahead more clearly. AHS significantly enhances driving safety in the dark by dynamically adjusting the headlights according to the car's current direction of travel to ensure optimum illumination of the road ahead and to give the driver much better visibility.

## 2. LITERATURE REVIEW

Priyanka Duba, Mr. Nanaware J.D Based on literature review the existing conventional light system do not provide illumination in the right direction on curve roads due to this constraint, a need to understand a alternative technology solution. This paper propose the new system which is based on camera as input sensor to adjust the horizontal rotation of headlamp and this is newly propose adaptive front lightning system in (AFS) helps to improve driers visibility at night time hence achieving enhance safety. The future work mainly concentrates on t invent a comprehensive AFS system which can be suitable for comlex road condition including related to this paper. Road surface water, corner, highway, rural road and urban road and so on.

Pankaj Vashishth, Prof. P. R. Rodge Based on literature review From the intelligent headlight project we can avoid the probable accidents that might happen in our country or in world. We will turn light when vehicle about to turn this is helpful in many situations. As the material we are using to develop this project is very low cost so this is also cost effective project. This can be easily implemented in all vehicles in the India.

Harshal Mohite Based we found the idea about intelligent and adaptive headlight with EPS system. The aim is to improve the visibility for the drivers thereby achieving avoid the accident in the night vision more efficiently. This paper is really useful to carry researcher work point of view.

Adarsh Gaurav Based on literature review, This paper has conferred the development of “Development of an adaptive steering controlled headlight for low cost vehicles ” in which the headlights rotates with a same angle as with which the front wheel of the vehicle rotates by the rotation the steering wheel. The linkage mechanism of steering controlled headlight proved to be robust and cost effective option which can be used in vehicles especially in heavy duty vehicles to transmit the rotation motion of the steering wheel to the headlights when the mechanism is engaged. It also increases the safety of drivers as well as passengers by providing appropriate field of view during ride in night and hilly areas which consists of frequent sharp turns. The provision of engagement and disengagement mechanism also made it suitable for use in small and mid level vehicles.

Harish Kumar Based This type of lighting system provides the better vision to the driver by turning according to the direction of the steering wheel. It will function as soon as the vehicle takes a turn. But, using this system along with automatic dimming lights can be proven to be even more effective as it automatically dims its light when a vehicle comes at a closer distance, and thus, providing a better vision to the passer-by

Shirsat Shashikant Based 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.

Ch. Prithviraj study based In this paper, primarily adaptive control of brightness of headlights is done by capturing the image of oncoming vehicle headlights and then calculating light intensity. Based on light intensity brightness of headlight is adjusted in order to avoid glaring and illuminate the path properly. Secondly Remote access of headlights of a vehicle is successfully controlled through smart phone connected to internet where it utilizes PHP based web services. This feature will help the user to find the vehicle whenever there is no proper lighting condition in the parking lane/cellar. The proposed design has been tested and implemented in real time. This system when integrated with existing vehicle features can be drawn into a commercial product.

### 3. CONCEPTUAL DESIGN

Design consists of application of scientific principles, technical information and imagination for development of new or improvised machine or mechanism to perform a specific function with maximum economy & efficiency. Hence a careful design approach has to be adopted.

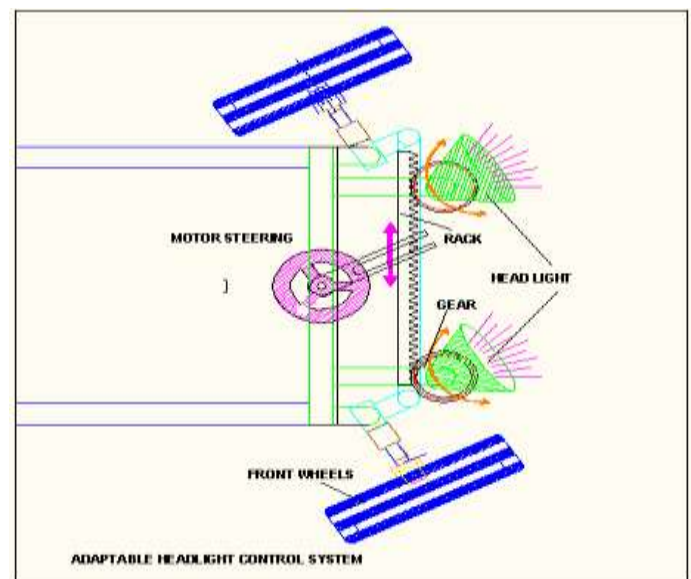


Fig.1 The conceptual design

The total design work, has been split up into two parts

1. System design
2. Mechanical Design.

System design mainly concerns the various physical constraints and ergonomics, space requirements, arrangement of various components on main frame at system, man + machine interactions, No. of controls, position of controls, working environment of machine, chances of

failure, safety measures to be provided, servicing aids, ease of maintenance, scope of improvement, weight of machine from ground level, total weight of machine and a lot more.

In mechanical design the components are listed down and stored on the basis of their procurement, design in two categories namely,

1. Designed Parts
2. Parts to be purchased

For designed parts detailed design is done & distinctions thus obtained are compared to next highest dimensions which is readily available in market. This amplifies the assembly as well as post production servicing work. The various tolerances on the works are specified. The process charts are prepared and passed on to the manufacturing stage.

The parts which are to be purchased directly are selected from various catalogs & specified so that any body can purchase the same from the retail shop with given specifications.

#### 4. CONCLUSIONS

By implementing this system in automobile, there will be less number of chances for road accidents, as the focus of driver is on driving. Due to this system there is a greater advantage in a darkness condition, where there are absences of street light, especially at highways. Thus the number of road accidents will be reduced on highways due to glaring.

This developed architecture help to remove "blind spot" and improve the drivers visibility at night time. Moving the Headlights horizontally and vertically achieved continuously corresponding to a sensor is achieved.. An advantage of the developed headlight system is easily configured to fit in variety of vehicles. The future work mainly concentrates on to invent a comprehensive AFS system which can be suitable for complex road conditions including road surface water, corner, highway, rural road and urban road and so on.

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