

Design and development of flexible headlight of auto vehicle

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Abstract—

This research presents the fabrication of movable headlight System for automotive vehicles. Headlight System is an active safety system, where the head lamp orientation control system rotates the right and left headlights independently and keeps the beam as parallel to the curved road as possible to provide better night time visibility to driver. In this device ,the use of rack and pinion arrangement which give perfect movement to the optical axes on which headlight are mounted so when a tie rod arms are moved with steering arm that give predefined motion to the wheel as well as headlights and provide light beam on curve as well as on front side of vehicle.

Keywords— wedge cam, follower, bell crank lever, spring, headlight.

I. INTRODUCTION

There is more chance of accident on hilly areas and especially at night because of improper focusing of light beam of headlights at the curve. Due to improper light visibility, judgment of driver is weak and accident can occurs. It is require to improve safety by focusing light beam at sharp turn in order to improve visibility of driver at sharp turns. This device will be used in auto vehicle like car, truck, bus etc. This device is simple in the working. In order to operate headlight, simple mechanism is used. There is no electrical units are used. As there is left turn on road movement of steering wheel will be in anticlockwise direction, by using this device only left head light will moves in left side and right headlight remains straight. Hence it provides better visibility at sharp turn as well as on straight road.

II. Literature review

SR. NO.	YEAR	AUTHOR	JOURNAL	RESEARCH PAPER TITLE	REMARK
1	2013	J.B. Jiang .et al.	International Conference on Power Electronics Systems and Applications	Design and fabrication of freeform reflector for automotive headlamp.	Modern automotive illumination system require higher efficiency, safety and good aesthetic feature.
2	2013	Kobayashi	NA	Development of Active Cornering Light System.	Enhances the light area at the corner side.
3	2010	Chi on-dong lin	NA	Steering wheel controlled car light piloting system.	Movement of headlights as per the movement of steering wheel.
4	2013	Sungmin Eum and Ho Gi Jung	IEEE Transactions on Intelligent Transportation Systems	Enhancing light blob detection for intelligent headlight control using lane detection.	The main function of the IHC system is to automatically convert high-beam headlights to low beam when vehicles are found in the vicinity.
5	2010	Jia H, Hui R, Jinfeng G, et al	NA	A lane detection method for lane departure warning system.	Experiment results indicate that this method can extract lane information from road images acquired efficiently and accurately.
6	2009	Borkar A, Hayes M, Smith M T, et al	NA	A layered approach to robust lane detection at night.	An enhancement procedure to manipulate the shape of the lane markers and then converted to binary using an adaptive threshold detection system hypothesizes lane position.

Table 1 Literature review

III. METHODOLOGY

According to practical view of AutoCAD, the two-dimensional AutoCAD model which presents the mechanism as shown in figure (1). First of all, the steering wheel which allows any vehicle in order to specify the direction during the driving. The rack and pinion mechanism which converts rotary motion into linear motion which is connected to the steering wheel. The further thing is that, two wedge cam blocks are welded on tie rod which are arranged with followers as well as moves as per movement of steering wheel. Follower is connected with bell crank lever which moves headlight in desire direction as per the movement of steering wheel. Headlight is mounted at the end of the bell crank lever which rotates headlight at fulcrum point of bell crank lever and provide light beam at desired area.

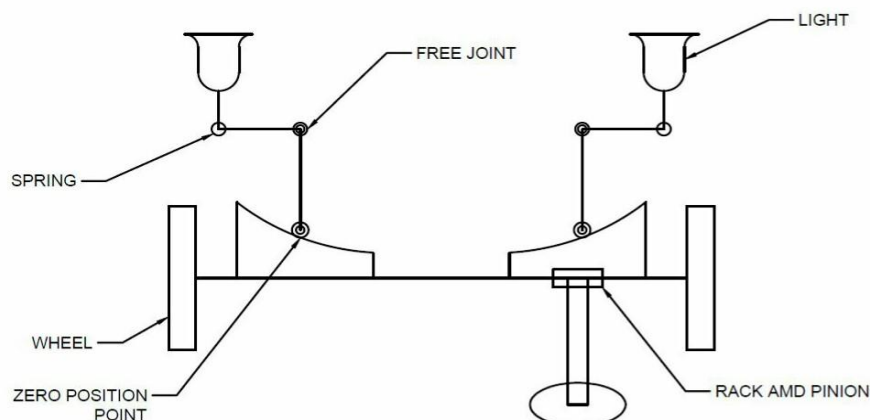


Figure 1 AutoCAD model of flexible headlight system

Components which are used for development of flexible headlight system are as shown in figure given below.



Figure 2 Project components



Figure 3 Wedge cam block

Blocks has curve cut as shown in figure which are welded on both end side of the tie rod. There are two roller links which are kept connected with wedge block and act as a follower when tie rod moves in either direction. At the end of the roller link there is a bell crank lever is joined by nut and bolt. There is fulcrum point on bell crank lever at which it rotates. Spring is attached between roller link and supporting pipe which is used for kept connected wedge block and roller link. The development of working model of flexible headlight system is as shown in figure (4) given below.



Figure 4 Model

Suppose there is right side turn on the road while driving vehicle movement of steering wheel will be in clockwise direction which allows movement of both wheels at right side direction and tie rod moves in left side which also give movement to the both wedge blocks in left side. At that time wedge block at right side gives perpendicular motion to the roller link and wedge block at left side keep left roller link straight. As per the movement of right roller link gives motion to the bell crank lever and at fulcrum point bell crank lever rotates which also give rotation to the right side headlight mounted at the end of the bell crank lever. There is no motion of left side of roller link hence left headlight will be remains straight.



Figure 5 Movement of right headlight

Suppose there is a left side turn on the road then flexible headlight system will allows to move only left headlight and right headlight remains straight which provides night time visibility on turn as well as on front side of car.



Figure 6 Movement of left headlight

Due to this system light beam can easily focused at the curve as well as at the front side of vehicle.

IV. CONCLUSIONS

Flexible headlight system focus light beam of vehicle on turn as well as on the straight side of the car which improve night time visibility of driver and reduce rate of road accidents, hence flexible headlight system is an effective method which enhances the safety against accident. For development of flexible headlight system simple mechanism which includes wedge cam, follower, bell crank lever, spring, etc. There are no any Electrical units are used for fabrication of flexible headlight system, hence initial cost will be low as well as operating cost also will be low. Simple mechanism require less maintenance which also reduce maintenance cost.

Adoption of this system in automotive vehicle will enhance the safety against road accidents.

V. FUTURE SCOPE

Flexible headlight systems require further research to develop a better system that moves headlight precisely as per the movement of steering wheel. As the time passes, designers and engineers will make flexible headlight system perfect so these systems will become more and more common. All vehicles in motion can take benefit from these systems.

Flexible headlight system controls left and right movement of headlights which focus light beam on turn. There are also more chances of accidents due to reflection of headlight to the other car drivers and reduce visibility of driver which causes accidents. There is scope of improvement in system which can sense other vehicles which are coming from front side on road by sensors and automatically provide up and down motion of headlights and enhance night visibility of drivers that improve more safety against road accidents.

Of course, problems are expected as any new technology is perfected, but few future technologies have more potential for improving focusing area of light beam toward curve then does flexible headlight.

REFERENCES

- [1] J.B. Jiang, C.F. Cheung, S.To, K.W. Cheng, H. Wang, W.B. Lee “Design and fabrication of freeform reflector for automotive headlamp” 2nd International Conference on Power Electronics Systems and Applications : Hong Kong, 12-14 November 2006, p. 220-224.
- [2] Kobayashi “Development of Active Cornering Light System” 1995.
- [3] Chi on-dong lin “Steering wheel controlled car light piloting system”, 16 May 1995, US5416465 A International Journal of Innovative and Emerging Research in Engineering Volume 1, Issue 2, 2014
- [4] Kenichi Nishimura, “Apparatus for automatically adjusting direction of light axis of vehicle headlight” 28 Jun 2011, US7967485 B2
- [5] Hiroaki Okuchi, Kunio Ohashi, Yuji Yamada, Yoshiyuki Miki “Automatic optical-axis adjusting device for automatically adjusting directions of optical axes of front lights with respect to steering angle of steering wheel” Dec 30, 2003, US6671640 B2.
- [6] Masanori Kondo, Kunio Ohashi, Yuji Yamada, Yoshiyuki Miki, “Automatic optical-axis adjusting device for automatically adjusting directions of optical axes of from lights” 10 Feb 2004, US6688761 B2