Automatic Head Light Alignment Using LDR System

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Abstract- *The topic of this project is steering controlled headlights using ldr, that are usually have separate set of headlights fit to car vehicles beside the usual low beam and high beam headlights and their feature is that they turn with the steering, so that the driver of the vehicle can see the bend, what he is actually turning into. The headlights can be connected to the steering by means of rods . operated by rack and pinion mechanism .*

Keywords- Automatic, Headlight, Alignment, Rack and Pinion.

I. INTRODUCTION

Car safety is the avoidance of automobile accidents or the minimization of harmful effects of accidents, in particular as pertaining to human life and health. Special safety features have been built into cars for years, some for the safety of car's occupants only, and some for the safety of others. This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased. Degrees of automation are of two types, viz.

- Full automation.
- Semi automation.

We have pleasure in introducing the project, which is fully equipped by automatic system. It is a project which is fully equipped and fabricated for automobile vehicles. This forms an integral part of best quality. This product underwent strenuous test in our automobile vehicles and the results are excellent. A headlamp is a lamp attached to the front of a vehicle to light the road ahead. While it is common for the term headlight to be used, headlamp is the term for the device itself, while headlight properly refers to the beam of light produced and distributed by the device. Headlamp performance has steadily improved throughout the automobile age, spurred by the great disparity between daytime and night-time traffic fatalities. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

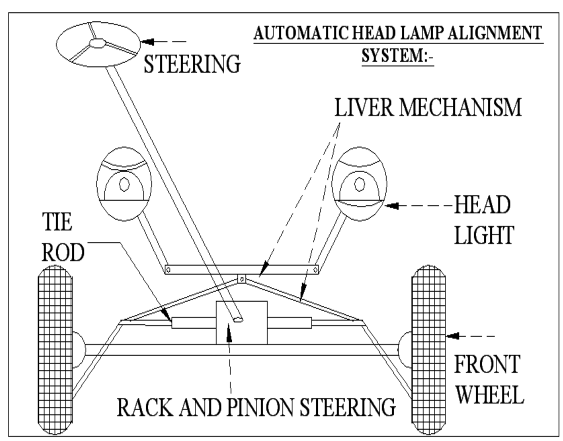
II. LITERARURE SURVEY

PriyankaDubal[1]: The aim is to improve visibility for driver and so achieve a significant increase in safety and driving comfort. This calls for a flexible front light for automobiles to illuminate road ahead in the night at corner. Adaptive front lighting system (AFS) helps improve driver's visibility at night time hence achieving enhance safety.AFS (adaptive front-lighting system) used to detect information about corner in advance with help of sensor which detect the information send it to motor to adjust headlamps to get the lighting beam which was suitable for the corner.

Robert Tamburo[2]:This paper introduces an ultra-low latency reactive visual system that can sense, react, and adapt quickly to any environment while moving at highway speeds. Our single hardware design can be programmed to perform a variety of tasks. Anti-glare high beams, improved driver visibility during snowstorms, increased contrast of lanes, markings, and sidewalks, and early visual warning of obstacles are demonstrated.

III. SYSTEM DESCRIPTION

This work is aimed at producing a cost effective smart, secured and safe vehicle system. We have built a prototype model which as shown in fig.



IV. WORKING PRINCIPLE

These provide improved lighting for cornering. Some automobiles have their headlamps connected to the steering mechanism so the lights will follow the movement of the front wheels.

1. AT NORMAL CONDITION:-

The rack and pinion steering is in straight line, so head light frame is in straight line. The head light frame is made up of mild steel materials.

2. AT LEFT SIDE TURNING TIME:-

`The rack and pinion steering turn the left direction, so that the head light frame moves in the same left side by using hinges mechanism.

3. AT RIGHT SIDE TURNING TIME:-

The rack and pinion steering turn the right direction, so that the head light frame moves in the same right side by using hinges mechanism.

Our project is to the turn the right light bracket to the right, when the vehicle turns to right leaving the left bracket to remain in standstill position, and vice versa.

V. CALCULATION

MOVABLE FRAME:

This is a frame which is mounted at the front portion of the vehicle setup and connected to the rack and pinion arrangement which is connected with the steering system.
length of rack is considered 150 mm

We have frame design of steering frame is 70 mm length
Then overall length is 150+70+70 = 390=400mm
Then consider link 1 190mm
Then from above link 1 = link 2= 190mm
Steering shaft diameter from outer diameter of pinion – pitch circle diameter=54mm
Steering shaft length is 2 feet.

RACK AND PINION:

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion.

Module formula for spur gear
Note:
M = Module
D = Pitch Diameter (mm)
T = Number of Teeth
C = Pitch circle (mm)
Maximum bending stress induced is given by Lewis bending equation as follows.

$$\sigma = \frac{Ft*D}{b*Y}$$

Where
σ = bending stress in gear tooth
Ft- maximum allowable tangential force acting on gear tooth = 25 N
D = diameter of pinion
b= face width of pinion = 15 mm
Y = Lewis form factor = 0.344 for 27 no. of teeth
We design pinion and rack of cast iron
σ= Syt / Factor of safety = 250 / 2 = 125 Mpa

$$\sigma = \frac{Ft*D}{b*Y}$$

$125 = \frac{20*D}{15*0.344}$
D= 125*15*0.344 / 25
D = 25.8 mm
Taking factor of safety as 1.5
The diameter of gear = 25.2*1.5 = 37.8 mm = 40 mm
So we take D= 40 mm

Module:

Module is the unit of size to indicate how big or small a gear pinion is. It is the ratio of the reference diameter of the gear pinion divided by the number of teeth. Thus the formula of Module Calculation of gear pinion is:

Module (M) = Reference Diameter / Number of Teeth
Pinion PCD = D =40 mm.
Minimum no. of teeth = we take minimum number of teeth= T = 27
Module m = D/ no. of teeth
= 40/27
= 1.4814 = 1.5
So selected module is 1.5

PINION DIMENSIONS:

Outside diameter:

Outside diameter, it is the overall diameter of the gear which is the pitch circle plus two addendums. Its relationship with module can be described by formula:

Outside diameter formula for spur gear Do
Do = 2m + D
Note:
Do = Outside diameter (mm)
M = Module
D = Pitch diameter (mm)
Do = 2m + D
= 2*1.5 + 40
= 43 mm

1. Root diameter:

Root diameter, it is the diameter of the root circle that is the circle formed by the bottoms of the tooth spaces. Its relationship with module can be described by formula:
Root diameter formula for spur gearDr
Dr = D – (2m + 2c)
Note:
Dr = Root diameter (mm)
M = module
D = Pitch diameter (mm)
C = Clearance 0.25 mm
Dr = D – (2m + 2c)
= 40-(2*1.5+2*0.25)
= 36.5 mm
So Root diameterDr= 36.5 mm

2. Addendum:

Addendum, it is the radial distance between the pitch circle and the outside diameter or the height or the tooth above the pitch circle. The addendum is equal to the module by formula:
Addendum formula for spur gear Ad
Ad = m
Note:
Ad = Addendum (mm)
M = module
So Addendum Ad = 1.5 mm

3. Dedendum:

Dedendum, it is the radial distance from the pitch circle to the bottom of tooth space. The dedendum is equal to the module plus the clearance by formula:
Dedendum formula for spur gearDd
Dd = m + c
Note:
Dd = Dedendum (mm)
M = module
C = Clearance = 0.25 mm
So Dedendum is calculated as
Dd = m + c
= 1.5+0.25
Dd= 1.75 mm

Rack and pinion design specifications-

No. of teeth of rack=70.
No. of teeth on pinion=27.
Length of rack= 380mm.
Pinion PCD=40 mm.
Pinion module =1.5
Rack module = 1.5

VI. CONCLUSION

An automatic headlamp dimmer of on-coming vehicles had been designed using LDR sensing technique. Thus, the system device automatically switches the headlight to low beam when it senses a vehicle approaching from the opposite side using Light Dependent Resistor (LDR) sensor.

VII. ACKNOWLEDGMENT

The preferred spelling of the word acknowledgment in American English is without an after the . Use the singular heading even if you have many acknowledgments.

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