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DEVELOPMENT OF HEAD LIGHT SYSTEM AND AUTOMATIC HAND BRAKE RELEASE SYSTEM

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ABSTRACT

This paper presents movable Headlight System for motor 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. The point of this project is guiding controlled (or directional) headlights, that are generally a different arrangement of headlights fitted to street vehicles close to the typical low bar/high pillar headlights and their component is that they turn with the guiding, so that the driver of the vehicle can see the curve, what he is really transforming into. The headlights can be associated with the guiding linkage by method for bars or links. Also represents "Automatic hand brake release" system which is one of the softening frameworks up car at the season of vehicle switch off condition. In this braking framework mechanized worked one. In this, the control unit is gotten the sign from the key switch. The key switch is "ON" at the season of vehicle beginning condition. Brake (Already wheel is on braking condition).

KEYWORDS: Automotive light system, Automatic Hand Brake Release System, Magnetic coupling, permanent magnets, Design.

1. INTRODUCTION

Automatic head light alignment a headlamp is a light joined to the front of a vehicle to light the street ahead.

While it is regular for the term front light to be utilized reciprocally as a part of casual

discourse, headlamp is the term for the gadget itself, while fog light appropriately alludes to the light emission delivered and disseminated by the gadget.

Headlamp execution has relentlessly enhanced all through the vehicles age, prodded by the immense uniqueness in the middle of daytime and evening time movement fatalities: the US National Highway Traffic Safety Administration expresses that almost 50% of all activity related fatalities happen oblivious, in spite of just 25% of movement going amid obscurity. Different vehicles, for example, trains and flying machine, are required to have headlamps. Bike headlamps are frequently utilized on bikes, and are required in a few locales. They can be fueled by a battery or a scaled down generator. This is a time of mechanization where it is comprehensively characterized as substitution of manual exertion by mechanical force in all degrees of computerization. The operation remains a crucial part of the framework despite the fact that with changing requests on physical data as the level of motorization is expanded.

OBJECTIVE

About the Head lamp

The main objective of this system is to apply automotive vehicle.

a) To move the headlight along with steering on sharp turning.
b) To keep the headlight beam parallel to road turning as possible as can.
c) To change the place of area illuminated by headlight and direct illumination area of headlight in useful direction.
d) To improve the visibility area of driver at night so that driver can judge road turning well.
e) To prevent road accidents on sharp turning at night specially in hilly areas.
f) To increase safety at night.

Automatic Hand Brake Release

"Automatic hand brake release", which is completely prepared via programmed framework. It is a venture which is completely prepared and intended for Automobile vehicles. This structures a vital piece of best quality. This item experienced strenuous test in our Automobile vehicles and it is great. In autos, the stopping brake, likewise called hand brake, crisis brake, or e-brake, is a locking brake generally used to keep the vehicle stationary. It is now and again additionally used to keep a vehicle from rolling when the administrator needs both feet to work the grasp and throttle pedals.

Car hand brakes generally comprise of a link straightforwardly associated with the brake

instrument toward one side and to a lever or foot pedal at the driver's position. The component is regularly a hand-worked lever (henceforth the hand brake name), on the floor on either side of the driver, or a draw handle situated underneath and close to the controlling wheel segment, or a (foot-worked) pedal situated far separated from alternate pedals.

Importance of automatic hand brake

Traditional stopping brake on in-citation includes the human impedance. Without pulling or pushing the lever, the stopping brake won't work. Additionally, at times because of carelessness or in crisis conditions, we people frequently neglect to apply stopping brakes. This might prompt moving of vehicle in the event of inclines and crash with different vehicles in stopping zone. Steady upgrades in dynamic safety and enhancements as for the dependability and solace of operation imply that mechanical handbrakes are progressively being supplanted by electromechanical frameworks.

2. LITERATURE REVIEW

Programmable Automotive Headlights Robert

Tamburo et.al. The primary goal of an automotive headlight is to improve safety in low light and poor weather conditions. But, despite decades of innovation on light sources, more than half of accidents occur at night even with less traffic on the road. Recent developments in adaptive lighting have addressed some limitations of standard headlights, however, they have limited flexibility - switching between high and low beams, turning off beams toward the opposing lane, or rotating the beam as the vehicle turns - and are not designed for all driving environments. Design and testing of a new electric parking brake actuator Chien-Tai et.al. Automotive Research & Testing Center (ARTC) Electric parking brake (EPB) system provides the roomy space for vehicles compared with traditional handbrake system.

Combining a control unit realizes the intelligent functions, which make vehicles more convenient and secure, and avoid the vehicle damage and danger caused by the negligence of drivers. This paper provides a new concept design of the EPB system that has simple and low-cost characteristics. Design of an adaptive headlights system for automobiles Rareş CRIŞAN et.al. Nowadays, the automobile industry is more and more dynamic. The major issue in the design of the automobiles represents the safety of the transportation. In this idea, this paper presents the issues related to the safety of driving in night or fog conditions, the comparison between classical lights and adaptive systems, as well as one solution, developed at our Department which deals with fully integrated solution for positioning of the spot lights

which is used as didactical stand.

3. SYSTEM ARCHITECTURE

These give enhanced lighting to cornering. A few vehicles have their headlamps associated with the guiding component so the lights will take after the development of the front wheels.

At Normal Condition:-The rack and pinion steering is in straight line, so that the head light frame is in straight line. The head light frame is made up of mild steel pipe materials.

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. Head light is drawn supplies from the already charged 12 voltage lead-acid battery. 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. "Automatic HAND BRAKE RELEASE" is only one of the softening frameworks up car at the season of vehicle switches off condition. In this braking framework mechanized worked one. In this venture, the control unit is gotten the sign from the key switch. The key switch is "ON" at the season of vehicle begin condition. The first run through grasp is connected so that the engine is turning in forward course for 2 sec to discharge the brake (Already wheel is on braking condition). The key switch is "OFF" the engine is turning in prize course for 2 sec to applying the brake.

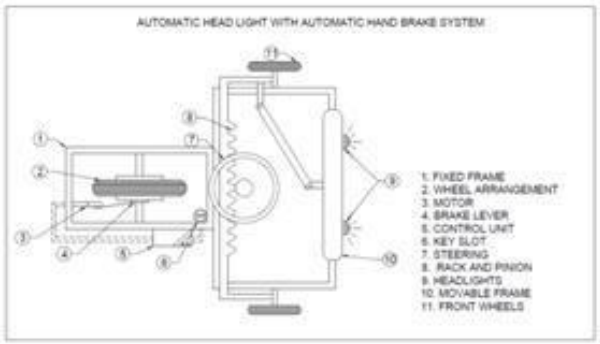

Fig.: The project schematic of the system.

4. COMPONENTS AND SYSTEM DESIGN

a. Motor

An electric motor is a machine which changes over electrical vitality to mechanical vitality. Its activity depends on the rule that when a current-conveying conductor is set in an attractive field, it encounters an attractive power whose course is given by Fleming's left hand

principle. At the point when a motor is in operation, it creates torque. This torque can create mechanical turn.

DC engines are likewise like generators ordered into shunt wound or arrangement wound or compound injury motor.

Output Power = 15 watt Shaft diameter = 15 mm Voltage= 12 volt DC Torque= 15 Kgcm= 1.47 Nm. Speed= 100 rpm

b. Control Unit

In car hardware, Electronic Control Unit (ECU) is a nonspecific term for any installed framework that controls one or a greater amount of the electrical framework or subsystems in an engine vehicle.

c. Wheel Arrangement

The simple wheel and braking arrangement is fixed to the frame stand. Near the brake drum, the pneumatic cylinder piston is fixed. This wheel arrangement is setup for showing the successful working of our project. But the real implementation can be done in the automobile and the brakes can be applied to all the four wheels.

d. Frame

This is made of mild steel material. The whole parts are mounted on this frame structure with the suitable arrangement. Boring of bearing sizes and open bores done in one setting so as to align the bearings properly while assembling. Provisions are made to cover the bearings with grease. WE design a basic frame for a prototype by mild steel channel (L beam), L Channel- MS Angles are L-shaped structural steel represented by dimension of sides & thickness. For e.g. 25x25x3 means, both the sides of angles are 25mm and thickness is of 3mm.

e. Rack and Pinion

A rack and pinion is a kind of direct actuator that contains a couple of riggings which change over rotational movement into straight movement. A round rigging called "the pinion" connects with teeth on a direct "apparatus" bar called "the rack"; rotational movement connected to the pinion causes the rack to move in respect to the pinion, in this manner deciphering the rotational movement of the pinion into straight movement. Rack and pinion design specifications-

No. of teeth of rack=70. No. of teeth on pinion=27. Length of rack= 380mm. Pinion PCD=20 mm. Pinion module = 6.

f. 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. When the steering is turned left or right, this frame along with the steering turns in the steering direction. The headlights are mounted upon this frame such that when the frame turns, the headlights also turns with it.

g. Headlights

A headlamp is a light connected to the front of a vehicle to light the street ahead. While it is regular for the term fog light to be utilized reciprocally as a part of casual exchange, headlamp is the term for the gadget itself, while front lamp appropriately alludes to the light emission created and dispersed by the gadget.

5. DESIGN CALCULATIONS

Design of frame for safety

Frame design for safety FOR 25*25*3 L angle mild steel channel

b = 25 mm, d= 25 mm, t = 3 mm.

Consider the maximum load on the frame to be 50 kg. Max. Bending moment = force*perpendicular distance

= 50*9.81*150

M = 73575 Nmm We know,

M / I = σb / y

I = bd3 /12

= 25*253 / 12

I = 32552.08 mm4

σb = My / I

= 73575*12.5 / 32552.08

σb = 28.25 N /mm2

The allowable shear stress for material is

σallow = Syt / fos

Where Syt = yield stress = 210 MPa = 210 N/mm2

And fos is factor of safety = 2

So σallow= 210/2 = 105 MPa = 105 N/mm2

Comparing above we get,

σb < σallow i.e. 28.25 < 105 N/mm 2

So design is safe.

Torque required by motor to brake the wheel

The torque required to tilt the solar panel with frame structure is as follows:Total mass of WHEEL = 4 kg (consider structural mild steel system) WHEEL OUTER DIAMETER = 400 mm = 0.4 m Angular velocity of tilting is 100 rpm = 100/60 rps

Amount of Torque required to apply brakes is:

$T=Mgr.\sin\theta + I\alpha$

Where,

Mg=weight of the tilting mechanism. I = Moment of Inertia I= mk2,

α = angular acceleration of the tilting mechanism

To calculate torque required for braking and force required for that we need to find above values

1. Radius of gyration

For rectangular object the radius of gyration can be obtained as, k2= 1/3((D/2)2

Where D is diameter of wheel in m D =400 mm = 0.4 m

So,

k2= 1/3((D/2)2 = 115 mm.

To calculate I (inertia of the tilting mechanism) I= mk2 = 0.0529 kg.m2

2. To calculate angular acceleration

Angular acceleration is the rate of change of angular velocity.

In SI units, it is measured in radians per second squared (rad/s2), and is usually denoted by the Greek letter alpha (α) We need to find angular velocity. In two dimensions the angular velocity ω is given by

$\omega = 2\pi N$

The angular acceleration is

α = angular velocity / time = ω/t = 2πN / t

For one t= minute = 60 sec.

= 2*3.142*100 / 60*60 = 1.74 rad/sec2

On substituting the values in equation 1, we get,

$T=Mgr\sin\theta + I\alpha$

$T= (4*9.81\times0.2\times\sin90) + (0.0529 \times 1.74) = 38.84$ N-m

3. Amount of Force required for braking

$T = F r$

$38.84 = F*0.2$

$F= 194.24$ N

6. ADVANTAGES

- Free from wear adjustment.
- Reduce the manual work
- Less skill technicians is sufficient to operate.
- Installation is simplified very much.

7. APPLICATIONS

- Four wheeler application.
- It is also implemented in two wheeler.
- This system can be used in heavy moving vehicles such as buses and trucks etc.

8. CONCLUSION

The topic of this project is steering controlled (or directional) headlights, that are usually a separate set of headlights fitted to road vehicles beside the usual low beam/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 electromechanical parking brake help with automatic parking brake application based on Engine ignition condition. Safe braking is assured in slopes and hill starts with the help of "HOLD" function. This system also gets some advanced options like hold function in head to head traffic and inclined roads, which would promise the drivers and vehicle owners with a safe pleasure drive and stops.

REFERENCES

1. Tamburo, Robert, et al. "Programmable automotive headlights." European Conference on Computer Vision. Springer International Publishing, 2014.
2. Huang, Chien-Tai, et al. "Design and testing of a new electric parking brake actuator." SAE International Journal of Passenger Cars-Mechanical Systems 1, 2008-01-2555,

2008; 1217-1222.

3. Priyanka Dubal Mr. Nanaware J.D. "Design of Adaptive Headlights for Automobiles."International Journal on Recent and Innovation Trends in Computing and Communication, March 2015; 3(3).
4. Tatsuya Yamasaki, Masaaki Eguchi, Yusuke Makino, NTN technical review No., Need of an Electromechanical Brake, 2007; 75.
5. Lee Y O, Wongoo Lee, Lee C W, Novel clamping force control for electric parking brake systems, Published in Asian Control Conference, 2009.
6. Sneh al Parhad, "Development of Automotive Adaptive Front Lighting System," Proceedings of IRF International Conference, 5th & 6th February 2014, PuneIndia. ISBN: 978-93-82702-56-6.
7. H. Hogrefe, "Adaptive frontlighting systems for optimum illumination of curved roads, highway lanes and other driving situations," SAE 2000-01-0431. Warrendale, PA: Society of Automotive Engineers, 2000.