FRONT WHEEL STEERING SYSTEM WITH MOVABLE HEADLIGHTS

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ABSTRACT

The aim is to design and develop a "Steering Controlled Headlight Mechanism" which acts as directional headlights. This is done by connecting headlights and steering. Present day automobiles don't have effective lighting system. Due to this many accidents are taking place during night times especially in ghat sections. The accidents can be avoided by incorporating Steering Control Headlight Mechanism. The rack and pinion steering gear mechanism is used for this project. When the steering wheel is rotated and rotary motion is converted to translator motion through the rack and pinion mechanism. When the front wheels are steered, the headlights follows the same path and the light is focused on more divergent area. In the present project, it is planned to design "Steering Controlled Headlight Mechanism" and a live model unit is fabricated. Present day automobiles don't have effective lighting system. Due to this many accidents are taking place during night times especially in ghat sections. Conventional Head lights tend to illuminate the side of the road while cornering or shine off the road entirely, which can lead to unsafe condition. To overcome this problem an idea has been developed by introducing "Steering Controlled Head lights Mechanism".

Keyword: -*Rack & pinion,Head light,front wheel steering with ackermans principle..*

1.INTRODUCTION

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. One of the choices available is Design and fabrication of steering controlled head light system. 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. Still, more specially, this device relates to a headlight arrangement operable connected to the steering and front wheel assembly of and automobile operably to maintain headlight members and the front wheels pointed in the same direction at all times. The most conventional steering arrangement is to turn the front wheels using a hand–operated steering wheel which is positioned in front of the driver, via the steering column, which may contain universal joints to allow it to deviate somewhat from a straight line. Other arrangements are sometimes found on different types of vehicles, for example, a tiller or rear–wheel steering. Tracked vehicles such as tanks usually employ differential steering — that is, the tracks are made to move at different speeds or even in opposite directions to bring about a change of course.dent rear suspension it is normally achieved by changing the rates of the rubber bushings in the suspension. Some suspensions will always have compliance over steer due to geometry, such as Hotchkiss live axles or a semi trailing arm IRS. Four-wheel steering (or all wheel steering) is a system employed by some vehicles to improve steering response, increase vehicle stability while maneuvering at high speed, or to decrease turning radius at low speed. most *active* four-wheel steering systems, the rear wheels are steered by a computer and actuators. The rear wheels generally cannot turn as far as the front wheels. Some systems, including Delphi's the system in Honda's Prelude line, allow for the rear wheels to be steered in the opposite direction as the front wheels during low speeds. This allows the

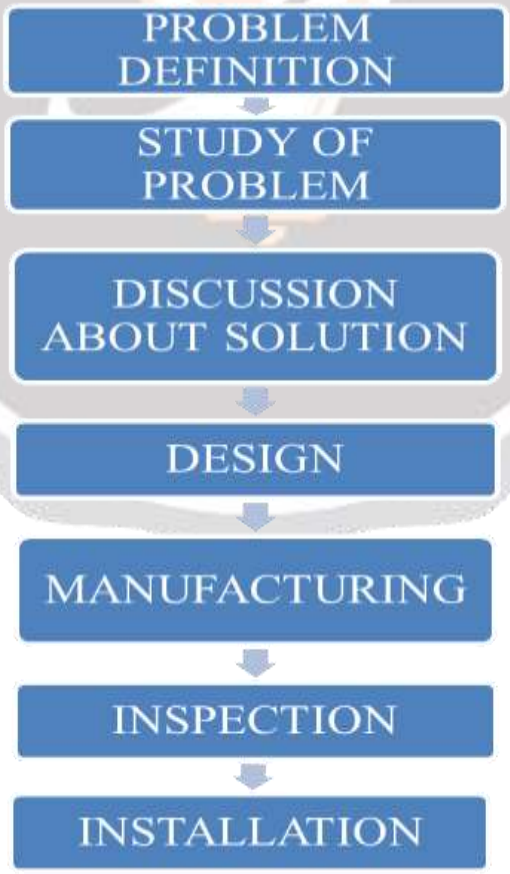
vehicle to turn in a significantly smaller radius — sometimes critical for large trucks or vehicles with trailers. An electronic four-wheel steer system is an option available on the JCB Fastrac. Many modern vehicles offer a form of *passive* rear steering to counteract normal vehicle tendencies. For example, Subaru used a passive steering system to correct for the rear wheel's tendency to toe-out. On many vehicles, when cornering, the rear wheels tend to steer slightly to the outside of a turn, which can reduce stability. The passive steering system uses the lateral forces generated in a turn (through suspension geometry) and the bushings to correct this tendency and steer the wheels slightly to the inside of the corner. This improves the stability of the car, through the turn. This effect is called compliance under steer and it, or its opposite, is present on all suspensions. Typical methods of achieving compliance under steer are to use a Watt's Link on a live rear axle, or the use of toe control bushings on a twist beam suspension.

1.2 Objectives

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

- To move the headlight along with steering on sharp turning.
- To keep the headlight beam parallel to road turning as possible as can.
- To change the place of area illuminated by headlight and direct illumination area of headlight in usefull directions
- To improve the visibility area of driver at night so that driver can judge road turning well.
- To prevent road accidents on sharp turning at night specially in hilly areas.
- To increase safety at night.

1.3 Methodology



2. LITERATURE REVIEW

The present invention relates to a vehicle front lamp light distribution control system and more particularly to a vehicle front lamp light distribution control system capable of raising visibility at the time of cornering bycontrolling light distribution means of the front lamp.

According to-

1. Japanese Patent Publication No. H5-23216,
2. Japanese Patent Application Laid-Open No. H8-183385,
3. Japanese Patent Application Laid-Open No. H11-78675, and
4. Japanese Patent Application Laid-Open No. H8-192674

Laxmi et al. [1] Design & Fabrication of steering controlled headlights in automobile states, A vehicle head lamp including a fog lamp is provided with a movable reflector and by turning the movable reflector in the steering direction by an amount corresponding to a steering angle of the steering wheel, the light distribution pattern of the front lamp is changed in the direction of vehicle's turn so as to raise visibility at the time of cornering However, according to the aforementioned earlier art, the light distribution pattern of the front lamp is changed in the steering direction of the steering wheel by an amount corresponding to the steering angle when the vehicle turns on an intersection or the like, cornering destination cannot be beamed brightly enough before operating the steering wheel.

Therefore, an t capable of beaming the cornering destination prior to operation of the steering wheel has been demanded. Czech Tetra and 1920s Ca dills were early implementer of such a technique, producing in the 1930s a vehicle with a central directional headlamp. The American 1948 Tucker Sera was likewise equipped with a third central headlamp connected mechanically to the steering system. The 1967 French Citroën DS and 1970 Citroën SM were equipped with an elaborate dynamic headlamp positioning system that adjusted positioning in response inputs from vehicle steering and suspension systems, though US regulations required this system to be deleted from those models when sold in the USA. Presently, studied changes are unfolding in automotive lighting technology.

Automobile manufacturers - together with suppliers and representatives - currently aspire to develop the headlights of tomorrow. Freeform headlamp is one of the popular design which offers great flexibility and compactness. They suggested that the apparatus for automatically adjusting a direction of a light axis of a vehicle headlight includes a steering angle sensor detecting a steering angle of a steering wheel of a vehicle and a swivel control unit performing swivel control by which the direction of the light axis of the vehicle headlight is adjusted to the target direction in accordance with the steering angle detected by the steering angle sensor. Proposed automatic optical-axis adjusting device for automatically adjusting direction of optical axes of front lights with respect to steering angle of steering wheel An electronic control for automobile headlight utilizing a spherical sensor comprised of a metal ball surrounding by a fluid encapsulated in a spherical sensor which is connected to the spherical sensor system. The automatic optical axis adjusting device for automatically adjusting direction of optical axis of from lights headlight control apparatus and method controls an irradiation direction of a headlight. This apparatus uses a navigation based swivel angle calculated based upon the shape of a road in a navigation based control period and a steering based swivel angle calculated based upon a steering angle in a steering based control period [2] The optical design, fabrication and the measurement of the freeform reflector headlamps are investigated by Shinde G. et al. [3] proposed the new standard for cornering light system allows not only the conventionally approved ONOFF control mode interlocked with the operation of the turn signal switch but also an automatic ON-OFF control according to the steering wheel angle. The active cornering light system (ACL system) on the new DELICA D: 5 have a dedicated ECU to control the operation of the lamps. On-dong line investigated by car light piloting system objective of the present invention is to provide a steering wheel controlled car light pointing system which automatically turns the lights of the motor car to coincide the projection of the lights with the steering direction of the motor car

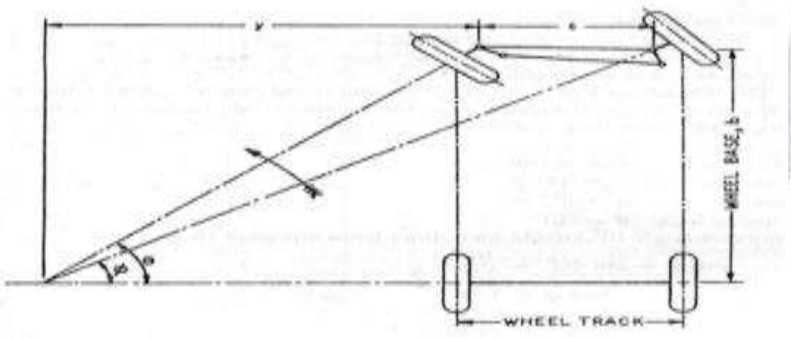
3. WORKING

Steering system is to achieve angular motion of the front wheels to negotiate a turn. This is done through linkage and steering gear which convert the rotary motion of the steering wheel into angular motion of the front road wheels. The parts of steering system are consisting of Steering linkage and Steering gear. Steering Linkage-it depend upon the type of vehicle, wither it is a car which has independent front suspension. Steering linkage for vehicle is defining two types like as Steering

Linkage for Vehicle with Rigid Axle Front Suspension and Steering Linkage for Vehicle with Independent Front System.

Fig- Front wheel system

4. CALCULATIONS:

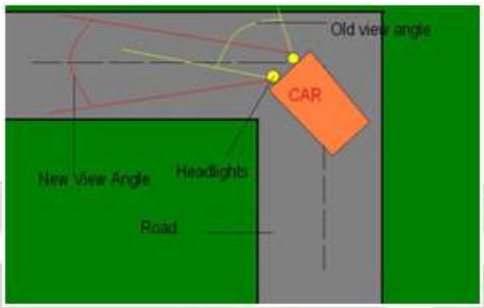


Cot φ = (y + c)/b (φ = angle of outside block)
= Cot θ + (c/b) (θ = angle of inside block)
Cot φ– Cot θ = c/b
Where,
b = wheel base
c = pivot center
y= is represented in the figure
a = wheel track

Data obtained by measuring the experimental set up
b = 3.7m
c = 1.2m
y = 2.2m
By calculating using above values
$\theta = 58.92^0$ $\emptyset = 34.79$

5. RESULT

The effective Headlight Moving mechanism with Steering was designed, based on Rack and pinion mechanism, to move the steering arm that gives predefined motion to wheel and headlights. This is very important system, which help to move the headlight as per turn, right or left. And it can be help for making nation accidents free roads. observed that when the steering wheel is rotated through a certain angle towards right side of the driver, the head lights are tilted through certain angle in degrees to the right with the help of different linkages arranged with respect to the steering wheel which were discussed earlier. The same features are observed when the steering wheel is turned to the left side. The results that we have achieve with mechanically actuated steering controlled head lights is pictorially represented as shown in figures.



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