

A
Project Report
on
"STEERING CONTROL
HEADLIGHT SYSTEM"

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SAHAKAR MAHARSHI LATE BHASKARRAO SHINGANE ARTS COLLEGE,
KHAMGAON

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**In partial fulfillment of requirements for the degree of
Bachelor of Vocational**

SUBMITTED BY:

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CERTIFICATE

Certified that Project work entitled "Steering Control Headlight System" is a Bonafide work carried out in the final year by "Roshan Prabhakar Wankhade Ganesh Bhagwat Faste Vitthal Pramod Wagh Buddhabhushan Deodhan Ingale Dnyaneshwar Sopan Digole Aniket Ambadas Girhe Sopan Rambhau Mohe" in partial fulfillment for the award of Bachelor of Vocation from Sant Gadge Baba Amravati University, Amravati during the academic year 2021-22 from 7 September 2021 to 21 September 2021 and 12 April 2022 to 27 April 2022.



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1. INTRODUCTION

The present invention relates to headlights of an automobile, more particularly to a direction turning device for headlights of an automobile which enables to turn direction synchronously with the rotation of the steering and hence increasing the safety for driving at night or in the darkness.

In the known technology of the prior art, a headlight of an automobile has a fixed line of emission which is aligned with the front direction of the automobile. Although the effects of "high beam" or "low beam" can be achieved by adjusting the angle of elevation of the headlight, the direction of emission is not adjustable as to the left or right.

When the road curves or turns, the corner on time when the car turns, thereby creating a dead angle of illumination and such lack of visibility poses danger in driving at night or in darkness. Therefore, it is highly desirable to invent a device to solve this problem and such device is of high utility. A headlight of an automobile in synchronization with steering and thus increases the illuminated area upon changes of direction of the automobile when the automobile makes turns.

In ancient Directional headlights, when the steering steers to right or left direction, then both the right and left headlights will steer to the perspective directions. It results in altering the optical axis of the head light to the vehicle speed and the front road-shape. But according to our project, when the steering steers to right then the right side of the headlight bracket steers to right side and the left side headlight bracket remains stationery by cam mechanism and it is similar for the other side also. Because of this, the optical axis of the headlight is widened and it is useful for the drivers for safety ride.

Our project comprises four bar mechanism is used to turn the head lights to right or left direction, sprockets are used to transmit motion and to reduce the no of rotations from steering rod to small shaft.

Steering Controlled Headlight System

According to our project, when the steering steers to the right, the light bracket at right as well as left steers to right using four bar mechanism & vice versa. At the same time the left bracket also rotate due to the mechanism. The reductions of motion of sprockets are used to turn the brackets to the required angle respective to the steering rotation.

Our project will be useful for vehicles, which are been used in hill areas. In our project the headlights are controlled by the steering introducing some mechanical linkage.

When car is turning about any turn then the driver should have to turn the steering for getting turn, at that time the headlights are steady and driver could not get any idea about the turning are is safe or unsafe. Our project removes this undesirable quantity of headlight and while taking turn the headlights also turn. And gives better turning effects.

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 by controlling light distribution means of the front lamp. According to-

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

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 art capable of beaming the cornering destination prior to operation of the steering wheel has been demanded. Czech Tatra and 1920s Cadillacs were early implementer of such a technique, producing in the 1930s a vehicle with a central directional headlamp.

3. HISTORY OF DEVELOPMENT

Although the concept of headlights that follow the movements of the steering is still considered nowadays as being innovative, it is not new.

Pioneers and milestones in the automotive history featuring directional headlights were the Willys - Knight 70A Touring, the Czech Tatra and the American Trucker Sedan.

These cars were equipped with a third central headlight mechanically connected to the steering system. The most famous car featuring directional headlights, was the Citroen DS, introduced on the Paris Motor Show.

This car had both headlights not only swiveling with the steering, but they were self leveling as well, responding to inputs from the suspension. While it was a purely mechanical system operated by cables, the Citroen SM used a sealed hydraulic system with a glycerin based fluid. On present day motorcars two types of directional headlight system are in use

1. A fixed light that only turns on and off based on steering and vehicle speed.
2. The light is motorized by the use of small electric motors and physically swivels according to the movement of the steering wheel and vehicle speed.

This modern technology first appeared in 2003 on the Porsche Cayenne (fixed) and the Mercedes E-class (motorized). Soon other manufacturers followed them such as the BMW with the steering controlled headlights and cornering lights and nowadays most of the main brands use such systems on their vehicles

like Acura, Audi, BMW, Cadillac, Ford, Infiniti, Jaguar, Land Rover, Lexus, Mercedes-Benz, Opel, Porsche, Saab, Volkswagen, Volvo and Mazda, Audi is experimenting with a system which uses satellite navigation adjusts the headlights according to the road layout ahead the vehicle.

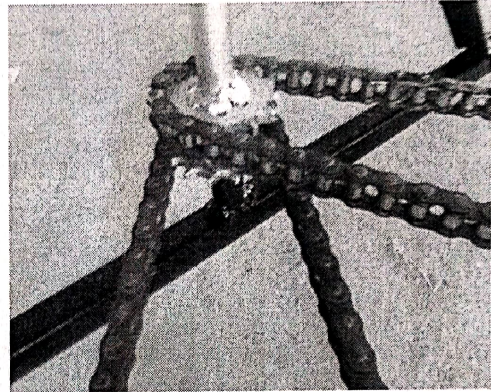
4. CONSTRUCTION

The main components used in this project are

1. *Small Sprockets*
2. *Big Sprockets*
3. *Transmission system*
4. *Steering system*
5. *Light brackets*
6. *Frames*
7. *Chain drive*
8. *Headlights*

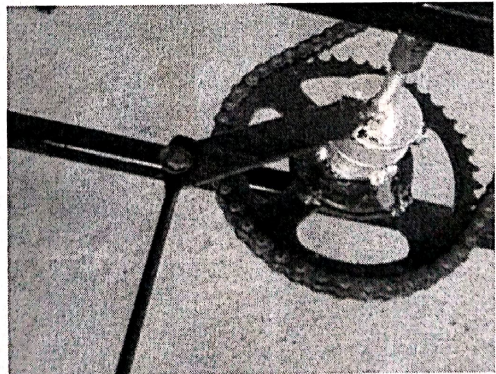
1. *Small Sprockets*

Small sprockets are used to transmit the power from steering rod to the main sprockets which are bigger in sizes. In the small sprockets steering rod is used as a sprocket shaft, so it is easy to transmit the torque for performing its simple power transmission work.



2. *Big Sprockets*

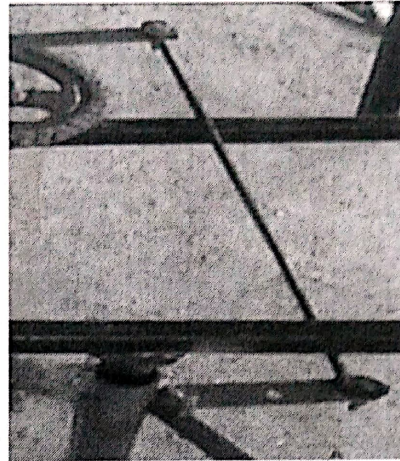
These are the main sprockets for transmission of power or torque from small sprockets to the headlight connections. These sprockets are bigger in diameter and transmit small power than the small sprocket and special holding shaft is necessary for these sprocket.



3. Transmission system

In our project we use the connecting rod and two moving links which are similar to the for bar chain mechanism.

This transmission system provide the power from larger sprocket to the headlight connecting rods.



4. Steering system

Steering system is an important part of the steering control headlight system. Steering is use to turn the vehicle and also an component of the control system in automobile.



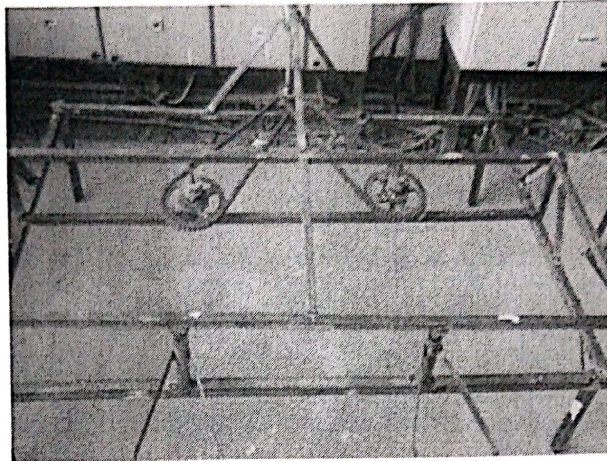
5. Light brackets

Light brackets are the component of turning of headlight. These are use to help, protect & turning facility to the lights inside it.



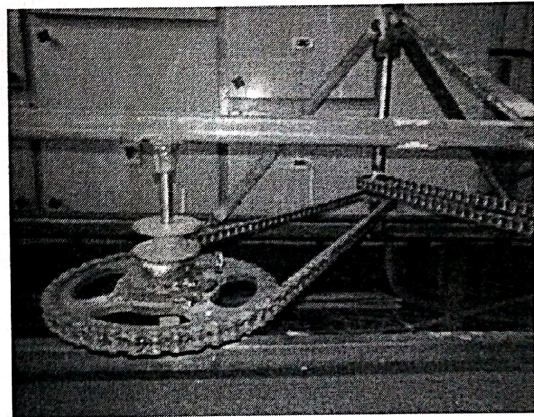
6. Frames

Frames are supporting components for steering controlled headlight system. These are linkages for supporting the upper system and for assembling it performs main roll.



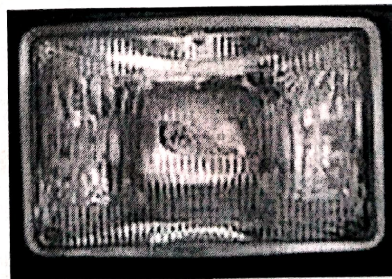
7. Chain drive

Chain drive is the power transmitting element in our project it help to transmit power from one shaft to another and causes into torque transmission.



8. Headlights

Headlights are main component in the lightning system in automobile. By using headlight the spray of the light can be obtain, by which we can see at night also.

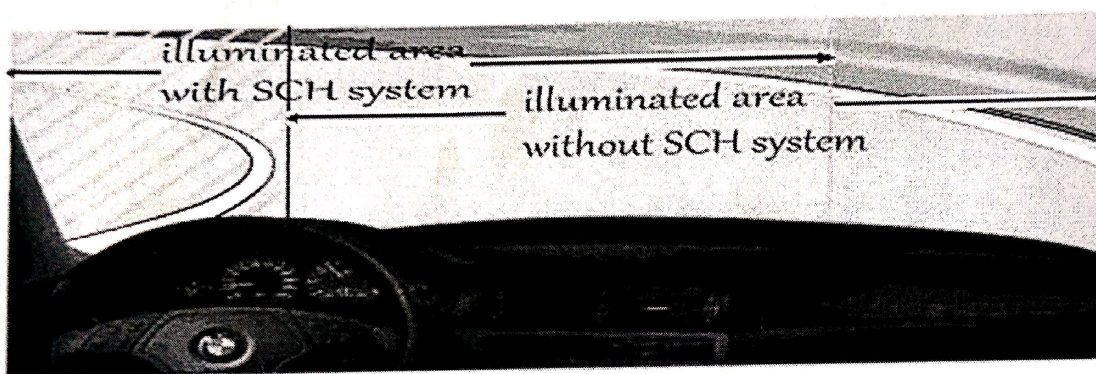


5. WORKING PRINCIPLE

Our project is to turn the light bracket to the right, when the vehicle turns to right and turn the light bracket to the left when vehicle turns to the left.

When the steering steers to the right, a small sprocket attached to the steering rod where the steering rod acts as the sprocket axle and also a steering rod, so when steering steers the small sprockets also rotate. The small sprocket gives steering motion to the big sprocket by using the chain.

The sizes of the sprockets were designed in such a way that, if the smaller



sprocket rotates three full complete rotations the larger sprocket will rotate once.

After this, the power or motion of big sprocket is transmitted to the light bracket by using some mechanical linkages, in other words the mechanical linkages are also known as four bar mechanism.

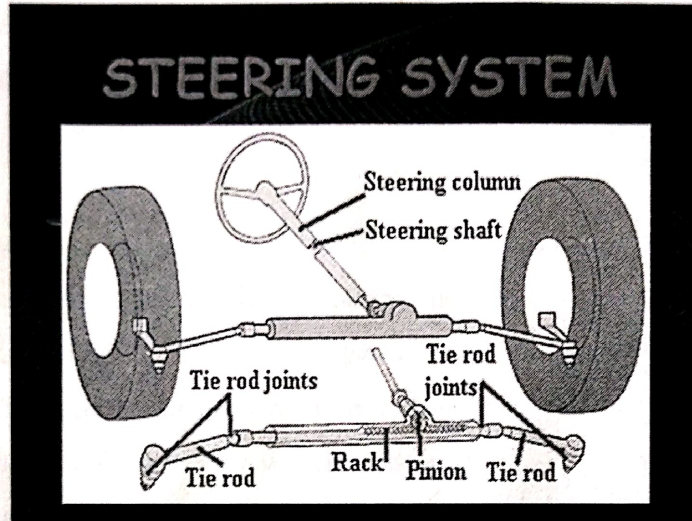
So the light bracket moves according to the movement of the steering system which gives comfort driving condition to the driver.

Thus in this way we can improve the driving at night time and avoid the chances of accidents.

Steering controlled headlights are an active safety feature designed to make driving at night or in low-light conditions safer by increasing visibility around curves and over hills. When driving around a bend in the road, standard headlights continue to shine straight ahead, illuminating the side of the road and leaving the road ahead of you in the dark. Steering controlled headlights, on the other hand, turn their beams according to your steering input so that the vehicle's actual path is lit up.

6. COMPONENTS

1) STEERING SYSTEM



- The steering system helps the driver to guide the moving vehicle on the road and turn the vehicle right or left according to his wishes.
- Safety of any automobile is mainly depends on the performance of steering and breaking system.
- Automobiles are controlled by steering system. Directional changes are provided by this steering system to the moving automobiles.
- In steering systems, the rotary motion of the steering wheel is converted into angular turning of the front wheels.
- Steering is done by moving the axes of rotation of the front wheels with respect to the chassis frame.

2) SPROCKETS

The normal function of a chain sprocket is not only to drive or be driven by the chain, but also to guide and support it in its intended path.

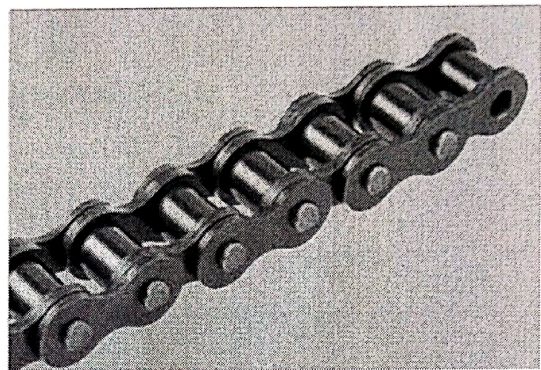
- Sprockets manufactured from good quality iron castings are suitable for the majority of applications. For arduous duty it may be necessary to use steel sprockets having a 0.4% carbon content.
- For extremely arduous duty the tooth flanks should be flame hardened. There are other materials which may be specified for particular requirements. Stainless steel for example is used in high temperature or corrosive conditions.
- Sprockets with removable tooth segments are particularly useful where sprocket tooth wear is much more rapid than chain wear. With this type of sprocket, segments of teeth can be replaced one at a time without having to disconnect or remove the chain from the sprockets, thus considerable expense and downtime can be saved.
- Sprockets are usually of 3 main types
 - One piece sprockets of steel or cast iron.
 - Two piece split sprockets.
 - Sprockets with bolt-on-tooth segments.



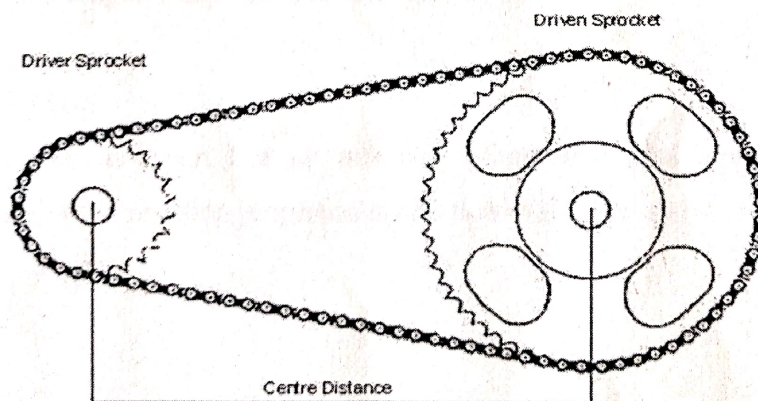
3) CHAIN DRIVE

Roller Chain is a series of alternate pin links and Roller Links in which the pins are free to pivot inside the bushing. The pin links are assemblies of two pins press fitted into two pin linkplates. The roller links are assemblies of two bushings press fitted into two roller linkplates with two rollers free to turn on the outside bushing.

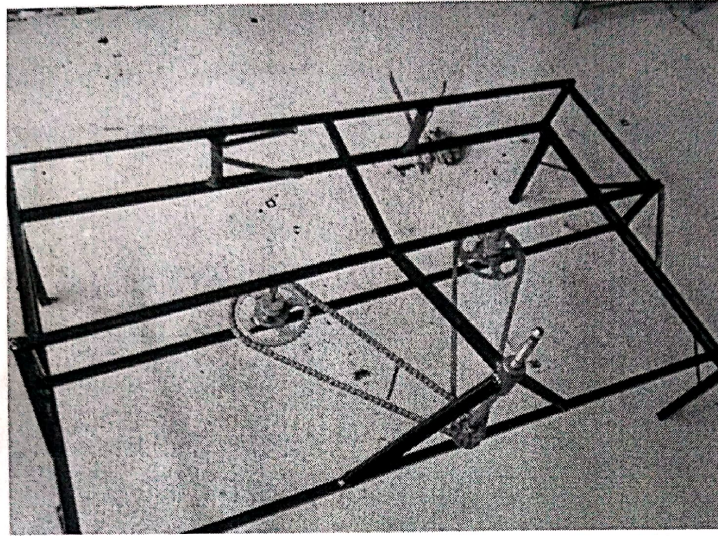
Roller Chain transmits power between two shafts at the same speed, reduced speed or increased speed. Power is transmitted via the chain through sprockets which are retained onto the shaft by keyways and grub screws. The teeth seat match the roller diameter of given pitch (size) roller chain. Bicycle development played a part in the development of Roller chain as it did with bearings



A cyclist turns pedals which are attached to a sprocket that transmits power to the rear axle via a Roller Chain and sprocket attached to the rear axle.



4) FRAME



It is the main structure, which has to support the various components, as well as the body of the vehical.

It is the structure to furnish supports for transmission system, the body and other units such as shock absorbers, springs, shackls etc. it also maintain the correct relationship between the other related parts in order to perform their normal functions and freedom from strain. It takes all static and dynamic load withot twist and deflection.

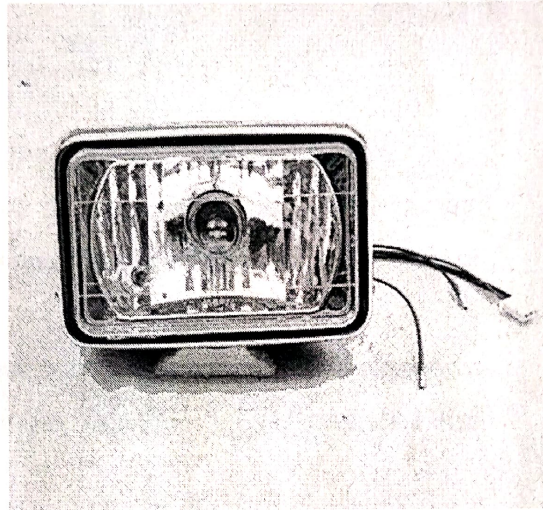
Load coming on frame:

- 1) Weight of vehical and passengers, which causes vertical bending of side member.
- 2) Vertical loads when vehical come across a bump or pot holes of road.
- 3) Inertia load due to application of sudden breaks.
- 4) Engine torque and breaking torque.

5) HEADLIGHT

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 interchangeably in informal discussion, headlamp is the term for the device itself, while headlight properly refers to the beam of light produced and distributed by the device.[citation needed]

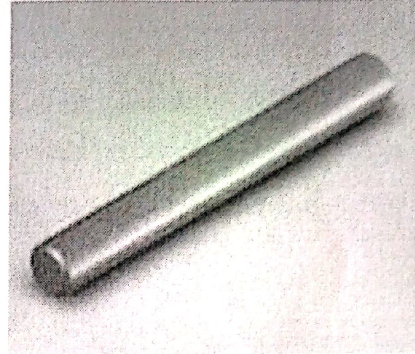
Headlamp performance has steadily improved throughout the automobile age, spurred by the great disparity between daytime and nighttime traffic fatalities: the US National Highway Traffic Safety Administration states that nearly half of all traffic-related fatalities occur in the dark, despite only 25% of traffic travelling during darkness.



Other vehicles, such as trains and aircraft, are required to have headlamps. Bicycle headlamps are often used on bicycles, and are required in some jurisdictions. They can be powered by a battery or a miniature generator.

6) SHAFTS

A shaft is a rotating machine element which is used to transmit power from one place to another. The power is delivered to the shaft by some tangential force and the resultant torque (or twisting moment) set up within the shaft permits the power to be transferred to various machines linked up to the shaft. In order to transfer the power from one shaft to another, the various members such as pulleys, gears etc., are mounted on it. These members along with the forces exerted upon them causes the shaft to bending. In other words, we may say that a shaft is used for the transmission of torque and bending moment. The various members are mounted on the shaft by means of keys or splines.



- The shafts are usually cylindrical, but may be square or cross-shaped in section. They are solid in cross-section but sometimes hollow shafts are also used.
- An axle, though similar in shape to the shaft, is a stationary machine element and is used for the transmission of bending moment only. It simply acts as a support for some rotating body such as hoisting drum, a car wheel or a rope sheave.
- A spindle is a short shaft that imparts motion either to a cutting tool (e.g. drill press spindles) or to a work piece (e.g. lathe spindles).

7. COSTING

Bill of Material

Sr. No.	Description	Material	Quantity	Cost
1	Steering wheel	Fiber	1	1000
2	Steering rod	M.S.	1	800
3	Frame	M.S.	1	800
4	Headlight	Glass	2	300
5	Big sprocket	C.I.	2	200
6	Small sprocket	C.I.	2	100
7	Chains	M.S.	2	350
8	Shafts	M.S.	2	40
9	Pipe	M.S.	2	40
10	Linkages	M.S.	6	20
11	Bushes	M.S.	6	25
12	Paint	Paint	3	80

TOTAL COST = COST OF MATERIAL FOR PROJECT

= 5170

8. ADVANTAGES OF STEERING CONTROLLED HEADLIGHT SYSTEM

Steering controlled headlights are helpful when driving on winding roads at night, during twilight, or in other low-light conditions. They can address many potentially dangerous situations, including:

- ✓ An animal is standing on the road just around a poorly lit curve.
- ✓ An oncoming vehicle negotiating a turn accidentally drifts into your lane.
- ✓ Cresting a hill on a narrow road, you are unable to see whether another motorist is coming.
- ✓ As you round a curve, your headlights temporarily blind oncoming traffic.
- ✓ Steering controlled headlights also benefit other motorists on the road. For example, when a vehicle turns around a bend in low-light conditions, standard headlights will temporarily point directly at oncoming traffic.

11. APPLICATIONS

- ✓ This system is used in cars or any four-wheeled vehicle.
- ✓ Steering controlled headlights have only been in the North American market since 2014.
- ✓ They are most often offered as an optional feature on luxury brands; however, steering controlled headlights are being made available on an ever-increasing range of vehicle makes and models.

12. CONCLUSION

When the road curves or turns, the corner on time when the car turns, thereby creating a dead angle of illumination and such lack of visibility poses danger in driving at night or in darkness. Therefore, it is highly desirable to invent a device to solve this problem and such device is of high utility which is our project steering controlled headlight system.