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DESIGN AND FABRICATION OF STEERING CONTROLLED FOG LIGHT

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ABSTRACT
The project's goal is to create a **"FOG ALIGNMENT WITH STEERING SYSTEM,"** or directed fog lights. Connecting the steering and headlamps does this. Modern cars are not equipped with efficient lighting systems. As a result, a lot of accidents happen at night, particularly in ghat portions. It is possible to prevent the incidents by integrating the fog light mechanism with steering control. For this project, the rack and pinion steering gear mechanism is employed. Through the rack and pinion system, rotational motion from the steering wheel is translated into translator motion. The fog light follows the same path and focuses on a more divergent area as the front wheels are manoeuvred.
A live model unit is manufactured as part of the current project's objective to build a "Steering Controlled Fog light Mechanism." An active safety feature is the fog light orientation system, where the head lamp orientation. In order to give drivers improved nighttime visibility, the control system turns on the right and left headlights as we make a left or right turn and maintains the beam as parallel to the curving road as feasible.

INTRODUCTION
On the road, a large number of cars equals mayhem. This raises the likelihood of becoming engaged in an automobile collision. Automobile accidents are mistakes that are easily preventable by adhering to lane discipline and other fundamental laws established by the authorities. However, the issue that emerges in this situation is the fact that many accidents are unavoidable because of the low visibility after dusk or as a result of inattention, which follows from inadequate lighting. In contrast to other automakers and manufacturers, we are not attempting to enlarge and brighten the headlamp here, as this would be contrary to the specifications. These days, the majority of accidents occur in hill stations as a result of heavy turns and poor road construction. Additionally, fog causes the roads in hill stations to become unclear, which leads to accidents. When cars or motors employ this steering-controlled fog light technology, it will open the path in the situations such as fog. As a result, the driver can see the road well and manoeuvre with ease.

OBJECTIVES
The main objective of the study is to identify the challenges in the Design and development of a steering-controlled fog light mechanism integrated with vehicle steering systems in terms of Fabricate and install the steering-controlled fog light mechanism in vehicles to ensure seamless integration and functionality. And to conduct detailed analysis to determine the optimal steering angles for activating and controlling the swivel of fog lights in response to changing driving conditions. Assess the effectiveness of the steering- controlled fog light mechanism in enhancing safety during low visibility conditions, such as fog, darkness, and poor lighting environments

METHODOLOGY
Primary function of the 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. Secondary function of steering system is:-
1. To provide directional stability of the vehicle when going straight ahead.
2. To provide perfect steering condition, i.e., perfect rolling motion of the road wheels at all time.

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3. To facilitate straight ahead recovery after completing a turn.
4. To minimize tyre wear.

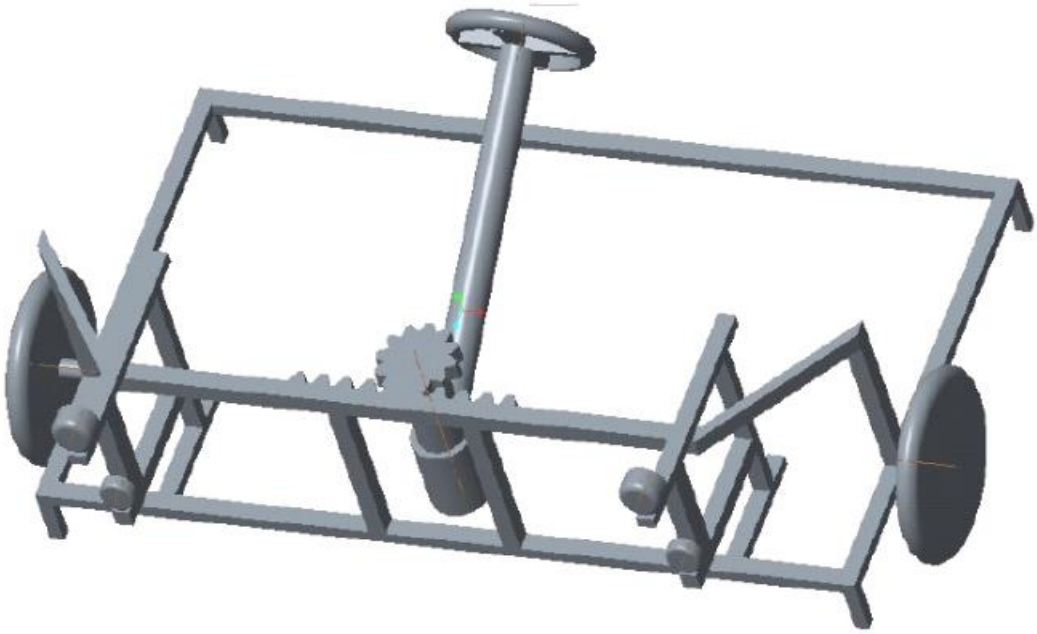

Figure 3: Movable Headlight & Foglight with Steering System.

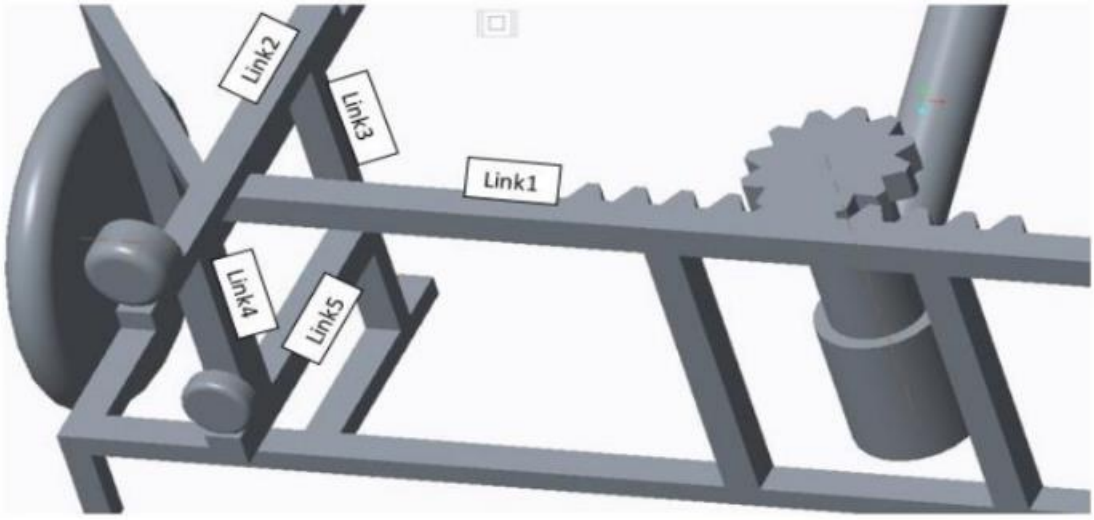

Figure 4: Movable Headlight & Foglight with Steering System.

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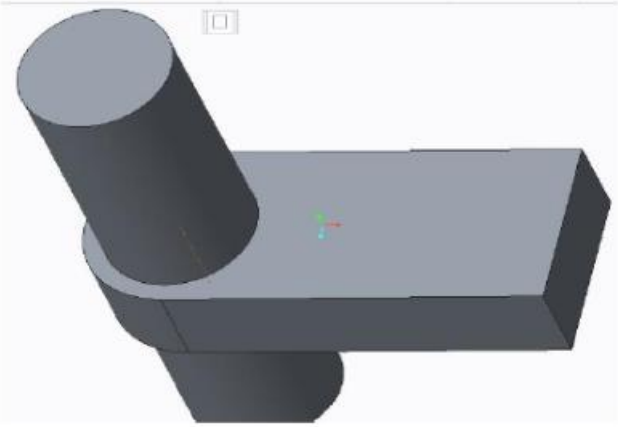

Figure 5: Hinge Joint

The entire mechanism that turns the wheels and headlights and foglights is depicted in figure 3. Figure 4 illustrates a specific section of Figure 3, which facilitates comprehension of the mechanism. The hinge point between links 3 and 2 and between links 3 and 5 in figure 4 is constructed as depicted in figure 5. As seen in figure 4, the wheel is rotated and the turn is made using the rack and pinion arrangement. Here, the pinion and steering are connected, allowing the pinion to revolve in tandem with the steering's revolution. The pinion is coupled to a rack. The vehicle's wheels are attached to this rack. Now, as we spin the steering, the pinion also turns, pushing the rack in either the left or right direction. As a result, the car turns and its wheels rotate. Here, a link1 is used to connect the headlamp to the rack and the rack to the vehicle's wheels. Link 2 has a headlight on one end and is connected to Link 3 via a hinge connection on the other (figure 5). Link 3 is supplied to join Link 2, which carries the headlight, to Link 5, which carries the foglight, and lastly it is fastened to the base. The base and this link3 are firmly fastened together. A hinge joint connects the link3 of the headlamp and the link5 of the foglight to that link3. The purpose of the hinge joint is to enable headlamp and foglight rotation. Additionally, there is a fourth link that exclusively connects the headlight and foglight. To move the foglight together with the headlight, this link4 is required. Hence, when the driver turns the steering, the pinion also turns, moving the rack to the right or left. The link carrying the headlight will spin about the hinge joint between links 2 and 3 as the rack moves, causing link1 to become dislocated. As a result, as the car turns, the headlight will turn. Additionally, the link4 that joins the headlight's link2 and the foglight's link5 will aid in rotating both the headlamp and the foglight about the hinge joint that is situated between links 5 and 3. We can therefore conclude that as the driver turns the steering wheel, the headlight and fog light also spin at an angle. Thus, in low light or during a fog buildup, the driver can see clearly while making a quick turn. As a result, accidents can be greatly reduced as a result of this number.

RESULTS AND DISCUSSION

The main benefit of this approach, as stated in the document, is that it allows the driver to see clearly in both fog and the night by rotating the headlight and foglight simultaneously. Additionally, while the study paper describes our project based on a rack and pinion steering mechanism, the majority of other steering mechanisms can also be used with this technology [9], [10], [11], and [12]. It is a cost-effective solution because we can rotate the foglight in addition to the headlamp by adding a few extra links and joints. Therefore, this approach is technically possible. The only disadvantage of this method is that it requires additional links and joints to enable the wheels to rotate in addition to the headlights and foglights. Although these additional links and joints increase the vehicle's overall weight and cost, they are insignificant in comparison to the vehicle's overall weight and cost. Thus, this approach has no drawbacks in this regard. This is not a practical strategy for straight roads; it works exclusively on curves.

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CONCLUSION

Together with the vehicle, the headlights and foglights rotate with the four-wheeler. Therefore, by modifying this process, we can lower the amount of accidents that occur during the night and in fog as a result of abrupt turns, particularly in hilly areas. It's also an economical approach. For that reason, all four-wheelers can use this strategy.

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