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Study of Troxler Effect and the Analysis of BMW & Audi Headlights Technology

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Abstract - In order to reduce the driving problem and accidents caused by insufficient light in India, at the time of night. It is necessary to design the headlights to some standards, so that the driver can see the road. Information in front of him in time and make a timely judgment. The dazzling of other cars Drivers due to headlights come under the law of torts as it can make the claimant suffer because of engineering negligence and absence of proper design standards, or safety inspections. Most of Night time accidents occur due to this, using high-beam headlights of opposite car users; if these high beams are not used, the road cannot be viewed with clarity and obstacles cannot be identified in time. Thus, to prevent both situations, These have been studied in the paper and the great brands have been analyzed based on these standards for better vision i.e. Audi and BMW.

Audi digital matrix LEDs. It has been found that it consists of such technologies that efficiently prevent the Dazzling and glare of drivers by darkening the specified areas, highlighting pedestrians and Traffic signs in front of them, and thus providing safe and secure travel. Thus, keeping in view the results of this research, the survey taken, and the analysis performed, It has been found that the loopholes or the main factor of accidents in India were Absence of proper headlight design standards, in an efficient manner. If it can be achieved, dozens of lives can be saved, and with efficient headlights, drives it can be smoother, less exhaustive, more focused and, above all, it will be safer.

***Key Words*:** Troxler effect, Dazzling, high beam, Audi digital matrix LEDs, BMW Adaptive laser lights.

1. INTRODUCTION

Headlights are one of a car's most essential safety features for driver to drive safely at night, but traditional headlight system have many demerits & road unevenness is also a major problem, when headlight beam falls on coming vehicles then the driver cants see anything present in front of him.
Being "dazzled" by high beams at night means the intense light from another vehicle's headlights makes it difficult or impossible to see clearly. This temporary blindness can be very dangerous, especially when driving.

Troxler effect:

The Troxler effect is an optical illusion where a stationary stimulus outside the fixation point appears to fade away or disappear when you fixate on a central point. This phenomenon is named after Ignaz Paul Vital Troxler, a Swiss physician who first described it in 1804.

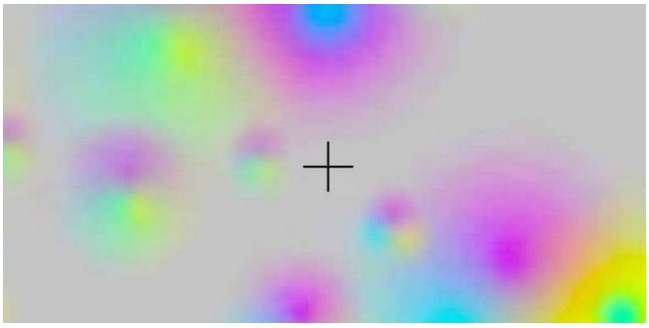

Fig 1: Troxler Effect

Troxler effect and glare at night similar?

Yes, the Troxler effect, which is the fading of stationary visual elements are similar to the experience of glare at night. Glare occurs when a bright light source like headlights, it causes a temporary loss of vision, essentially a temporary "blind spot". The Troxler effect can be considered a

form of temporary blindness caused by bright light, as even after the source of glare is removed, an after-image can persist.

Fig 2: Glare due to high beams

To avoid the accidents due to this causes I studied the concept of headlight clever technology which can helpful to riders or drivers in future to drive safely at night.

2. Body of Paper

1. Background and History

Horse-drawn carriages were the primary mode of transportation before the advent of the automobile. These carriages had lamps with candles and oil-burning lanterns. The Automobile did not appear until the late 1880s. At first there was no lighting on the vehicle and no night time driving. Although the electric light bulb was invented by Thomas Edison in 1879, The first lighting on automobiles was not electric headlamps. When people started driving at Night, the first vehicle lighting devices were oil (kerosene) burning lanterns. These lighting the devices provide a signal to drivers of other vehicles and carriages, and also to pedestrians. They did not provide any substantial illumination on the road, which was badly needed because the roads were often in poor condition and people were not able to see objects in the road. At the turn of the century, the use of the automobile was limited because people were not yet accustomed to the increased potential for mobility that it offers in 1911 the first electric headlamps were installed as standard equipment on some U.S. passenger cars. However, the volume was extremely low. In 1912, the first vehicle-wide wire Harness, electric starter, and electrical system were installed (Johnston, 1996). This allowed an Increased the use of electric light sources and significantly increased the installation of electric Headlamps on vehicles. It was at about this time that the U.S. driver position was established on the left side of the vehicle.

2. Audi Digital Matrix LEDs

As lighting technology advances, Audi does not lag behind. It continues leading the way with more innovations and improved performance. Audi has been pushing the limits of vehicle lighting technology for many years. Its most recent innovation is the digital Matrix LED. Headlights for the new Audi e-tron Sport back. It offers new features that make driving safer. And more secure for everyone on the road. This technology has now been used for other roads cars too. The headlights consist of one million pixels and can project lights onto the walls just like any projector. One major advantage is the lane and orientation lighting for highways, in which the headlights emit a carpet of light up to 50 meters long, brightly illuminating the driver's current lane and adjusts dynamically during lane changes. Dark spots are used for showing the position of car in lane. Also, the main headlights can exclude other vehicles from the beam of light even more precisely, to avoid blinding them when driving opposite to the car. At the beginning and at the end of a trip, the digital Matrix headlights can generate dynamic loops. These are animations that display geometric lighting patterns on the garage door or the ground. These animations also help while driving, making road signs visible ahead of the driver and making a virtual crossing sign for the people crossing the road.

Fig 3: Audi Digital Matrix

3. BMW Adaptive Laser Lights

Multiple headlight technologies have been employed by BMW over the years. They have come through the halogen lights to the standard LEDs and, at the latest, they have been using the laser headlights with adaptive lighting technology which includes the cornering light and the BMW selective beam that aims to optimally improve road illumination in dark conditions. The BMW adaptive LED headlights rely solely on diodes for both beam phases (short and High) to illuminate the road and can actively adjust themselves depending on road conditions, Incoming traffic (BMW Selective Beam) and vehicle speed. Almost a nocturnal revolution has been made by these laser lights that have a scope of 600 meters, less power consumption and more light intensity. BMW I8, the first ever car with the latest technology in the field of light research comes onto the market in 2014.

Fig 4: Adaptive laser light

4. BMW VS Audi: Who will light the way?

The BMW adaptive laser lights and the Audi digital matrix LEDs are both fully effective. And completely serves the purpose they are made for. But there are always some differences, and each has their own areas of perfection. Although BMW beats Audi when it comes to safety across its lineup. BMW's overall average brand safety score is 9.76 out of 10, compared to Audi's 9.68

The similarity between both types of headlights can be observed in the case of both consist of adaptive-lights technology. The headlights adapt to the road environment, and adjust accordingly. They detect oncoming vehicles and dim the lights on that side to avoid Dazzling for the upcoming driver. The lights also focus on the obstacles and pedestrians while Driving, ensuring better control and less need for concentration. The lights also dip when there is a vehicle ahead to prevent from causing glare to the front car driver. Surface alignment Systems adjust the headlights according to the road surfaces while driving on steep roads or hills. So that the range of headlights remains unchanged, providing a better view. In terms of being energy efficient, BMW leads the way.

While the projections made by Audi really helps in road safety as they project the traffic signs ahead of the vehicle so that they It can easily be seen. They also make it easier to identify if there is a work in progress or any lane. It is closed as the warning system initiates markings ahead of the driver. However, the BMW Lasers are much brighter. Audi digital LEDs serve a similar purpose in just a different way, using different technology with some different designs.

Hence, it can be concluded that the most common factor that is kept in view when designing headlights is the prevention of dazzling effects and a precise identification of pedestrians and oncoming traffic from a safe distance.

According to the survey, in India, among the 36.49% of users who drive cars, 74% often Use high beams. The reason being addressed resulted in 50% because of less clarity in low beams, 20.4% because they use it as a warning light, 17%-18% users use it only for overtaking purposes and 18.6% use high beams to increase the spread. When the solution to that being asked, it has been found that a high percentage of people were in favor of adaptive headlights technology. The frequent use of high beam headlights is the reason for the increasing number of roads Accidents.

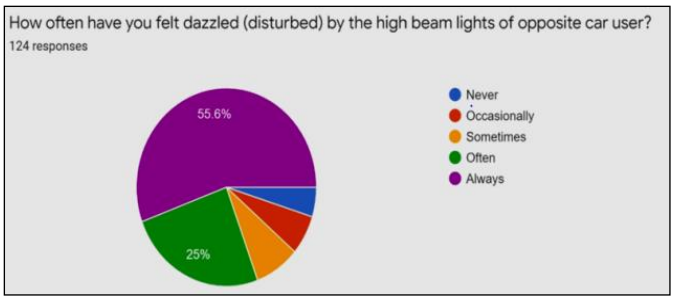

Fig 5: A Survey Question

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4. CONCLUSIONS

Headlights are as important to cars as eyes are to humans. To make our rides beautiful and safe, we need headlights to improve vision. Some of the people who ride on the road do not consider safety features important, which can cause harm to them and other who are riding or sharing the path with them. A clear and focused vision is required to ride on the road especially for night, which can be provided by (headlight matrix LED). BMW laser light and Audi digital matrix LED are role designs for future-generation vehicles. Therefore, standardized system of headlight's should be implemented to avoid such road accidents and provide focusi, clear, safe and smooth driving conditions.

Fig 6: BMW VS Audi

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