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THE 13TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION 2024

EXTENDED ABSTRACTS

e-BOOK

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INDICATOR FOR BRAKE LIGHTS (INBREL)

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ABSTRACT

The detection of failures in vehicle lighting systems is crucial for enhancing vehicle safety and quality. Malfunctioning brake and tail lights can pose significant safety risks, as drivers may be unaware of these failures and consequently face higher chances of being involved in accidents. This project aims to address this critical issue by developing an innovative system that provides a warning signal to drivers in the event of brake or tail light failure. The proposed system, named the Indicator for Brake Lights (InBreL), includes an advanced control module that continuously monitors the functionality of the vehicle's brake and tail lights. Upon detecting a malfunction, the InBreL Control Module (ICM) promptly alerts the driver, enabling them to take immediate corrective action. This proactive approach not only enhances vehicle safety by preventing potential accidents but also provides car owners with an additional safety feature that ensures they are always aware of the operational status of their vehicle's lighting system. Throughout the project, various testing and validation processes were conducted to ensure the reliability and effectiveness of the ICM. The final product, the InBreL Control Module, demonstrated high reliability and ease of integration into existing vehicle systems, making it a practical solution for improving road safety, with its core component designed to notify drivers of any issues with the brake light system.

Keyword: brake light indicator, vehicle safety, lighting system failure, InBreL Control Module, accident prevention

1. INTRODUCTION

Vehicle lights are essential components designed to produce illumination using electricity (Goodall, 1995). The vehicle lighting system includes headlights, side lights, rear lights, signal lights, and warning lights. This system is crucial for ensuring that drivers can operate their vehicles safely in low-light conditions. Additionally, it provides vital information regarding the vehicle's condition, location, distance, movement, and brake status (Beron, 2015). Investigating the failures of vehicle lighting systems is essential for enhancing vehicle quality and safety. If drivers are unaware of non-functional lights, the safety risks are significant, potentially leading to accidents due to brake light system failures (Darus, 1994). Despite their dominance in the domestic passenger vehicle market, local manufacturers often do not equip their vehicles with brake light failure detection systems. This omission exposes vehicle owners to a heightened risk of accidents.

2. METHODOLOGY

Based on a study conducted through direct observation of vehicle owners, and informed by referrals from the Royal Malaysian Police, the Road Transport Department, and PERODUA Service Kuala Terengganu, the following issues were identified:

- i. It is difficult for drivers to know the failure of their own vehicle's brake lights.
- ii. There is no brake light failure detector and indicator on the market.
- iii. A brake light that doesn't work without realizing it can be one of the factors in the occurrence of an accident (Charles & Matthew, 2004).
- iv. Brake lights that don't work without realizing it can also be sued according to the road safety act - ln170/59 - 026 (1) (ii)' – brake light offense and 'road safety act - ln170/59 - 026 (2) (ii)' –third brake light fault.

The 'INBREL' system was developed to provide an early warning to drivers in the event of a brake light malfunction. Currently, most vehicles, excluding luxury models, lack brake light detection systems. Consequently, damage to the brake light often becomes apparent only through external notification, involvement in an accident, or citation by authorities (Hanif, 2015). Furthermore, the INBREL device is designed to be affordable for all vehicle owners and can be easily installed on any vehicle using the 'PLUG AND PLAY' concept, which connects to the vehicle's brake light cable without causing damage or requiring modifications.

Before designing the INBREL system, a thorough study must be conducted, utilizing readily available sources. This is crucial to ensure that the study's outcomes are applicable and beneficial to the target audience. Various research methods can be employed, such as analyzing previous designs, internet research, and conducting surveys. For this project, two research methods were utilized to gather the necessary information for the development of the INBREL system.



Figure 1 Customer Satisfaction Survey

3. FINDINGS

Statistics from the Kuala Terengganu traffic department reveal that many motorists fined for brake light issues claimed they were unaware of the malfunction. According to the Road Safety Act- ln170/59 - 026 (1) (ii)' for brake light faults and 'Road Safety Act-ln170/59 - 026 (2) (ii)' for third

brake light faults, a fine of RM150.00 is imposed for each non-functioning bulb. The following information supports the frequency of brake light faults from 2013 to 2015:

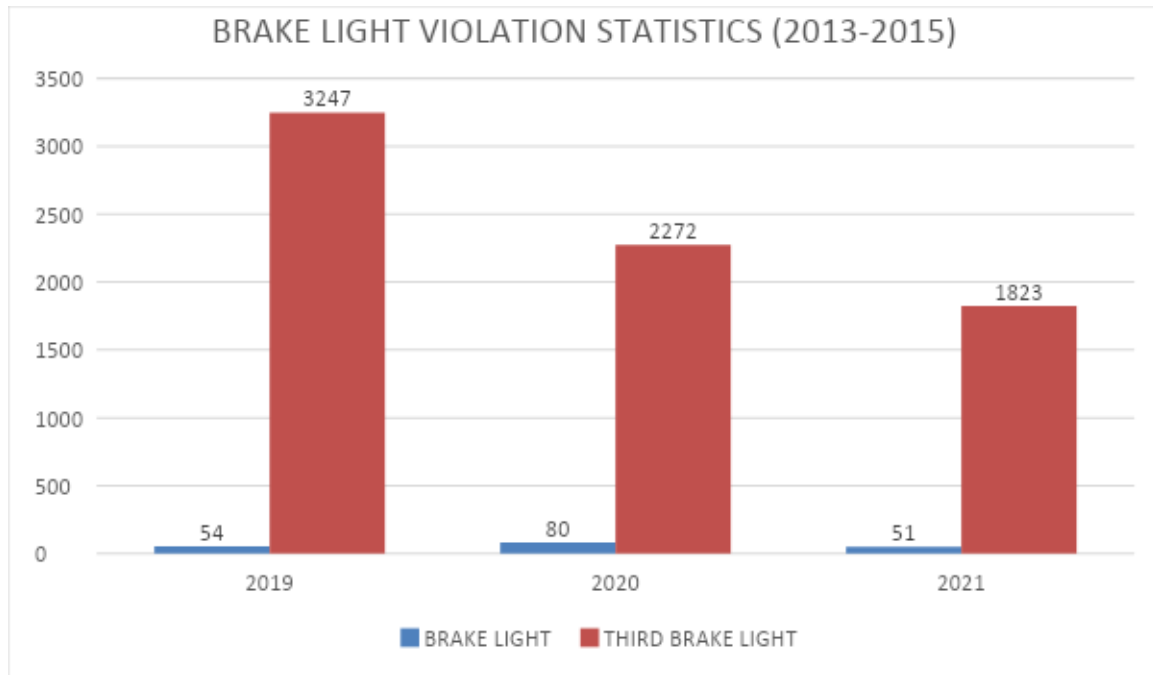


Figure 2 Brake light fault statistic

4. CONCLUSION

In today's challenging times, it's crucial that all tasks are completed efficiently and methodically. This means that the development of equipment and machinery should embrace technological advancements. Old-fashioned methods have been replaced with newer, more sophisticated approaches that not only meet user satisfaction but also improve overall effectiveness. Additionally, it's important to consider the project's cost and production time. This not only attracts user interest but also encourages healthy competition in the market. Evaluation is key to assessing design effectiveness, identifying both strengths and weaknesses. Following prescribed procedures is essential to ensure that any tool, including the INBREL, is easy to use.

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Sekian, terima kasih.

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