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A Review on Sudden Unintended Acceleration in 2-Wheelers

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Abstract: This review paper addresses the pressing concern of accidents caused by sudden acceleration resulting from child interactions with scooter accelerators. Limited reported statistics indicate the severity of such incidents, necessitating proactive measures to ensure the safety of riders and passengers. The paper presents a comprehensive analysis of existing literature, discusses proposed solutions, and highlights the need for further research in this area. The review explores the design and implementation of safety measures, emphasizing the importance of a balanced approach that considers both rider comfort and child-rider protection. The findings underscore the significance of addressing this safety concern and provide valuable insights for the automotive industry.

Keywords: Scooter safety, Child interactions, Sudden acceleration, Accelerator throttle, Push and twist mechanism, Design solutions

1. INTRODUCTION

The rapid growth of the two-wheeler market in India, particularly the scooter segment, has brought about numerous benefits in terms of mobility and convenience. However, with the surge in scooter ownership, concerns related to safety, especially when children are present, have become increasingly significant. Accidental control of scooters by children, resulting in unintended acceleration, poses a grave risk and has led to several unfortunate incidents across the country. Such incidents highlight the pressing need to address this safety issue and develop effective solutions to mitigate the associated risks.

In this review paper, aim to tackle the problem of unintended acceleration caused by children inadvertently manipulating the scooter's accelerator throttle. Currently, only a few scooter models are equipped with auto start-stop systems, and these features are often available only in the higher-end variants. As a result, the majority of scooters on the market lack this crucial safety feature, leaving riders vulnerable to accidents, particularly when children are seated or standing in the front.

To address this concern, propose a novel solution in the form of an accessory for the accelerator throttle, which introduces an additional motion requirement to prevent accidental acceleration. Our approach involves incorporating a push and twist mechanism that necessitates a deliberate two-step action from the rider to engage the accelerator. By implementing this design, we aim to enhance the safety of scooter riders, particularly when children are present, and reduce the occurrence of accidents caused by unintended acceleration.

2. ANALYSIS OF REPORTED INCIDENTS

Understanding the prevalence and impact of unintended acceleration by children on scooters is crucial, yet it remains a challenging task due to underreporting. While specific statistics are limited, available evidence in the form of multiple videos on YouTube sheds light on the seriousness of this issue. These videos capture distinct incidents from various locations, all demonstrating the potential dangers when children inadvertently accelerate scooters, resulting in crashes. The existence of these videos confirms the urgent need to address the problem and implement effective solutions. To gather additional insights, personal inquiries were made among friends, relatives, and acquaintances. The responses received further validated the occurrence of similar incidents, with many individuals sharing their own experiences or knowledge of such occurrences within their social circles. These firsthand accounts, combined with the observations

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from the videos, underscore the significance of addressing unintended acceleration by children to ensure the safety of scooter riders [1-8]. The child given unintended acceleration is shown in Fig. 1.

Fig. 1 : Unintended acceleration given [3]

3. EXISTING SAFETY MEASURES: AUTO START SYSTEM IN SCOOTERS

The auto start system, also known as the automatic start-stop system, is a feature that has been incorporated into some scooter models to address the issue of unnecessary engine idling. This system automatically turns off the scooter's engine after a certain period of idling, typically around 5 seconds, and restarts it when the rider is ready to resume riding. The primary objective of the auto start system is to improve fuel efficiency and reduce emissions by eliminating the wastage of fuel during extended idling periods.

The auto start system works by utilizing various sensors and electronic controls integrated into the scooter's engine management system. When the scooter comes to a stop and idles for a specific duration, the system detects the idle state and initiates the engine shutdown process. This is achieved by cutting off fuel supply to the engine and disabling the ignition system. Once the rider releases the brake or twists the throttle to resume riding, the system quickly restarts the engine, allowing the scooter to accelerate smoothly.

While the auto start system has proven to be beneficial in conserving fuel and reducing emissions, it does have limitations concerning the specific problem we are addressing. The system aims to prevent unnecessary idling, but it does not completely eliminate the potential for unintended acceleration by children. Although the engine is turned off during idle, simply twisting the throttle again will reactivate the scooter's engine, and another twist will set the scooter in motion. This means that if a child inadvertently manipulates the accelerator after the engine restarts, unintended acceleration can still occur, leading to potential accidents [9-10]. The hand brake implemented in the scooter is shown in Fig. 2.

Fig. 2 : Hand brake in the Scooter [5]

Among the scooters available under the price range of Rs 1 lakh, a few models offer the stop-start technology as an option. These include the Honda Grazia, Honda Activa 125 Deluxe, TVS Jupiter ZX disc, Hero Destini 125, Hero

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Maestro Edge 125, Yamaha Fascino 125, and Yamaha Ray ZR125/Rally. It's important to note that the mentioned prices are indicative and exclude taxes and other charges [11-16].

While the stop-start technology is a step towards addressing the issue of unnecessary idling and fuel wastage, it is crucial to acknowledge that it may not provide a comprehensive solution to the problem of unintended acceleration caused by children. Furthermore, it's worth noting that the stop-start feature is predominantly available in the top variants of these scooters, which often come at a higher price point.

4. SOLUTION TO THE PROBLEM

Considering the limitations of the stop-start technology and the need for a more specific safety measure to prevent unintended acceleration, our proposed solution offers an alternative approach. By introducing a two-step push and twist mechanism as an accessory for the accelerator throttle, aims to enhance rider safety, particularly when children are present. While the auto stop feature comes closest to addressing the problem, it also provides an additional layer of protection and ensures a deliberate and intentional action from the rider to engage the accelerator.

By highlighting the limitations of existing solutions and proposing an innovative solution aim to contribute to the ongoing efforts in enhancing the safety features of scooters, particularly in scenarios involving children.

5. CONCLUSION

In conclusion, the problem of unintended acceleration by children on scooters necessitates attention and proactive measures to enhance rider safety. While the limited availability of stop-start technology in select scooter models offers some benefits, it alone does not fully address the issue.

Solution presents a design solution that incorporates a two-step push and twist mechanism as an accessory for the accelerator throttle, providing an additional layer of protection against unintended acceleration. By requiring deliberate and intentional actions from the rider, our design aims to minimize the potential for accidents caused by children.

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