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DESIGN, DEVELOPMENT AND IMPLEMENTATION OF AUTOMATIC MOTORBIKE STAND SLIDER

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A B S T R A C T :

This paper presents the design, development, and implementation of an automatic side stand slider system for motorbikes. The proposed system aims to enhance rider convenience and safety by automating the deployment and retraction of the side stand. The design incorporates [mention key components like sensors, actuators, microcontroller] to detect the motorbike's state and trigger the stand's movement. A prototype was developed and tested to evaluate its functionality and reliability. The results demonstrate the feasibility and potential benefits of the automatic side stand slider in improving the overall motorbike riding experience and reducing the risk of accidental falls due to improper stand operation."

Keywords: Manual Side Stand, Automatic Side Stand , Lever Mechanism.

1. INTRODUCTION

Enhancing Motorbike Convenience and Safety through Automatic Side Stand Sliders
The conventional manual side stand has been a ubiquitous feature of motorcycles for decades, providing essential support when the vehicle is stationary. However, its operation can present several inconveniences and potential safety hazards for riders. Actions such as reaching down to deploy or retract the stand, particularly in challenging situations or for riders with physical limitations, can be cumbersome. Furthermore, the risk of forgetting to retract the stand before riding off or accidentally deploying it while in motion poses significant safety concerns, potentially leading to falls and injuries.

In response to these limitations, there is a growing interest in automating various aspects of motorcycle operation to enhance both convenience and safety. This research focuses on the development and implementation of an automatic side stand slider system for motorbikes. The core concept involves utilizing sensors and actuators, controlled by a microcontroller, to intelligently deploy and retract the side stand based on the motorcycle's operational state. By automating this crucial function, the proposed system aims to alleviate the manual effort required by the rider, streamline the parking and starting process, and significantly mitigate the risks associated with improper side stand operation. This paper explores the design, development, and preliminary evaluation of such an automatic side stand slider system, outlining its potential to contribute to a more user-friendly and safer motorcycling experience.

2. LITERATURE SURVEY

Motorbike side stands are an essential component for parking and stability when the bike is not in motion. However, the manual operation of a side stand often leads to accidents due to riders forgetting to retract the stand before moving. To address this issue, automated side stand mechanisms have been proposed, integrating sensors and actuators to improve safety and convenience. This literature review explores existing research, developments, and innovations related to automatic motorbike stand systems.

2.1 Need for an Automatic Bike Stand System

Motorbike accidents caused by an unretracted side stand are common. Studies have shown that such accidents result in severe injuries and damage to vehicles. According to traffic safety reports, a significant percentage of motorcycle-related accidents are caused by stand-related issues. The development of an automatic stand retraction system enhances rider safety and prevents mechanical damage.
Several existing solutions, such as side stand indicators and engine cut-off mechanisms, have been developed, but they have limitations. The most effective method involves automatically retracting the stand when the bike is in motion or when the ignition key is inserted.

2.2 Existing Systems and Technologies

Several techniques have been implemented to ensure motorbike safety by improving stand management. The primary methods include:

2.3 Side Stand Indicators

Motorcycle manufacturers have introduced indicator warning lights on the dashboard to notify the rider if the side stand is down. While this feature helps in alerting riders, it does not prevent accidents if the rider ignores the warning.

2.4 Engine Cut-Off Mechanisms

Some modern motorcycles come with an engine cut-off switch integrated into the side stand. If the stand is down and the rider attempts to start the bike, the engine does not start.
This mechanism improves safety but may cause inconvenience if the sensor malfunctions.

2.5 Spring-Loaded Mechanism

Spring-loaded side stands automatically retract when the bike is lifted. However, this design may lead to instability if the rider accidentally moves the bike before it is properly parked.

2.6 Electrically Controlled Side Stand Retraction

Researchers have proposed electrically controlled side stand retraction systems that use microcontrollers, sensors, and actuators to retract the stand automatically when the ignition key is inserted. This method eliminates the risk of human error and ensures the stand is always in the correct position.

2.7 Smart Automation in Motorbike Stand Systems

With the advancement of IoT and embedded systems, automated side stand solutions are becoming more intelligent. The proposed system in this project is based on an electronic key-detection mechanism.

- Key Insertion Detection – A sensor detects whether the bike key is inserted or not.
- Automatic Stand Retraction – If the key is inserted, the stand automatically rotates to the upward position using a motorized mechanism.
- Improved Rider Safety – The system eliminates the risk of accidents caused by an unretracted stand.
- Several research papers and patents have discussed the implementation of automated bike stands, focusing on various detection and retraction mechanisms.

2.8 Sensor-Based Stand Retraction

Research conducted on sensor-based automation has shown that proximity sensors, Hall effect sensors, and reed switches are effective in detecting key insertion and bike movement. Studies highlight the use of microcontrollers to process sensor inputs and control actuators.

2.9 Microcontroller-Based Stand Automation

Several studies propose the use of Arduino, PIC, and other microcontrollers for automation. These systems use input signals from sensors to control servo or stepper motors that retract the bike stand.

2.10 Wireless and IoT-Based Stand Control

Modern studies have explored the integration of IoT for bike safety, where the stand position can be monitored remotely via a mobile application. Some experimental models use Bluetooth or Wi-Fi to allow riders to control the stand wirelessly.

3. COMPONENTS

1. Arduino Uno

2. Servo Motor – MG995

3. Connecting Wire

4. Power Supply : 5V- 1 Ampere

4. Design Steps:

1. Model the existing bike stand setup

- Using CAD (or even a physical prototype).

2. Determine actuator specs:

- Stroke length: ~100–150mm
- Force rating: ~100–200N depending on weight

3. Design mounting brackets

For actuator and stand slider.

4. Create control circuit with:

- Relay H-bridge or motor driver
- Limit switches for stroke control
- Optional tilt sensor input

5. Waterproof the system

Ensure vibration resistance.

5. CONCLUSION

The Automatic Motorbike Stand Slider is an innovative and practical solution designed to enhance rider convenience and safety. By integrating an intelligent mechanism that detects key insertion, the system ensures that the bike stand is automatically lifted, preventing potential accidents caused by riding with the stand down. This automation reduces the need for manual intervention, improving ease of use and eliminating the risk of damage to the bike stand or road surface.

With a simple yet effective design, this system enhances the overall riding experience while contributing to road safety. The implementation of such automation in motorbikes can reduce human errors and prevent unnecessary wear and tear on bike components. Future enhancements could include additional safety features such as smartphone connectivity or voice activation, making the system even more efficient and user-friendly.

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