

An Implementation of a Low-cost Automatic Side Stands Retrieval Mechanism to Enhance the Safety of Two-wheeler Riders

Anoop Tiwari¹, Chandrika Saxena²

Department of Mechanical Engineering

Marri Laxman Reddy Institute of Technology & Management Dundigul Hyderabad

Corresponding Author's Email id: anooptiwari21@yahoo.com

Abstract

The automobile has played a significant role in the evolution of the modern world. When it comes to automobiles, the two-wheeler plays a crucial part because it saves the traveler's time by getting them to their destination much faster. We all know that using a side stand carelessly can lead to significant mishaps. As a result, we're developing a device that will automatically retrieve the side stand whenever the motorcycle begins to move.

A parked motorcycle is supported by the side stand. If the rider forgets to retract the side stands before riding, the unattended stand will interfere with the rider's control during the turn or even cause a major accident. Our goal is to create a mechanism in motorcycles that allows the side stand to automatically retract. This will help to ensure the safety of two-wheeler riders and will save countless lives.

Keyword: *Side stand, Passenger safety, Low Cost, Automatic system, Hook and loop mechanism*

INTRODUCTION

In India, almost 13 people are killed in car accidents every hour. And the negligence in lifting the side stands is responsible for 36% of these accidents. So, in order to avoid a situation like this, we reasoned that

there must be a device that automatically retracts the side stand as soon as the motorcycle starts moving.

Table 1: Survey of road accidents

S. No.	During the Year	Reason for Accidents	Percentage Of Accidents
1.	2008-2012	Forgetting to lift side stand	36%
2.	2008-2012	Does not maintain speed limit	38%
3.	2008-2012	Does not obey traffic rules	22%
4.	2008-2012	Other problems	04%



Figure 1: Motorcycle Side Stand

As shown in Table 1, 36 percent of two-wheeler accidents occurred between 2008 and 2009 as a result of neglecting to lift the side stand. The main reason of side stand accidents is that it is interrupted by road impediments when taking a turn, causing the bike to become imbalanced and an accident to occur. In many circumstances, if the driver does not wear a helmet, he may suffer a serious brain injury and even die. So, in order to save the driver's life and protect him from any form of injury, we must employ the "Automatic Retrieved Side Stand" in our two-wheelers.

A BRIEF OVERVIEW OF SIDE STANDS

A side stand is a device that allows a bicycle or motorbike to be kept upright without the use of another item or the assistance of a person. Refer Figure 1. A kickstand is typically a piece of metal that extends from the frame and contacts the ground. It's usually found in the middle or near the back of the bike.

There are two on certain touring bikes: one in the back and one in the front.

Steel or cast aluminium can be used to make side stands. On the end, there could be a rubber cover. Kickstands can be

locked in position, up or down, in a variety of ways:

- A spring that is stretched when the kickstand is partially extended and less stretched when it is fully extended.
- A detent mechanism that, in most cases, also has its own spring.

Existing side-stand types

- Manual Stand—this stand is operated by hand.
- Stands with indicators—Indicate side-stand position
- Spring-assisted stands—springs cause retraction.

Side-stand Retrieval Systems Have a Long History

In recent years, side stand-related accidents have become a source of worry. As a result, a variety of procedures have been used to automate the recovery of side stands. The next sections go over several mechanisms.

Using a microcontroller and a speed sensor, create automatic side stands

This system makes use of a microprocessor, a speed sensor, and a DC battery. The speed sensor detects the rotation of the wheel and transmits a signal to the microcontroller, which controls the

dc motor, causing the stand to disengage from the road.

For such a system, a component is used:

The following are some of the components that are involved:

1. Battery
2. DC (direct current) motor
3. Activate the button
4. Microcontroller
5. Stand on the side
6. Relay
7. Sensor for measuring speed

Sprockets Mechanism for Automatic Side Stands

The essential idea of a two-wheeler is that the engine's power is transmitted to the back wheel, which rotates as a result of receiving it. In most cases, power is transmitted from the gearbox to the back wheels through a chain drive. The “sprocket-side stand retrieve system” is based on the aforementioned idea since it is powered by chain drive.

Involved Components

1. **Axle:** Axle refers to the mild steel rod that connects the wheels to the axle. It serves as a focal link between the lifting lever and the sprocket.
2. The power-transmitting device, the sprocket pinion, is the most important

component of this system. It is powered by the chain drive and allows the system to function. It is the mechanism that, through the tooth on its surface, converts the linear motion of the meshing chain drive into circular motion. This system's heart is known as the sprocket.

3. **Lifting Lever:** The system's third important component is the lifting lever. The lifting lever is a rectangular rod made of mild steel with two lifting leaves that are attached to the axle's edge.

4. The component pivoting centrally to the side stand is the pushing lever. This short piece of rod is utilised to help the lifting lever lift the weight.

Power Source of Working Components

- Engine
- Chain
- Sprocket
- Axle
- Lifting Lever
- Pushing Lever
- Side Stand

Figure 2: Source of Power

This was an excellent retrieval system. The configuration is so little that it has no effect on the vehicle's performance. The

sole disadvantage of this arrangement was the sprocket's meshing with the chain drive and the lifting and pushing lever's less efficient movement.

Mechanism of Hook and Loop

A hook and loop closure system is a type of fastener. The rough side is known as 'Hook,' while the softer side is known as 'Loop.' The hooks are inserted into the loop and serve as a closure mechanism. The linkages between them are portrayed as giving optimal connections.

Joints are structures that allow movement, such as pure rotation or sliding. A kinematic chain is a linkage that is modeled as a network of rigid links and ideal joints. A linkage can be made up of open chains that are joined to one or more other links via a joint. Mechanical connections are often created to convert a given input force and movement into the appropriate output force and movement. The mechanical advantage of the linkage is defined as the ratio of output force to input force, whereas the speed ratio is defined as the ratio of input speed to output speed. In an ideal linkage, the speed ratio and mechanical advantage are defined so that they produce the same number.

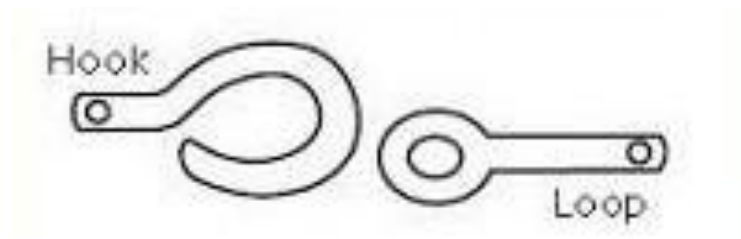


Figure 3: Hook and Loop Arrangement

In India, almost 13 people are killed in car accidents every hour. And the negligence in lifting the side stands is responsible for 36% of these accidents. So, in order to avoid a situation like this, we reasoned that there must be a device that automatically retracts the side stand as soon as the motorcycle starts moving.

Working and Construction

A servo/stepper motor would be attached to a shaft with teeth resembling a rack, and the entire system would function like a rack and pinion arrangement. When the rider opens the side stand, a hook at the end of the shaft will be attached to another hook on the stand, and the servo/stepper motor will be connected in the same circuit as the ignition coil

The mechanism is based on automatic side stand retrieval. When the rider opens the side stand, the hook linked to the side stand carries the shaft along with it. The side stand is now fully functional. Because the mechanism is automatic, when the

rider turns on the ignition, the servo/stepper motor is likewise powered.

When a servo/stepper motor begins to rotate, its rotatory motion is translated into shaft translator motion, which returns the shaft to its original position. The hook that was previously engaged was disengaged as a result of this movement, and the side stand is now lifted using the energy stored in the spring.

Benefits of Implementing the System

- Customer security
- Can take the form of a 'Standard Feature'
- Costs rise by a smidgeon
- Increased sales: in order to compete
- Ergonomic design
- Low-maintenance: Repairs can be done on-site.

Implementation & Design

The theoretical analysis, working, construction, and project planning will all be part of the project process.

The features of servo motors that will enable us to attain our objectives are the notions on which we are working.

Let's start by defining some key characteristics of servo motors

- High efficiency with minimal loss.
- High horsepower and a small footprint.
- Curve of current vs. torque is extremely linear.
- High sustained torque output at low range of speed

The question now is, "How are we going to control the rotation of the servo motor in accordance with our requirements?" The answer is that a rotatory encoder, also known as a shaft encoder, is an electro-mechanical device that translates the angular position or motion of a shaft or axle into an analogue or digital code.

The servo motor we'll use is a linear servo motor, which is similar to the positional rotation servo motor mentioned above but has additional gears (typically a rack and pinion mechanism) to shift the output from circular to back-and-forth.

Criteria for Design

To automatically raise the stand, we must determine the amount of torque required, which is equal to the torque provided by a

normal person, and we will select the servo/stepper motor with the required rating for this purpose. The gearing arrangement, as well as the hook and connection mechanism, will be subjected to more calculations.

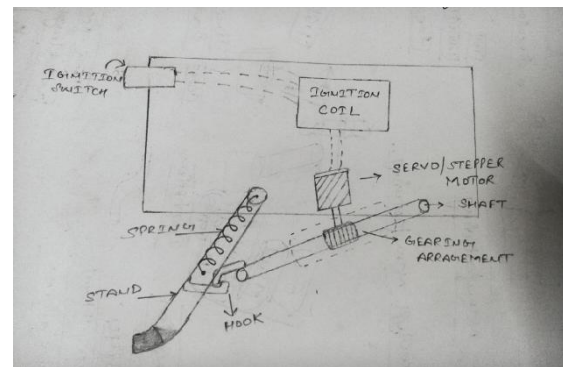


Figure 4: Line Sketch of Automatic retrieving Side Stand

Manufacturing

A servo/stepper motor would be attached to a shaft with teeth resembling a rack, and the entire system would function like a rack and pinion arrangement. When the rider opens the side stand, a hook at the end of the shaft will connect to another hook on the stand, and the servo/stepper motor will be connected in series with the ignition coil. The mechanism is based on automatic side stand retrieval. When the rider opens the side stand, the hook that is attached to the side stand carries the shaft with it.

The side stand is now fully functional. Because the mechanism is automatic, when the rider turns on the ignition, the servo/stepper motor is likewise powered. When a servo/stepper motor begins to rotate, its rotatory motion is translated into shaft translator motion, which returns the shaft to its original position. The hook that was previously engaged is disengaged as a result of these actions, and the side stand is now lifted using the energy stored in the spring.

Estimated costs

A number of components will be used in the construction of our automatic side stand. The following is a list of the parts and their prices:

Table 2 Cost Analysis

S. No.	Component	Cost
1	Servo/ stepper motor	500/-
2	Shaft and casing	300/-
3	Battery	900/-
4	Spring	50/-
5	Side stand	150/-
6	Wire	50/-
7	Auxiliary items	150/-

CONCLUSION

A parked motorcycle is supported by the side stand. If the rider forgets to retract the side stands before riding, the unattended stand will interfere with the rider's control during the turn or even cause a major

accident. We have created a mechanism in motorcycles that allows the side stand to automatically retract. This will help to ensure the safety of two-wheeler riders and will save countless lives.

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