

# Implementation of Low Cost Automatic Retrieved Side Stand Mechanism to ensure Safety of Two-Wheeler Riders

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## Abstract

Automobile takes a great part in the development of a modern world. While automobile is concern two-wheeler plays a very important role because it saves the time of traveler by reaching the target place very faster. We know that carelessness with side stand invite major accidents. So we are making such a mechanism that will automatically retrieve the side stand as soon as motorcycle starts moving.

The side stand is used for supporting a parked motorcycle. If the rider may forget to retract the side stands before riding, then the undistracted stand hitting the ground will affect the riders control during the turn or it may lead to a serious accident. Our goal is to make such a mechanism in motorcycles that side stand automatically retrieve itself. This will ensure safety of two-wheeler riders and will help a lot in saving many lives.

**Keywords:** Side stand, Passenger safety, Low Ccost, Automatic system, Hook and loop mechanism.

## Survey of Road Accidents

About 13 people die every hour due to automobile accidents in India. And 36% of these accidents are due to negligence in lifting the side stands. So to avoid such situation we were thinking that there

must be some mechanism which should automatically retract side stand as soon as motorcycle starts moving.

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%

**Table 1.Survey of road accidents**

As we can see in the table 1 the 36% two wheelers accidents are happened in between the years of 2008-2009 due to forgetting to lift the side stand. The main cause of accidents due to side stand that it interrupt by the road obstacles at the time of taking turn and the bike becomes unbalanced and accident happens. In more cases if the driver is not wearing the helmet, he may get fatal injury on his head and also may get died. So to save the drivers life and to save him from any type of injury” The Automatic Retrieved Side Stand” is necessary to be used in our two wheelers.

## Introduction to Side Stand

A side stand is a device on a bicycle or motorcycle that allows the bike to be kept upright without leaning against another object or the aid of a person. A kickstand is usually a piece of metal that flips down from the frame and makes contact with the ground. It is generally located in the middle of the bike or towards the rear. Some touring bikes have two: one at the rear, and a second in the front.



Figure 1. Motorcycle Side Stand

Side stands can be made of steel or cast aluminum. There may be a rubber cap on the end. Kickstands can lock in place, either up or down, by several means:

- A spring that is stretched when the kickstand is partway deployed and less stretched when it is stowed or all the way deployed.
- A detent mechanism, which usually also employs its own spring.

### Types of existing side-stands

- Manual Stand-Manually operated
- Stands with indicators-Indicate position of side-stand
- Stands with springs-Retraction caused by springs

### History of Side-stand Retrieval Systems

Accidents occurring due to side stands have become a matter of concern in recent years. So, a variety of mechanisms has been applied on the automatic retrieval of the side stands. Various mechanisms have been discussed below.

### Automatic Side Stands using Microcontroller and Speed Sensor

In this system microcontroller, speed sensor, dc battery is used. Through the speed sensor, sensor senses the rotation of the wheel and sends the signal to the microcontroller which is actuating the dc motor which is caused to disengage the stand from the road.

### Component used for Such system

Various components involved are:

1. Battery

2. DC motor
3. Push button
4. Microcontroller
5. Side stand
6. Relay
7. Speed sensor

### Automatic Side Stands using Sprockets Mechanism

The basic principle of two-wheeler is that the power generated in the engine is transmitted to the rear wheel which rotates on receiving this power. Generally a chain drive is used to transmit power from the gear box to the rear wheels. Based on the above principle, "sprocket-side stand retrieve system" is designed because this system works by getting power from chain drive.

### Components Involved

1. *Axle*: It is the metallic rod made up of mild steel. It connects the lifting lever and the sprocket centrally.
2. *Sprocket Pinion*: This is the major component of this system because it is the power transmitting device. It gets power from the chain drive and makes this system to work. It is the device which transmits the linear motion of meshing chain drive into rotary motion by means of the tooth found on it. Sprocket is considered as the heart of this system.
3. *Lifting Lever*: Lifting lever is the third major component of the system. The lifting lever is the rectangular rod made of mild steel, which consists of two lifting leaves which is mounted with the edge of axle.
4. *Pushing Lever*: Pushing lever is the component pivoted centrally to the side stand. This small piece of rod is used for getting lifted by the lifting lever.

**Power Source of Working Components**

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

**Figure 2.Source of Power**

This was definitely a good retrieval system. Since the setup is compact it does not affect the performance of the vehicle. The only drawback of this system was the meshing of the sprocket with the chain drive and the less efficient moving of the lifting and pushing lever.

**Hook and Loop Mechanism**

Hook and loop is a fastener closure system. The rough side is called 'Hook' and its softer mate is called 'Loop'. The hooks engage into the loop and provide the closure mechanism. The connections between links are modeled as providing ideal

movement, pure Rotation or sliding for example, and are called joints. A linkage modeled as a network of rigid links and ideal joints is called a kinematic chain. Linkage may be constructed from open chains is connected by a joint to one more other links. Mechanical linkages are usually designed to transform a given input force and movement into a desired output force and movement. The ratio of the output force to input force is known as the mechanical advantage of the linkage, while the ratio of the input speed to the output speed is known as speed ratio. The speed ratio and mechanical advantage are defined so they yield the same number in an ideal linkage.



**Figure 3.Hook and Loop Arrangement**

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**Construction and Working**

There would be a servo/ stepper motor which will be connected to the shaft having teeth like rack and pinion arrangement. At the end of the shaft there would be a hook which will be connected to another hook of the stand when the rider will open the side stand and the servo/ stepper motor would be connected

in series with the ignition coil.

The mechanism is based on the automatic retrieving side stand. In this mechanism when the rider will open the side stand then the hook which is attached to the side stand also carries the shaft along with itself. Now the side stand is in open condition. As the mechanism is automatic and when the rider gives the ignition then it also powers the servo/ stepper motor.

As the servo/ stepper motor starts rotating its rotatory motion gets converted into translator motion of shaft which brings back the shaft to its initial position. This movement result in disengagement of the hook which was initially engaged and now the lifting f the side stand is done by the energy stored in the spring.

### Advantages of Introduction of the System

- Customer safety
- Can form as a 'Standard Feature'
- Marginal Increase in cost
- Improved sales: to face competition
- Ergonomic friendly
- Low maintenance: Can be repaired locally

### Design & Implementation

The methodology of the project will include the theoretical analysis, working, construction, and the project planning.

The concepts on which we are working are the features of servo motor that are going to make our goals achieved.

Let us first define some important features of servo motor.

- Minimum loss and high efficiency.
- Big horsepower and compact construction.
- Extremely linear current v/s torque curve.
- High continuous torque output and at low

speed range.

Now the point arises that "How we are going to control the rotation of servo motor as per our requirement". The answer to this question is that there is a rotatory encoder also called as shaft encoder which is an electro-mechanical device that converts the angular position or motion of shaft/ axle to an analog or digital code.

The type of servo motor that we are going to use is of linear type i.e. linear servo motor which is also like the positional rotation servo motor described above but with additional gears (usually a rack and pinion mechanism) to change the output from circular to back-and-forth.

### Design Criteria

For the uplifting of the stand automatically we have to calculate the amount of torque required which is equal to the torque provided by the normal person, so for this purpose we will select the servo/ stepper motor of the required rating. Some more calculation will be performed related to the gearing arrangement, the hook and linkage mechanism.

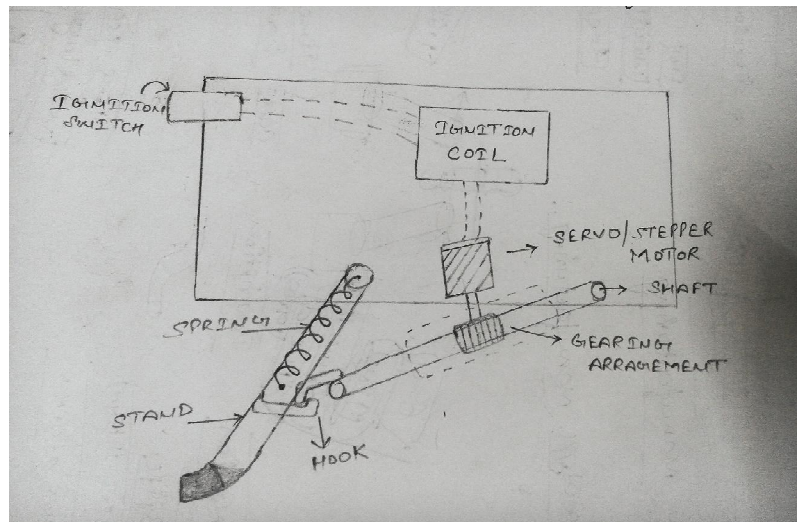


Figure 4. Line Sketch of Automatic retrieving Side Stand

### Manufacturing

There would be a servo/ stepper motor which will be connected to the shaft having teeth like rack and whole assembly would work like rack and pinion arrangement. At the end of the shaft there would be a hook which will be connected to another hook of the stand when the rider will open the side stand and the servo/ stepper motor would be connected in series with the ignition coil. The mechanism is based on the automatic retrieving side stand. In this

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disengagement of the hook which was initially engaged and now the lifting of the side stand is done by the energy stored in the spring.

### Cost Estimation

For the construction of our automatic side stand, a number of components will be involved. The parts, along with their costs, are tabulated below:

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/-

**Table 2. Cost Analysis**

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