

# DESIGN AND FABRICATION OF AUTOMATIC MOTORCYCLE STAND

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**Abstract**-In the modern engineering world two-wheeler vehicles play an increasingly significant role in our lives in today's globe. The use of two-wheelers is extremely common. Side stand plays a major role in all types of two wheelers while in rest position, most of the time accidents occur due to forgetting to lift off the side stand. In India, 20 to 22 percent of accidents occur because the lift of the stand is forgotten. So it is necessary to prevent this condition. It may be avoided by using an automatic side stand mechanism. This paper enables the side stand of the two wheeler to release automatically when the acceleration is given after the engine gets started. The main focus of the project is to avoid the accident due to non-removal of the side stand of the motorcycle.

**Key words:** Automatic side stand, Release Mechanism, Safety, Economical

## Introduction

In the present world more advancement in our living standard. Bike travels are more economical and easy travel from one place to another than other modes of travel. The side stand plays a major role while the bike is in a rest position. The riders are forgetting to take off the side stand that leads to an accident. To prevent this, an automatic side stand retrieval system is essential. This project works under the principle of Bernoulli's theorem. This project focuses on eliminating external sources of energy. The intake manifold concentrated with power and torque. The intake manifold used to maintain the charge's quality, physical qualities, and air-fuel ratio must all be the same. As a result, manufacturers pay great attention to the engine intake manifold when designing. The air-fuel mixture is fed to the engine through a carburetor. It properly balances the gasoline with the incoming air and feeds it to the engine. The intake manifold moves forward, directing an equal amount of charge to each of the cylinders. A special diaphragm is connected to the intake manifold by means of a rubber hose to take off the side stand.

## Literature Review

In this present work, reviews of previous work done related with automatic mechanism used for releasing the side stand of the two wheeler with safety measures of the mechanism is also analysed and are detailed below.

Shanmugapriyan et al., (2020) studied the smart side stand control system powered from the wheels and doesnot affect the performance of the vehicle. In future, the mechanism can be attached with Internet of Things (IoT) that ensures the safety measures of the human to avoid accidents.

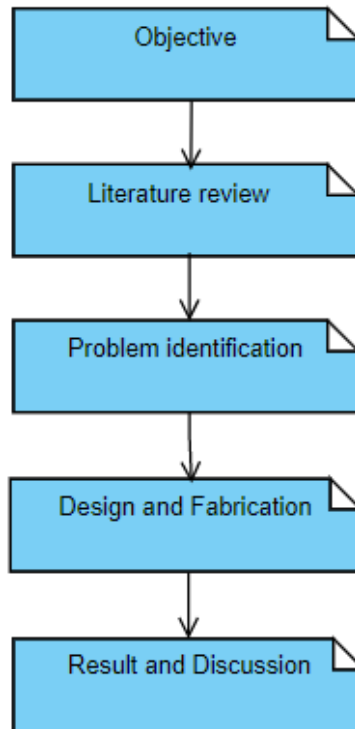
Aniket Gulkane et al., (2017) confirmed that this mechanism will not affect the efficiency of the vehicle and also reduce the risk of being ride with the side stand. It is more economical and reduce accidents due to unnoticed mistake by the user of the vehicle. It is not used with any external power and thereby not disturbing the power of the vehicle.

Vishal Srivatsava et al., (2014) designed a mechanism to release the stand for maximum frictional toque operated by a push button. The author concluded that the mechanism has some disadvantages while engaging and disengaging and it is running with a worm gear mechanism powered by the battery.

## Methodology

The mechanism involved in designing of this automatic release of motorcycle stand is that it has to be release automatically when the vehicle starts to move. The extra spring mechanism attached with the stand will take care of this function when the engine speed will be increased by throttling. An indication buzzer is also attached to confirm the release of the stand and it can also be a message to the user of the vehicle for safety purpose. The methodology uses the power from the engine only during

the start of the vehicle and it is found that there is no significant variation in the efficiency of the vehicle. The main objective of this mechanism is to avoid accidents and can be easily adopted in any two wheelers in a cost effective manner. In future the mechanism can also be connected with IoT for further enhancements in order to improve the safety of the vehicle user.



### Problem Identification

In actual side stands, a kickstand is a single leg that folds out to one side, typically the left, and the bike leans against it. Side stands can be attached to the chain stays behind the bottom bracket or to a chain and seat stay near the back hub. The most common cause of accidents is people forgetting to take off their vehicle's side stand.

### Design concept

#### Parts implemented for design

The parts that are implemented for design are

- Intake manifold
- Rubber Tube
- Vacuum Diaphragm
- Extension Spring
- Side stand lever

### Intake manifold

An intake is a system of passages which conduct the fuel mixture from a carburetor to the intake valve of the engine. The intake manifold is located between the carburetor and the cylinder head. On the multipoint injected engine, the intake manifold holds the fuel injector.



### Intake manifold

Manifold design has to do with the efficient operation of an engine, for smooth and even operations, the fuel charge taken into each cylinder should be of the same strength and quality.

### Rubber Tube

Rubber tube has 15mm diameter and length 80cm is fixed between the intake manifold and vacuum port on the diaphragm.

### Vacuum Diaphragm

Major parts of diaphragm are

- Steel rod
- Spring
- Rubber tube
- Vacuum port
- Cover

The Vacuum port is connected to the pressure (Vacuum) line. When the pressure is applied to the port by below atmospheric pressure, the spring tension is released due to this the spring is compressed, the rubber cap is sucked inside which causes the side stand rod to move.



The diaphragm is fixed on the stand at bottom position, it locks the side stand which causes struggle to push the stand manually. The vacuum pressure is applied to the diaphragm due to this the rod will move backward and stand release automatically.

### Fabricated Stand Structure

The top of the female section is removed and a single steel plate is welded. The two metal pieces are welded together within the gap of the female section and is held by bolt and nut.

### Spring

The spring is to serve an important function in vibration control. Open coil spring is used with following specifications

Wire diameter=1.5mm

Outer diameter = 15 mm

Mean radius = 6.75 mm

No.of turn = 25

Free height (h) = 89 mm

Pitch (P) = 3.56 mm

Stiffness = 7.75 N/mm

Modulus of Rigidity = 749.41 N/mm<sup>2</sup>

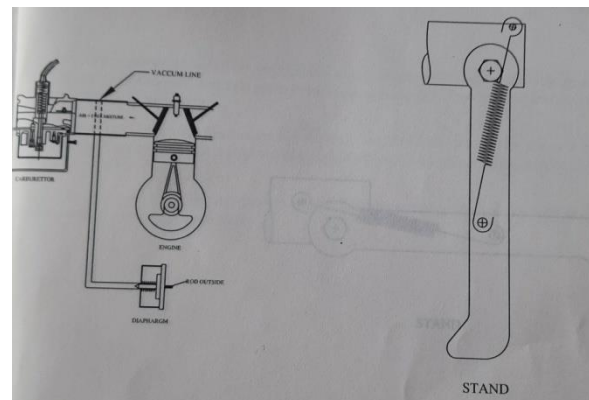
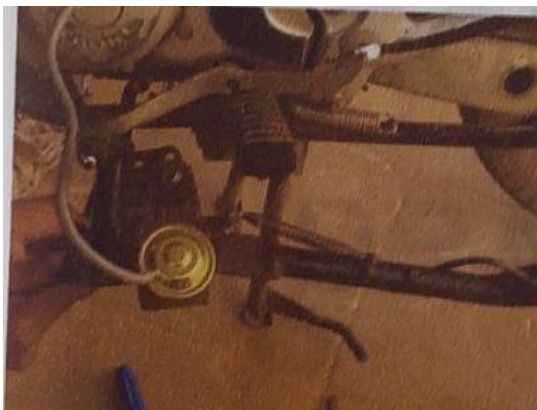
Elastic energy stored in spring = 4703.89 N/mm

Volume of spring = 1873.68 mm<sup>3</sup>

Strain energy / unit volume = 24.62 N/mm<sup>2</sup>

### Working of side stand retrieval system

The user provides the initial input to the system by turning the key ignition switch. When an engine is started, the air fuel is mixed in the right proportion in the carburetor, and then it is supported to the combustion chamber of the engine through the intake manifold. The intake manifold gets a vacuum effect due to the flow of air mixture inside the intake manifold. The quantity of vacuum pressure depends on the rate of flow of air fuel mixture from carburetor to engine cylinder through intake manifold. This vacuum pressure is created by the vacuum.



At the end of the vacuum line, a vacuum port of the diaphragm is connected. The vacuum pressure inside the diaphragm through the vacuum port causes the steel rod

Which is initially extended to get back inside, this results the side stand to release. The steel rod is connected to the top of the side stand as in manner to lock the side stand.

### **Conclusion**

The automatic retrieval system is specially designed by a pneumatically operated mechanism needed for safety purposes. It is designed to operate with the help of the existing vacuum pressure from the inlet and without any external requirements. The construction for this mechanism is simple and the minimum parts required. It is the economically best suitable supporting device for bike riders to operate the vehicle in safer conditions. In future aspects, the mechanism will be fitted in an integral part of the vehicle and studies will be carried out accordingly.

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