

A Review on: A Design & Validation of Side Stand Sensor for Two Wheeler

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Abstract- As today's life is very fast and rider kick the bike and move forward without removing the side stand because of hurry and this may cause accident to avoid such accidents cause due to uplift the side stand, we may produce the new advancement in bike. The need of prevention of the rider on this type of condition, which is happened many times, hence it is important to create something or one mechanism, which prevents the rider from accidents cause due to uplifted side stand. The mechanism should be such that it should neither affect the original mechanism nor create problems. In additional it should not increase the price of the bike. It is just a small mechanism which stand is open or close is conformation is easy. There for it is necessary to have a separate sensor attachment in a bike to conformation of side stand.

Keywords: Reed Switch, Inductive Sensor, Magnet, Two Wheeler Safety

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I. INTRODUCTION

In all over world motor cycles are major mode of transportation used. The side stand is a part of two wheeler which plays major role to park the vehicle and it also takes the complete load of vehicle in its parking condition. Side stand is a crucial part of a two wheeler. But it has some disadvantages also. There is a possibility of rider forgetting to remove the side stand when starting the vehicle. Also there may be possibility of forgetting to release the side stand; this will lead to unwanted troubles. There are many options to avoid this like there is self-retracting mechanism provided in dirt bike. But it is not useful when parking the vehicle. This project is about new type of function used in motor cycle. In this project we are using magnetic sensor to confirm side stand is open or close. If side stand is open then vehicle will not start and its rider will understand that side stand is open. When rider close stand then vehicle will start

Side stand switch is new concept used in automobile sector, especially in two wheelers for safety purpose. Its first innovative feature is the safety of the vehicle. Its second innovative feature is vehicle does not start when side stand switch is on. Third, when vehicle is in running condition and if side stand accidentally gets on, vehicle gets off automatically.

II. PROBLEM DEFINITION

In normal two wheeler vehicles when side stand is on vehicle does not gets off and due to this chances of accident while riding with side stand on condition is more. We are implementing side stand switch with sensor which is used to ensure vehicle does not start when side stand is on.

The other physical problem is that many times rider does not know side stand on when he comes out from parking. To overcome this situation, giving sensor to side stand will make ride safer for the rider.

III. OBJECTIVES

The main objective of designing these projects is to avoid accident of a two wheeler vehicle when side stand is in on condition. For side stand we are using magnet and sensor. Study the various real time conditions during side stand switch design and development. To study various sensors and switches in market, find out problems in it to choose best for the above project. Increase the safety of product and giving safer product to customer.

IV. METHODOLOGY

Collecting data of previous manufacturing products of various companies which have given Side Stand Sensor

Study on problems of existing side stand and switches with its sensors.

Designing the side stand with brackets for sensor and switch for fitment on vehicle and overall packaging

Procurement of materials for manufacturing the different parts for side stand switch.
Manufacturing of different parts as per requirement in the design
Fabrication & Assembly of the different parts manufactured in previous stage.
Conducting trials of model and finding the errors in the system.
Taking the corrective actions to overcome the errors occurred in trial stage.

V. LITERATURE REVIEW

- [1] SAE Technical paper On the Safety of Motorcycle Side Stands - author - Dror Kopernik
– The side stand is a common means of supporting a parked motorcycle. Motorcycle riders may, on occasion, forget to retract the stand before riding. The potential of an unretracted stand hitting the ground and interfering with the rider's control during a turn has been recognized for a long time. Different designs have been tried in an effort to reduce or eliminate the problem. Laboratory and road tests show the effects of geometrical design parameters on the retractability of side stands and define those parameters having the greatest influence.
- [2] US9738339B1 Side stand indicator for a two-wheel vehicle – In this paper, it is stated that disclosed embodiments use inductive sensors to determine whether the side stand is properly stowed. Inductive sensors detect metal objects, so that the side stand itself can serve as the target. This allows the sensor to be operable without adding an additional target to the side stand. The proposed side stand sensor can be implemented in at least two ways: a) detecting the presence or absence of the metallic side stand adjacent the inductive sensor or b) detecting the strain in a spring attached to the side stand and translating that strain into a determined position. In one aspect, an embodiment of a two-wheel vehicle is disclosed. The two-wheel vehicle includes a frame; a metallic side stand, rotatable within a bracket attached to the frame, the metallic side stand rotatable between a first position that supports the two-wheel vehicle when parked and a second position substantially adjacent the frame; an inductive sensor attached to the two-wheel vehicle and connected to detect at least one position of the metallic side stand; and a circuit connected to receive an output from the inductive sensor and to provide a signal that reflects the position of the side stand. In another aspect, an embodiment of a side-stand detector for a two-wheel vehicle is disclosed. The side-stand detector includes an inductive sensor configured for attachment to the two-wheel vehicle to detect at least one position of the side stand; and a circuit connected to receive an output from the inductive sensor and to provide a signal that reflects the position of a side stand.
- [3] Motorcycle Side Stand Retraction Test Procedure (STABILIZED Oct 2014) J1578_201410
– In this Paper, test procedure is provided for retraction of side stand. This test Procedure provides a standard method for evaluating the side stand retraction performance of a side stand/motorcycle combination.
- [4] Motorcycle Side Stand Retraction Performance Requirements (STABILIZED Oct 2014) J1579_201410
– In this paper, requirements are specified for side stand retraction performance. These requirements define minimum recommended levels of side stand retraction performance of a new side stand/motorcycle combination when tested according to the procedures of SAE J1578.
- [5] US6733025B2 Motorcycle stand control mechanism – This paper describes Motorcycle stand control mechanism. A motorcycle stand control mechanism is constructed to include a rotor rotatable with the transmission line of the cable of the mileage meter of the motorcycle in which the motorcycle stand control mechanism is installed, a rotary driven member fixedly fastened to one end of the rotor, the rotary driven member having a plurality of magnets alternatively arranged around the periphery thereof in reversed direction, and a fixedly circuit board provided near one side of the rotary driven member, the circuit board having sensor adapted to act with the magnets and to output a corresponding control signal to turn the motorcycle stand of the motorcycle subject to the status of the rotary driven member.

VI. DESIGN

About Side Stand

Side Stand is a component of vehicle which is used to park the vehicle. It is mounted on vehicle with spring attached to it to provide tension to keep the side stand in its position. See Below Fig. 1.



Fig. 1 Side Stand

About Side Stand Sensor

Side stand sensor is combination of magnetic sensor and a magnet mounted on side stand. When Magnet comes in close to the sensor it sends signal and tells vehicle system that side stand is closed. When magnet is away from magnetic sensor then it sends the signal to vehicle system that side stand is open. See fig. 2 and Fig. 3.

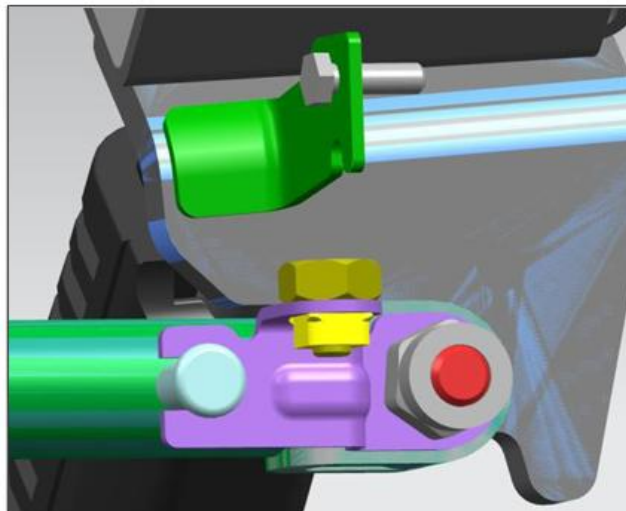


Fig. 2 Magnet for sensor

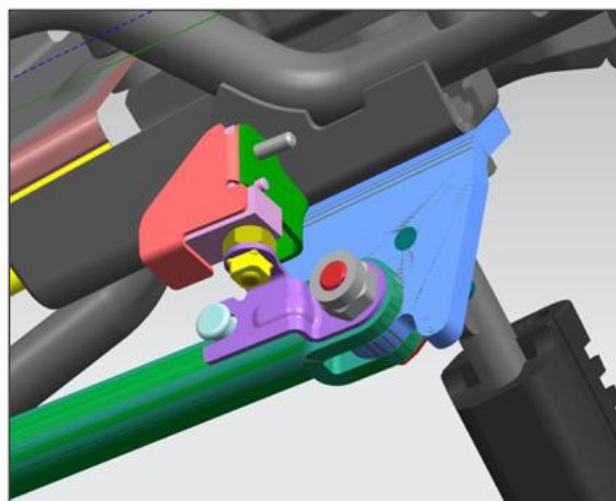


Fig. 3 Side stand sensor

Function of Side Stand Sensor

Side stand sensor uses magnet and magnetic sensor for its working. It is a non-contact type sensor which is ideal for the application in side stand. A magnetic sensor is added in the vehicle harness to carry the

side stand signal to the vehicle system. When the magnet is close to the sensor, sensor sends the high signal to the vehicle system indicating that side stand is in closed condition. Then only vehicle will get started. If the magnet is away from the sensor, sensor will not sense the presence of magnet and will send low signal to the vehicle system indicating that side stand is in open condition, thus preventing the vehicle from starting. The ideal gap between the sensor and the magnet should be 1-3.5 mm for optimum working. See Fig. 4.

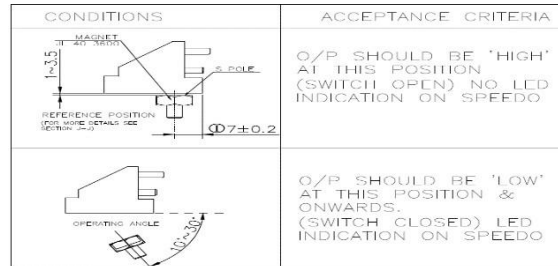
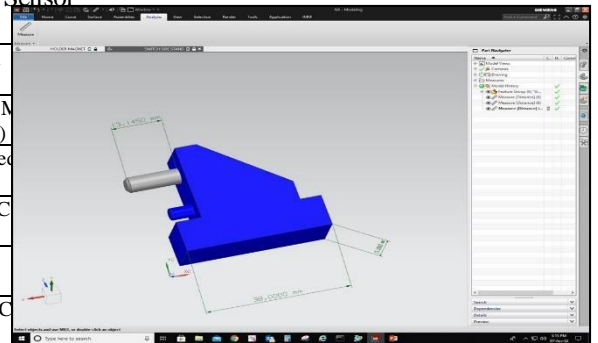


Fig. 4 Acceptance Criteria

Specification of Side Stand Sensor

Sr. No	Parameter	Specification
1	Angular Movement of Magnet	~105° (Total Movement of Side stand)
2	Mounting	To be mounted on Side Stand
3	Operating Temperature	-20°C +120°C
4	Gap between magnet and sensor	1 ~3.5 mm
5	Operating Range	4V to 18V DC
6	Rated load current	0.5A to 12V DC
7	System current	Approx. 20mA
8	Insulation resistance	10 MOHM min.
9	Output Voltage	Side stand Up - <1.2V(Low) Side stand down - >3V (High)



Circuit Diagram for Side Stand Sensor

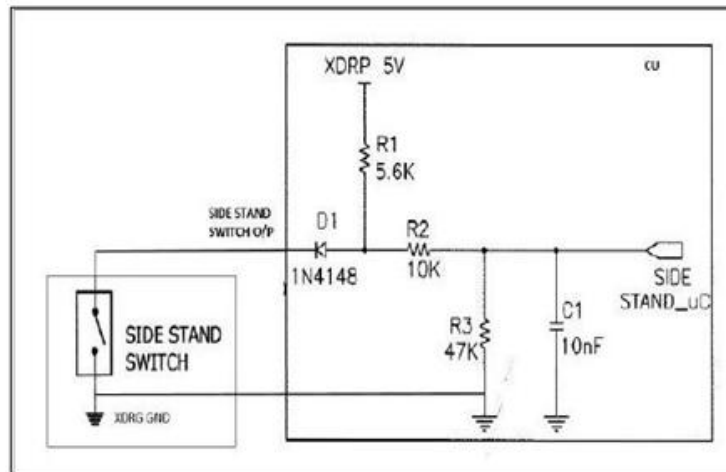


Fig. 5 Circuit Diagram

Design of Side Stand Sensor

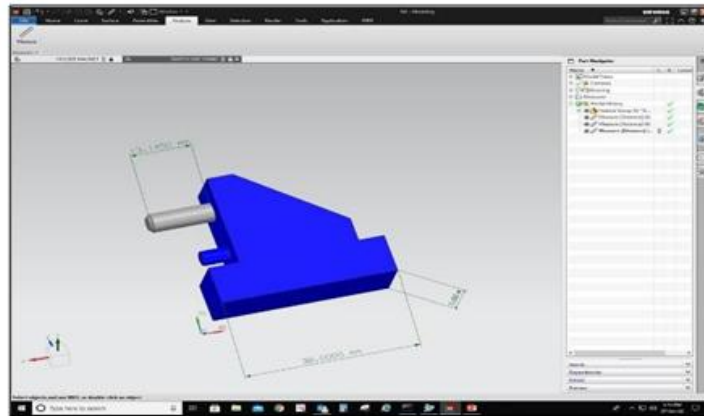


Fig. 6 Side Stand Sensor Design

Design of Magnet

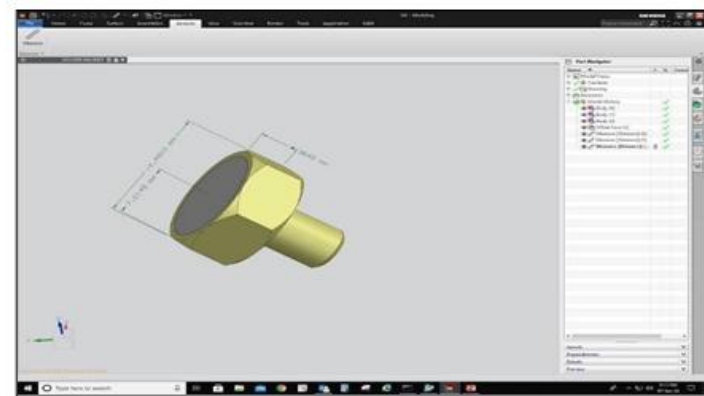


Fig. 7 Magnet Design

condition of side stand. By seeing it rider can easily determine the side stand condition without checking physically.

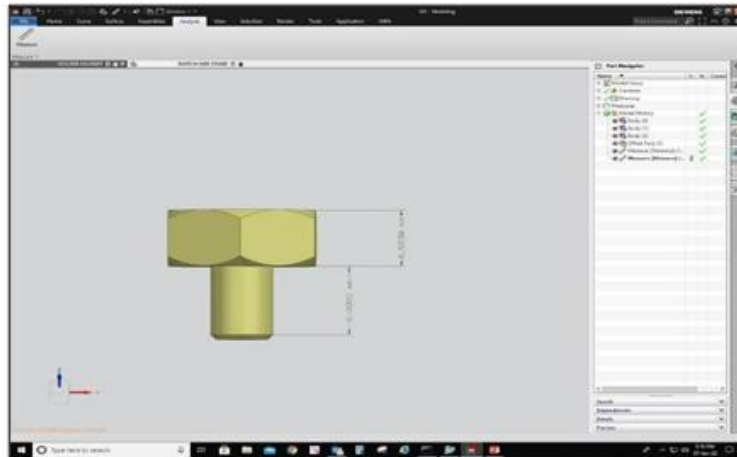


Fig. 8 Magnet Design (Side View)

Design of Sensor Protection Plate

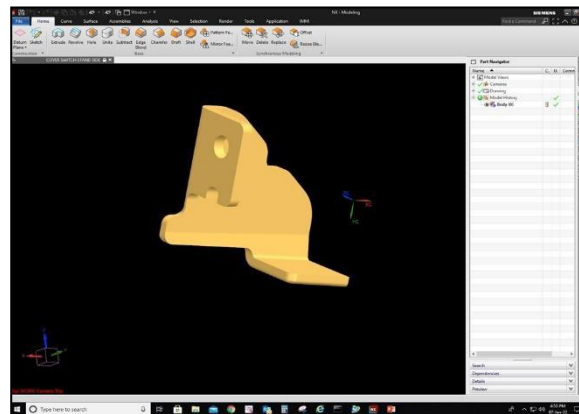


Fig. 9 Sensor protection Plate Design

VII. ADVANTAGES

There are multiple advantages of side stand with sensor. Below are some of them.

Safety Point of View – Adding a sensor to the side stand improves safety of the vehicle. Side stand sensor helps to remind condition of side stand (Open or Close) to the rider improving safety when vehicle is in running condition. It also prevents the vehicle from starting if the side stand is in open condition.

Quality of Product – Addition of side stand sensor technology will improve the overall quality of vehicle. It will attract more customers due to increased number of technology incorporated in the vehicle.

Visual Analyze – With side stand sensor, there will be LED indication in instrument console indication the

Conditional Function – Conditional functioning can be used in two wheelers Vehicle Control Unit software. Side stand condition can be used as triggering condition for some parameters in Vehicle control Unit software, such as Side stand should be in open condition to flash the updated version of vehicle control unit software.

Ease of inclusion in Vehicle – As this require less space and less components, it is easy to install in mostly all of the available two wheelers.

No effect on overall functionality of vehicle – There is no effect on the functionality of engine or structure of the vehicle.

It will help in reducing the road accident caused by open side stand while driving.

VIII. CONCLUSION

In this project CAD model is used to design the sensor, magnet and protection plate followed by assembly of components. Also by fabricating the parts it will be possible to conclude the problems during operation and assembly of the parts. This will increase the chances to solve the issue at early stages, if any, after reevaluating the design and assembly. By conducting initial trial, it will be possible to remove any operational defects and issues. After all this reevaluation and initial trials final project specimen will be assembled and presented.

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