

Gear Lock System for Enhancing Safety of Two Wheeler Side Parking Stand

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Abstract— Vehicle safety has become an important issue over the years due to exponentially increasing number of vehicles. Two wheelers are most suitable and accepted for transportation, since they are economical, needs less space for driving and parking, and can be easily used in rough terrain. The side stand is useful for parking the two wheelers on rough surfaces, takes less time and effort, hence it is predominantly used while parking the two wheelers. One of the most common problems encountered while using the two wheelers after parking is the negligence or carelessness to swivel it back to its original position, because of urgency, absence of mind, divergence in concentration etc. Failure to bring back the side stand to its original position may hit the side stand to speed breakers, rough terrains on road and may cause the fatal accident by sudden losing vehicle control. To overcome this problem, reliable and robust safety system has been proposed in this paper. Proposed system integrates the side stand positions with clutch shifter utilizing side stand cable which restricts the gear shifting, ultimately controls the vehicle movement. Proposed system is simple, robust, and economical which can be mounted on any brand of two wheelers with minor modifications. The safety system has already been mounted on hero honda two wheeler, and is in use successfully.

Keywords— Two Wheelers, Safety, Side Parking Stand, Clutch Shifter, Side Stand Cable.

I. INTRODUCTION

According to the Global Road Safety Report 2015, published by World Health Organization, more than one lakh deaths are caused in a year due to road accidents in India. As per NDTV reports, two wheelers account for 25% of the total road crash deaths [1]. Vehicle safety has become an important issue over the years due to the increasing number of vehicles. Two wheelers are most suitable and accepted for transportation, since two wheelers are economical, needs less space for driving and parking, and can be easily used in rough terrain. Therefore, two wheelers have become the basic need of every home for rural, as well as urban areas. Exponentially increasing number of two wheelers makes it essential to ensure all safety means for safe journey.

Two wheelers are provided with centre stand and side stand for parking the vehicle. A center stand, a pair of legs or a bracket that flips straight down and lifts the rear wheel off the ground. The center stand takes most of the motorcycle's weight off its tires for long-term parking, and also allows the user to perform maintenance without need for an external stand or jack [2]. The side stand is useful for parking the vehicle on rough surfaces, less space for parking, and mainly

it takes less time and effort for parking, therefore side stand is predominantly used for the two wheelers. One of the most common problems encountered in using the side stand is negligence or carelessness to swivel back the side stand to its original position, because of absence of mind, urgency, divergence in concentration etc. Failure to bring back the side stand to its original position may hit the side stand to rough terrains on road and may cause the fatal accident by losing stability of the vehicle.

This paper presents a reliable, robust and economical safety system for side parking stand by integrating the side stand positions with clutch shifter which restricts the gear shifting, ultimately controls the two wheeler movements according to the position of the side stand. Proposed system utilizes additional side stand cable as the main component, which is connected to the clutch lever on handle and clutch shifter located on engine. Proposed system is reliable, robust very economical and can be mounted on any brand of two wheelers.

II. LITERATURE REVIEW

Several researchers, academicians, and technicians have suggested different ways for the safety use of side parking stand. R. Prashantkumar et al. [3] proposed security system for two wheelers which included the engine immobilizer and alarm, SMS alerting to the owner, location tracking of vehicle using GPS in case of theft. Authors also provided remote keyless system, servo motor operated locking system for handle lock, fuel lock and rear wheel lock, and also side stand indicator for indicating the position of the side stand. P. Prajapati et al. [4] and B. Murlidharan et al. [5] developed sprocket side stand retrieval system, which takes the power from chain for the retrieval of the side stand. Developed system consisted of axle, sprocket, lifting lever, and pushing lever. Diagaraj R. [6] designed and filed a patent for side stand alarm for two wheelers, which alerts the rider about retrieval of side stand. Alarm system consisted of electrical circuit, tensional spring, and alarm i.e. bell. Bharucha P. [7] developed automatic two wheeler stand using DC motor and hydraulic pump, coupled together with the help of distributing manifold and having a reserve oil tank forming a power pack. D. Ramraika et al. [8] filed a patent for design and development of a device for enhanced safety in using a side stand for parking of two wheeler. The device consisted of a base plate, main frame. R. Girimurugan et al. [9] designed and fabricated automatic side-stand retrieval system for two wheelers, by using sprocket and pinion. V. Shrivastva

et al. [10] developed automatic side stand retrieve mechanism for two wheeler that consisted of D.C. motor, worm and worm wheel, and rotation sensor. N. Kumar [11] et al. developed trigger mechanism for side stand retrieval system to lift the side stand as soon as the two wheeler starts moving. The trigger mechanism consisted of main components namely, the clutch, stand and trigger device. Side stand indicator system may fail in case of loss of battery, failure of indicator lamp, or overlook by the rider etc. Side stand alarm system may also fail due to battery loss or failure of alarm speakers. Even though various systems have been developed for safety use of the side parking stand, there is the need to develop some simple, robust and economical safety system for the side parking stand of two wheelers. Therefore design and fabrication of reliable, robust and economical safety system for side parking stand by integrating the side stand positions with clutch shifter has been proposed by the authors.

III. PROPOSED SAFETY SYSTEM

The schematic of the proposed safety system is as shown in fig. 1. Figure shows the position of the side stand in parking condition. The side stand is to be swiveled back, when the two wheeler needs to be used. The proposed safety system is very simple, robust and economical, since it has side stand cable (clutch cable) only as the main component. Two cables namely clutch cable and side stand cable are connected to the clutch shifter. The side stand cable is connected to the clutch shifter and pivot on side stand. The clutch cable is connected to clutch shifter and clutch lever on handle. For shifting the gear, clutch needs to be disengaged. The tension between the cables plays an important role during the use of safety system. When the side stand is in parked condition, the side stand cable is in function which pulls the clutch shifter and restricts the disengagement of clutch i.e. gear shifting, ultimately prevents the movement of two wheeler. When the side stand is in retracted condition, clutch cable is in function which disengages the clutch by operating clutch lever on handle and finally permits the gear shifting i.e. movement of two wheeler.

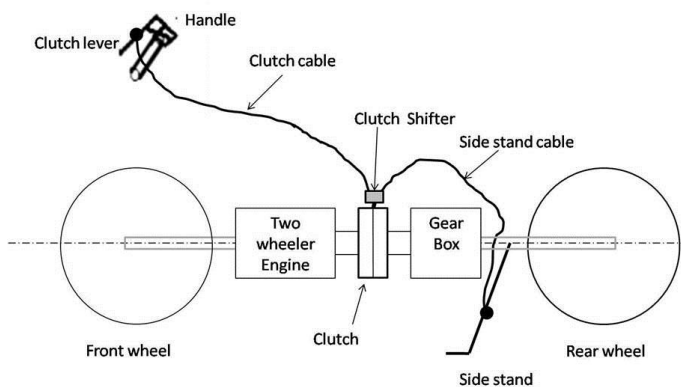


Fig. 1 Schematic of proposed safety system

IV. CONSTRUCTIONAL FEATURES

Components of Safety System

Developed safety attachment consisted of the following components, the functions of which are as given:

A. Clutch cable

The clutch cable is important part of this system. It is mounted between the clutch lever at handle and clutch shifter. Additional clutch cable which functions as side stand cable is connected between the side stand and clutch shifter. Its main function is to disengage the clutch during gear shifting. Fig. 2 shows the photographic view of clutch cable.



Fig. 2 Clutch cable

B. Clutch Shifter

Fig. 3 shows the dimensional details and photographic view of clutch shifter.

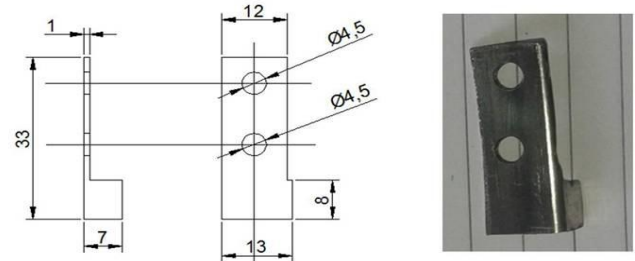


Fig. 3 Clutch shifter dimensional details

It is mounted on main clutch shifter with the help of chain lock joint as shown in figure 4. Its main function is to hold the main clutch cable and side stand cable. Two clutch shifter cable holders are pivoted on clutch shifter by using chain lock joint.



Fig. 4 Mounting of clutch shifter lever

C. Clutch Shifter Cable Holder

In the proposed safety system two clutch shifter cable holders are used. They are pivoted on clutch shifter with the help of chain lock joint. One of them hold one end of main clutch cable and other one holds one end of side stand cable. Fig. 5 shows the dimensional details and photographic view of cable holder. In addition to above components small components like cable adjuster, cable holder on side stand, and nut bolts are also used. Figure 6 shows the photographic views of the proposed system mounted on two wheeler of the Hero Honda brand.

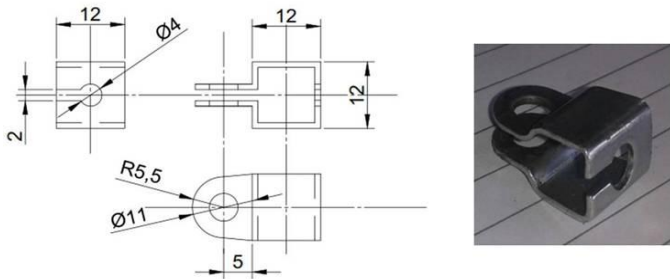


Fig. 5 Clutch shifter cable holder dimensional details



Fig. 6 a. proposed system mounted on two wheeler showing side stand pivot and side stand cable



Fig. 6 b. proposed system mounted on two wheeler showing clutch shifter and both cables

V. COSTING

Table- 1 Part list and their cost

Sr. no.	Part name	Cost (Rs.)
1	Clutch cable	60/-
2	Clutch shifter	40/-
3	Cable holders	165/-
4	Chain lock joint	11/-
5	Cable adjuster	70/-
6	Nuts and bolts	18/-
7	Rubber bush	19/-
Total		383/-

Proposed system is very robust and economical. Clutch cable and cable holders as the main parts of the system. Table 1 shows the list of parts and the total cost of the parts including the manufacturing process if any. Cost of the proposed system is in few hundreds, whereas it can be further reduced, if the system is manufactured in batch or mass production

VI. RESULTS AND DISCUSSIONS

The design of the proposed system is very simple, economical, and compact which occupies very less space and can be easily mounted on the motorcycle frame. Various trials have been performed to verify the use of safety system. It has been observed that system does not affect the working of motorcycle and there are no issues while driving the motorcycle.

This system is presently in use and quite successful with following advantages:

1. Very simple in construction and installation,
2. Compact.
3. External power source is not required.
4. Cost of system is low.
5. Less maintenance is required.
6. Weight of system is less and simple in structure.

VII. CONCLUSIONS

The main purpose of the safety system is to implement a side stand retrieval system with simple mechanism and easily available components. authors strongly admit that the developed system is one of the most optimal, and effective solution for the major problem at minimum resources. The developed safety system can be successfully mounted on any of the two wheelers in minimum cost and time.

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