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Automated Center Stand

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Abstract - *Most modern scooters come with both a side stand and a centre stand. The side stand is easily deployed allowing the scooter to lean to the left side. The scooter must be hoisted up onto the center stand. This is normally difficult as these stands need to be stepped upon and the vehicle needs to be lifted manually. Unless on firm, leveled ground, the side stand on a scooter or any bike cannot be trusted whose wheels cannot be locked in place by setting a parking brake or leaving it in gear. In this paper, an automated centre stand is designed and fabricated which uses a linear actuator powered by a battery to lower the stand and lift the vehicle and park it on the stand. This stand minimises human efforts to almost zero. In addition, the self balancing mechanism was firmly established which lifts the scooter upright on uneven surfaces. As a result, it has become possible to install this automated centre stand in mass production scooter.*

Key Words: **Centre stand, automated, linear actuator, self balancing, battery, etc.**

1. INTRODUCTION

Conventional method of applying a centre stand requires lot of human efforts. Hence, applying scooter on the centre stand is a herculean task, especially for ladies and old people. Due to this, they hardly apply centre stand. Here we introduce automated centre stand which is easy to apply and requires no man power.

As a replacement to man power, a linear actuator driven by battery is used. The operation is controlled by a toggle switch which lifts the lower unit of stand assembly and apparently brings it down in order to lift the scooter. In addition, meshing of rack in rack, i.e. a self balancing mechanism helps the scooter to stand upright on uneven surfaces. Moreover, it is not possible to change the position from that of present one. Usually the stand is deployed under the engine where the ground clearance is minimum.

1.1 Problem Identification

On surveying, it was found that around 72% males and 28% females drive scooters. Among those 72% males, around 20% are oldies and remaining are adults. Mostly females and old people find it difficult to apply centre stand and hence this made us develop and make it automated. Moreover, applying a side stand;

1. Develops fatigue in stand.
2. Increases chances of accident.
3. Requires more parking space.
4. Reduces battery life since the electrolyte is in constant touch with electrode.

Whereas, applying a centre stand manually;

1. Requires more effort for application.
2. May cause back and/or leg injuries.

Due to above described problems, centre stand is hardly used. However, the centre stand cannot be used on uneven surfaces.

1.2 Solution for above problems

The automated centre stand assembly is more like a metallic rectangular box. It is fixed at the same location that of the conventional stand. It has two main parts; the lower unit and the upper unit. The upper unit is pivoted to the scooter frame and the lower unit is joined to a curved surface for easy lifting. The linear actuator is powered by automobile battery, controlled by toggle DPDT switch which changes the polarities of the supply. The linear actuator is pivoted at the centre of the stand assembly which distributes load equally on both the limbs of the stand. A pair of interlocking racks helps to balance the scooter upright.

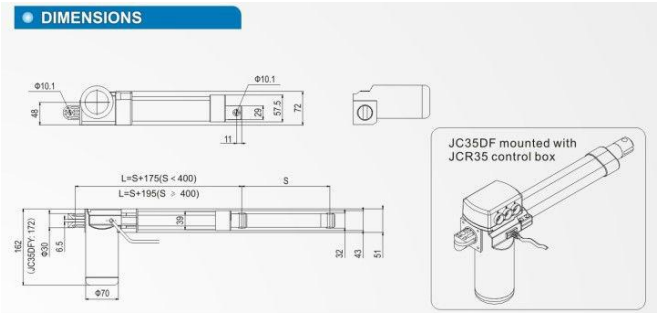
2. MAIN COMPONENTS OF THE PROJECT:

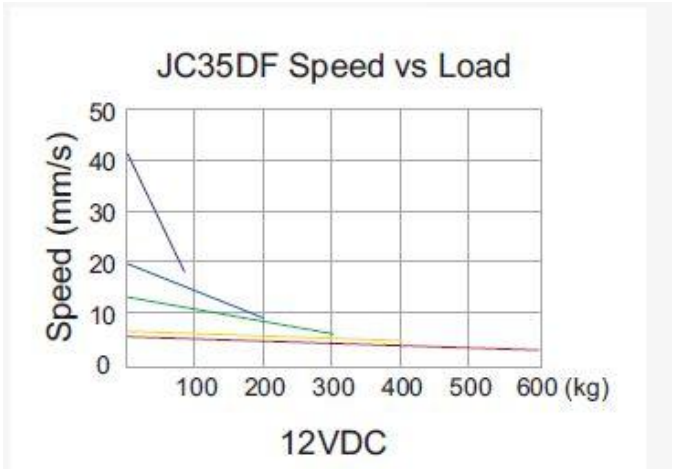
1) Mechanical linear actuator
2) Modified stand
3) Toggle switch
4) Battery

2.1 Components specification:

2.1.1. Linear Actuator

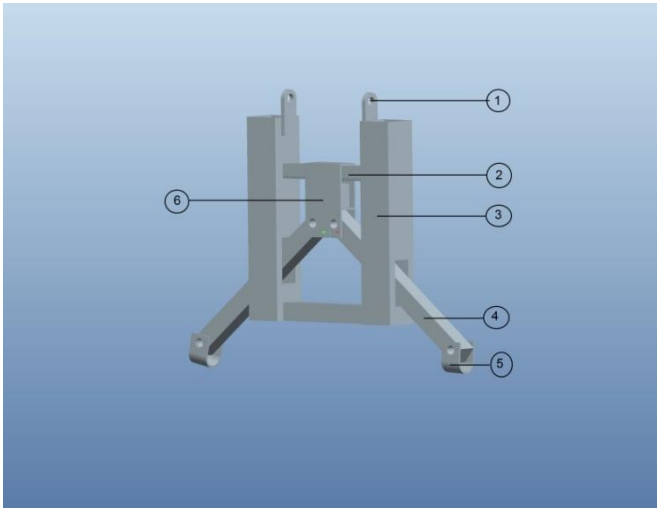
A **linear actuator** is an actuator that creates motion in a straight line, in contrast to the circular motion of a conventional electric motor. Linear actuators are used in machine tools and industrial machinery, in computer peripherals such as disk drives and printers, in valves and dampers, and in many other places where linear motion is required.





2.1.2. Modified stand

Modified stand comprises of;

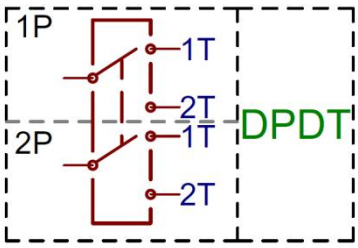


1. Pivot at vehicle frame
2. Rack and rack for balancing
3. Primary frame
4. Adjustable legs
5. Contact pads
6. Pivot for Actuator

2.1.3. Toggle DPDT switch

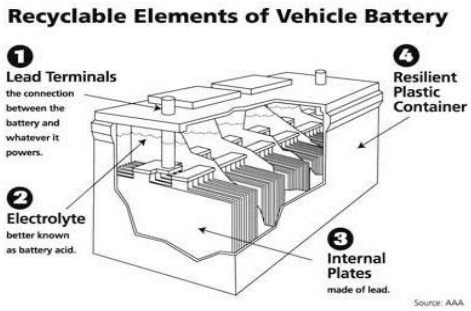
DTDP -In electrical engineering, a **switch** is an electrical component that can break an electrical circuit, interrupting the current or diverting it from one

conductor to another. The mechanism of a switch may be operated directly by a human operator to control a circuit.



2.1.4. Battery

An electric **battery** is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell contains a positive terminal, or cathode, and a negative terminal, or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work.



3. WORKING OF THE STAND

1) When the switch is turned on, the linear actuator pivoted at the centre of the stand assembly actuates and pushes the stand downwards.
2) On touching the ground, it is not possible for the stand to move any further and hence the scooter gets lifted gradually.
3) On full displacement of the actuator, the stand is in applied position.
4) The actuator cannot be manually displaced which gives an additional benefit in respect to safety.
5) On reversing the polarity through the toggle switch, the actuator starts to displace in reverse direction and hence lifting the stand and lowering the scooter back onto the wheels.
6) Following observations are recorded;

Stand rotation angle (degree)	**Lift of scooter (cms)**	**Displacement of actuator (cms)**
46 (ground contact)	0	2
53.5	3	4
60.64	6	5
67.06	8.5	6
80 (Applied position)	12	10

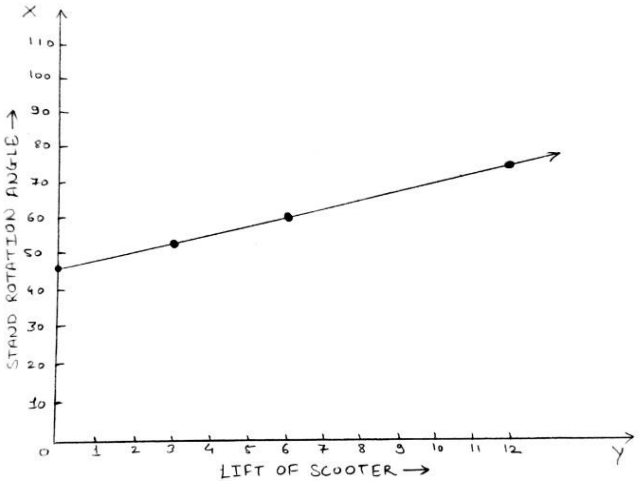


Fig. Graph of Rotation of stand vs Lift of scooter

4. CONCLUSION

The centre stand of scooter is made automated under the scope of B.E. Mechanical Engineering project. Linear actuator and modified stand are used to make the stand automatically operational. The main advantage of this mechanism is to reduce the human efforts and parking space required while the scooter is parked on side stand.

5. ADVANTAGES

1. Requires less human efforts.
2. Requires less parking space.
3. Easy to handle for women and old people.

4. Easy to use for handicaps.
5. Easy to install and uninstall.
6. Balances the scooter upright on uneven surfaces.

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