

# A Review Paper on Design & Development of Hydraulic Jack Controlled by Wireless Remote

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**Abstract**— Now a days, peoples are interested in luxury and modified life, comfort and safety is main purpose for life of peoples. Lives provided with money and technology available with the mankind and using atomized this project purpose is to reduce the physical effort by humans to lift an automobile by remote control automation this reduce the accident and workers safety. In this project we use the human safety with comfort as main criteria. This project consist of designing of model fabrication of remote controlled hydraulic jack. This system also includes the crank mechanism for easy working of system. It works on the mechanism of conversion of rotary motion of the wiper motor into the reciprocating motion of the hydraulic jack's plunger. The functioning of the motor being controlled by the RF module and a remote, through simple push of a button one could lift a heavy vehicle thereby reducing the physical effort considerably. Prototype the aforementioned mechanism was designed and fabricated. Also, this includes it was tested and its functioning can be successfully illustrated .A project work on design and fabrication of a remote controlled system for a hydraulic jack which consist of a base, gearing system and crank mechanism is presented. The prototype includes motor powered from a 12v battery of a tractor through a car adapter or from a lighter adapter in vehicles. The motor with gearing system will be the lifting mechanism. When an equipment is needed to be lifted, just press the button on the remote device, firstly to lock the hydraulic jack valve, then pressing again will start the lifting operation and afterwards the button is released at a desired height level This work would help to overcome drudgery, musculoskeletal disorders, injuries, increase timeliness and efficiency in the farm while carrying out maintenance works, would also help in reducing size, space occupied, cost employed in maintenance operations.

**Key words:** Hydraulic Jack, Design & Development, Four-Bar Mechanism. Car Jack, Remote Control, Fabrication, Affordable & Performance

## I. INTRODUCTION

In this project fluid power technology is integrated with electronics to control the hydraulic components and systems of a car jack. An alternate source of energy was to be provided by taking the power from wiper motor to drive the hydraulic jack automatically that will definitely reduce the physical burden on the human. The project principle is, converting rotary motion of the wiper motor into the reciprocating motion of the hydraulic jack plunger which was done by using a four bar link designed based on the crank of the four bar link is connected to the motor and the rocker acts as the hydraulic jack plunger. When the crank is being rotated by the motor, the rocker or the jack plunger reciprocates. The plunger is first drawn back, which opens the suction valve ball within the hydraulic jack and this draws oil into the pump chamber. As the plunger is pushed forward, the oil moves through an external discharge check valve into the cylinder chamber, and in this system the suction valve closes, which

results in pressure building within the cylinder. The general idea of project jack is to minimize the human effort while operating the jack. A mechanical jack is a portable device consisting of a screw mechanism used to raise or lower the load. There are mainly three types of jacks- hydraulic, pneumatic and mechanical. A hydraulic jack consists of a cylinder and piston mechanism. In day to day life it is very job to operate the jack manually and it is also a very difficult job and time consuming work as well. The general idea of project is to minimize the human effort while operating the jack. A mechanical jack is a portable device consisting of a screw mechanism used to raise or lower the load. There are mainly three types of jacks- hydraulic, pneumatic and mechanical. A hydraulic jack consists of a cylinder and piston mechanism. The movement of the piston rod is used to raise or lower the load. Mechanical jacks can be either hand operated or power driven. Jacks are used frequently in raising cars so that a tire can be changed. The jack is made out of various types of metal, but the screw itself is generally made out of lead.

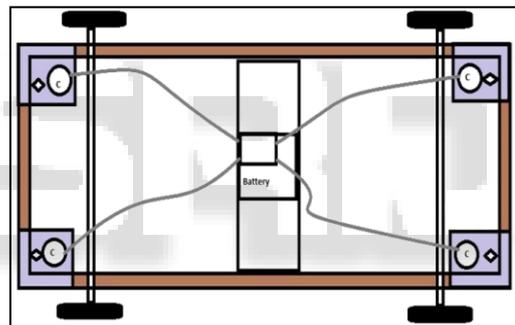


Fig. 1: Diagram of Mechanical Jacks for Four Wheeler

Some screw jacks are built with anti-backlash. The anti-backlash device moderates the axial backlash in the lifting screw and nut assembly to a regulated minimum. A large amount of heat is generated in the screw jack and long lifts can cause serious overheating. To retain the efficiency of the screw jack, it must be used under ambient temperatures, otherwise lubricants must be applied. There is oil lubricants intended to enhance the equipment's capabilities. Apart from proper maintenance, it according to its design and manufacturer's instruction. Ensure that you follow the speed, load capacity, temperature recommendation and other relevant factors for application.

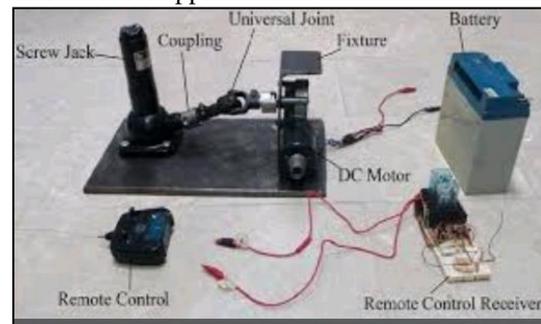


Fig. 2: Model of Hydraulic Jack

The car jack is very important device all vehicle owner must have to help in servicing their car when the need arise. The need for the car jack is often necessitated by flat tires that need repair or replacement. Other cases include the repair that will require going under the vehicle and so to get access to such areas, the car jack is needed. The type of car jack used will determine the amount of physical labor to operate them to raise the car to the required height and most time result in much exertion from the individuals and could be energy sapping. Developed the impetus for a more complex type of television remote control came in the late 1970s with the development of the service by the BBC. Most commercial remote controls at that time had a limited number of functions. As previously mentioned, Zenith was ready to change the lives of "lazy" people for good.



Fig. 2: Working of Hydraulic Jack

## II. LITERATURE REVIEW

[1] A mechanical jack is a device which lifts heavy equipment and vehicles so that maintenance can be carried out underneath (Budynas, 2008). A hydraulic jack is a device that uses a liquid to push against a piston. This is based on Pascal's Principle. The principle states that pressure in a closed container is the same at all points. If there are two cylinders connected, applying force to the smaller cylinder will result in the same amount of pressure in the larger cylinder. However, since the larger cylinder has more area, the resulting force will be greater. In other words, an increase in area leads to an increase in force. The greater the difference in size between the two cylinders, the greater the increase in the force will be. A hydraulic jack operates on this two cylinder system (Muchnik, 2007). Many trends (screw or hydraulics) have gone down around the lifting applications in the automobile workshops. Increasing the mechanical advantage of doing work remains the objective of these developments (Muchnik, 2007). Mechanical jacks were very common for jeeps and trucks.

[2] World War II jeeps (Willys MB and Ford GPW) were issued the "Jack, Automobile, Screw type, Capacity 1 1/2 ton", Ordnance part number 41-J-66. This jacks and similar jacks for trucks were activated by using the lug wrench as a handle for the jack's ratchet action to of the jack. The 41-J-66 jack was carried in the jeep's tool compartment. Screw type mechanical jack's continued in use for small capacity requirements due to low cost of production raise or lower it. A control tab is marked up/down and its position

determines the direction of movement and almost no maintenance.

[3] Thomas J. Prather (2009): In this, there was an introduction about vehicle lift system. A drive assembly was mechanically coupled to the piston. The drive assembly was operated in first direction to raise an upper end of the piston with respect to the housing. The drive assembly was operated in a second direction to lower the upper end of the piston with respect to the housing. The drive assembly was coupled to the power supply port which is removable to supply electrical power to the drive assembly.

[4] Lokhande Tarachand (2012): This paper referred to optimize the efficiency of square threaded mechanical screw jack by varying different helix angle.

[5] Manoj Patil (2014): In this general article, screw jack is developed to overcome the human effort. It is actually difficult job to operate for pregnant women and old person. Changing the tire is not a pleasant experience. Especially women can't apply more force to operate. For that, electric operated car jack is introduced. With the industrial revolution of the late 18th and 19th centuries came the first use of screws in machine tools, via English inventors such as John Wilkinson and Henry Maudsley The most notable inventor in mechanical engineering from the early 1800s was undoubtedly the mechanical genius Joseph Whitworth, who recognized the need for precision had become as important in industry as the provision of power applications and only 10 years later, in 1940, the first worm gear screw jack, that is instantly recognizable today, was offered by Duff-Norton, for adjusting the heights of truck loading platforms and mill tables. With the ability to be used individually or linked mechanically and driven by either air or electric motors or even manually, the first model had a lifting capacity of 10 tons with raises of 2" or 4".

[6] Vol-4 Issue-2 2018 IJARIE-ISSN(O)-2395-43967424 www.ijarie.com 75 Since then the product has evolved to push, pull, lift, lower and position loads of anything from a few kilos to hundreds of tones. One of the biggest single screw jacks made to date is a special Power Jacks E-Series unit that is rated for 350 tones –even in earthquake conditions for the nuclear industry. A mechanical jack that has a built-in motor is now referred to as a linear actuator but is essentially still a screw jack. Today, mechanical jacks can be linked mechanically or electronically and with the advances in motion-control, loads can be positioned to within microns. the screw jack by gear arrangement. The screw jack shaft's rotation depends upon the rotation of D.C motor. This is a simple type of automation project. This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains to be an essential part of the system although with changing demands on physical input, the degree of mechanization is increased.

## III. OBJECTIVE

The general idea of project is to minimize the human effort while operating the jack. A mechanical jack is a portable device consisting of a screw mechanism used to raise or lower the load

#### IV. METHODOLOGY

- 1) Operational considerations of a screw jack
- 2) Parts of motorized screw jack
- 3) Process involved in motorized screw jack
- 4) Working principle
- 5) Result and conclusions

#### V. CONCLUSION

The main purpose of this remote operated jack is to reduce the physical burden of car jacks using manually and give comfort to the operator .here we used minimum tools which reduces the weight and cost and also the range of operation can be increased .hence we design and fabricated the hydraulic jack serving as the lifting device. This jack gives more reliable operation to the human operator this system should use more and more for the time consuming and safety purpose. This project work was tested and it worked properly

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