# The Automatic Hydraulic Jack

[1]Shraddha S. Jadhav, [2]Prajakta K. Patil, , [3] A .R .Kharat
[1] U.G. Student, [2] U.G. Student, [3] Assistant Professor
Department of Mechanical Engineering
Bharati Vidyapeeths College of Engineering, Kolhapur, India.

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***Abstract*— This project deals with design and fabrication of automatic hydraulic car lifting attachment with the help of hydraulic cylinder. Lifting the car in any problem case like replacing wheel, & when tyre is puncture it is not easy. For this type of operations we need heavy force. In the case of tyre puncture or replacing wheels lift the car is more important part. This time we use traditional ways to lift the tyre. In that case a physically handicapped person, ladies person or aged person not lift the tyre easily. They require more time and also require more force to lift the tyre. Automatic hydraulic jack system is more useful for this type of problems.**

***Index Terms*— Design, Hydraulic Jack, Fluid, Automation.**

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## I. INTRODUCTION

A revolutionary change has taken place in the field of fluid power technology due to the integration of electronics as a control medium for hydraulic components and system. Efforts have been made to include the latest possible trends in the field of hydraulics and allied control areas to keep the over changing state technology in hydraulics.[1] In the case of tyre puncture or replacing wheels lift the car is more important part. This time we use traditional ways to lift the tyre. In that case a physically handicapped person, ladies person or aged person not lifts the tyre easily. They require more time and also require more force to lift the tyre. In that way to help those who are physically challenged, ladies or aged person this project automatic hydraulic jack system is more useful. So we tried to grab the opportunity. Here we use a wiper motor to drive the hydraulic jack loading subsequently and automatically. Our project works on the mechanism of converting rotary motion of the wiper motor into reciprocating motion of the hydraulic jack plunger. A cylinder cage structure of wiper motor ensures maximum power delivered by consuming the available battery power which can be easily generated. Important thing is that power is available at instant and anyone can withdraw easily, without any hazard. Battery is also available in any car so when our external battery will be discharge then we use power in the car.

## II. LITERATURE REVIWE

Blaise Pascal (2013) - have Worked on the principal of hydraulic power and operated by 12 Volt DC current, solves the all major problem of maintenance of all automobiles specially the heavy vehicles like truck and bus. Kenneth J. Waldron and Robert B.McGhee (1986) - provides a description of the Adaptive Suspension Vehicle. The vehicle uses a legged, rather than a wheeled or tracked, locomotion principle, and is intended to demonstrate the feasibility of systems of this type for transportation in very rough terrain conditions. The vehicle is presently under test, with installation and validation of software modules for different operational conditions scheduled for com-pletion by the end of 1986. N.K. Mandavgade (2012) –studied that Automobile hydraulic jack can be easily operated by a single push button provided on the dash board. The jack will be installed on both the sides of chassis according to the weight distributions of the car. The system operates on hydraulic drive which consists of three main parts: hydraulic pump, driven by an electric motor, hydraulic cylinder to lift the vehicle.The car gets lifted and load gets distributed on three point i.e., plunger or ram of hydraulic cylinder and two tires opposite to side which is lifted. Dr. Ramachandra C G, Krishna Pavana, Shivraj Shet and Venugopal Reddy, Virupaxappa B (2013) – have presented that whenever any vehicles undergo a tyre failure, it becomes a very cumbersome task for the person to lift the vehicle from the ground level and lot of manual effort is required even though a jack is used. Musa Nicholas, Abodunrin Tosin Oladipo Sarafadeen (2016) - have studied that in order to mitigate the problems associated with the use of a single jack and other lifting devices to raise cars completely off the ground to effect repairs.P. S. Borkar, S. V. Sontakke, R. R. Dorwe, A. B. Ganorkar, S. P. Lokhande (2015)-have studied application of pressurized air to produce mechanical motion. Pneumatic jack is a fabricated model which when installed in four wheeler, will ease in the problems arising in the conventional operated jack. Balkeshwar Singh, Anil Kumar Mishra.(2015) - This research paper analyzes the modification of the existing motor screw jack by incorporating an electric motor in the screw in order to make load lifting easier. In this modified design, the power screw is rotated by connecting motor through universal coupling, plugged to the automobile 12 V battery source to generate power for the prime mover (motor), which transmits its rotating speed to the power screw to be rotated with required speed reduction and increased torque to drive the power screw. Mohammed Siddique Ahmed, MohdRiyazUddin ,Faraz Ur Rehman Azhar, Md Shaffi ( 2014 )- A jack is a device that uses force to lift heavy loads. The primary mechanism with which force is applied varies, depending on the specific type of jack, but is typically a screw thread or a hydraulic cylinder. Jacks can be categorized based on the type of force they employ: mechanical or hydraulic. Mechanical jacks, such as car jacks and house jacks, lift heavy equipment and are rated based on lifting capacity (for example, the number of tons they can lift). Hydraulic jack tend to be stronger and can lift heavier loads higher, and include bottle jacks and floor jacks.

## III. PROBLEM DEFINATION

Mechanical jack requires more effort moreover not suitable for uneven surfaces. It requires more power consumption also Maintenance is quite high as well as Suitable for small capacity and requires skilled labour. The purpose of this project is to modify the design of existing car jack in terms of its functionality and also human factors considerations. General idea of the project is to minimize the human effort while operating the jack. To provide an inbuilt hydraulic jacking system that is directly and permanently incorporated into the vehicle frame in such a way as to prevent the additional risk of damage.

## IV. WORKING PRINCIPLE

The hydraulic jack is a device used for lifting heavy loads by the application of much smaller force. It is based on Pascal's law, which states that intensity of pressure is transmitted equally in all directions through a mass of fluid at rest. The working principle of a hydraulic jack may be explained with the help of Fig. Consider a ram and plunger, operating in two cylinders of different diameters, which are interconnected at the bottom, through a chamber, which is filled with some liquid. An excellent style manual for science writers is given by Young [7].

## V. MODELING, TESTING AND RESULTS

Fig. 1 Actual model of Automatic Hydraulic Jack

Comparing with mechanical jack, our project helps to save more time and man power during lifting the car. The project construction is simple and compact. It is easy to installation and easy to carry. Our project is applicable for the cars whose ground clearance is below 130 mm, and the car weight should be below 3500kg.

| SR. NO. | CAR NAME | CAR WEIGHT (KG) | LIFTING TIME (MIN.) | LENGTH (MM) |
|---|---|---|---|---|
| 1. | MARUTI 800 | 650 | 2.36 | 130 |
| 2. | ALTO | 1185 | 3.46 | 130 |
| 3. | NANO | 635 | 2.00 | 130 |
| 4. | ZEN | 1190 | 4.00 | 130 |

## VI. CONCLUSION

The challenges that a new product faces is not just to meet social necessities but also to build a product that is worth as regard of its cost and utility. Pessimistic dorks predict that it could not be don but this gloomy out looks obviously neglect the inventive genius of the building engineers .things changes quietly without warning which makes old rules to lose their meaning. Just yesterday this conventional jack was the most widely used, tomorrow it will be obsolete. Enter the bright new innovative idea, for your lifestyle and status, the grandeur of "Automatic hydraulic jack" is the end product of concerted process in design aesthetics, value edition and comfort engineering and high grade materials backed by a hard core service team. Yet some of the ingredients remain the same. With these extra cost owners of car can get facility, which they are very happy to own of their cars. It is very convenient system and its use will be very popular if any entrepreneur's introduced the system in the market.

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