

Mobile Operated In-Built Hydraulic Jack For Automobiles

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Abstract- The project work has been conceived having studied the difficulty in lifting any type of vehicles. This project deals with converting the conventional hydraulic jack in to automated hydraulic jack by using linkage mechanism with a help of a motor. Such that the vehicles can be lifted from the floor without the application of impact force. It works on the principle of Pascal law the invention relates to hydraulic jack and more specifically to an automobile hydraulic jack system. The fabrication part of it has been considered with almost simplicity and economy, such that this can be accommodated as one of the essential tools on automobiles. An inbuilt hydraulic jack system is attached to automobile vehicle on front part of the chassis. An automobile hydraulic jack system can be easily attached to all currently manufacture automobile chassis and frames with some modification. There is also a front suspension hydraulic jack that is mounted centrally to the front suspension of the automobile between its front wheels. The same kind of rear hydraulic jack can be mounted centrally to the rear suspension of an automobile between its rear wheels

Keywords- Hydraulic Jack System, Inversion of Crank lever Mechanism, Mobile Operated, Shifting and Lifting

I. INTRODUCTION

Hydraulic jacks work on the basis of Pascal's Principle, named for Blaise Pascal. Basically, the principle states that the pressure in a closed container is the same at all points.

This project uses the Inversion of "Single slider crank mechanism" that is oscillating cylinder crank mechanism to change the rotary motion of circular disc internally attached to the motor to the reciprocating motion of the connecting rod connected to the lever of the hydraulic jack that will help in lifting of the jack.

II. DESIGN AND DEVELOPMENT OF HYDRALIC JACK

2.1 MOTOR 1:

This motor is connected indirectly to the jack through a gearbox with a long rod and two bearing for smooth rotation from horizontal to vertical direction and vice-versa. The motor used here is a heavy motor so that it can rotate the gear box in an efficient way i.e. for holding heavy weight. The motor used here is 12V, 17W wiper motor.

2.2 GEAR BOX:

The gearbox is used to transmit rotational motion of the motor to the rotation of jack by reduction in its rpm for safe and easy movement of automated hydraulic system. The gearbox also serves the purpose of holding the hydraulic jack in horizontal position for longer time, when not in operation. It also supports the weight of automated hydraulic jack system

2.3 MOTOR 2:

The second motor is connected to the pump of hydraulic jack by mechanism. It is used to lift the vehicle or operate the jack. Its circular motion is converted to the reciprocating motion with the single slider crank mechanism. The motor is DC motor of 12V wiper motor and speed rating is 100 rpm no load condition,

Torque – 30 N-m Power,

$$P = 2\pi NT/60 = 2\pi \times 100 \times 30/60 = 314.16 \text{ watts}$$

Force, $F = T/\text{radial}$

$$\text{distance} = 30/0.05 = 600 \text{ N}$$

Force output is **60 Kg** of motor considering $g = 10 \text{ m/s}^2$ (sufficient to lift the car).

2.4 MOTOR 3:

The third motor is a small motor used for pressure release and tightening of pressure release valve. Releasing the pressure causes the jack to retract in its original position due to

the weight of the vehicle. This motor is connected directly to the pressure release valve. It is a DC motor, 12 volts, and 2000 rpm at no load condition.

2.5 BALL BEARING:

This is a type of rolling element bearing that uses balls to maintain the separation between the bearing races. The purpose of a ball bearing is to reduce rotational friction and support and radial and axial loads. It achieves this by using at least two races to contain the balls and transmit the loads through the balls.

2.6 MICROCONTROLLER:

This project used a 8 bit microcontroller called 8051. This microcontroller had 128 bytes of RAM, 4K bytes of chip ROM, two timers, one serial port, and four ports all on a single chip. It is introduced by Intel corporation in 1981. 8051 has a total of four I/O ports each 8 bit wide.

2.7 BLUETOOTH RECEIVER:

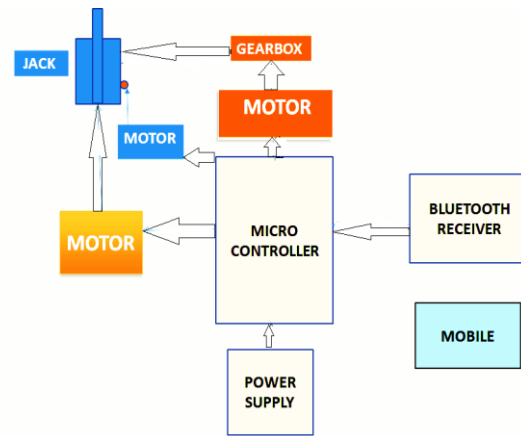
This project used a class-2 Bluetooth module with Serial Port Profile, which can configure as either Master or slave. A Drop-in replacement for wired serial connections, transparent usage. You can use it simply for a serial port replacement to establish connection between HC-05 bluetooth.

2.8 OTHER COMPONENTS:

Control cables, frame and wheels

III. WORKING PRINCIPLE

Normally the jack system is in horizontal position, when the operation is required it should come in vertical position with the help of gearbox and the external motor. After that the pressure relief valve is closed with the help of small motor connected to the pressure relief valve. Then the motor connected to the circular disc will be actuated and due to the circular motion of the disc creates reciprocation in the piston pump, and lifts the vehicle. For retraction process pressure is released by actuating the small motor in opposite direction connected to the pressure relief valve will release the pressure bringing the piston back in original position. The external motor is actuated again to bring back the motor in horizontal position.



IV. CONCLUSION

This project has provided us an opportunity to use our knowledge. By doing this project, we gained a lot of practical and software knowledge. Some of them includes purchasing, designing, machining, assembling, and programming. Finally, we feel this project is a good solution in the present situation and we feel proud that the work has been completed within the time successfully.

The trial performance of this device provides to be successful, with case of operation and safety, hence the results has given a clear indication of its commercial viability. The cost analysis has shown its economic feasibility and it is under the impression that it can be further reduced, when produced on a mass scale.

With some design consideration an inbuilt car lifting mechanism can easily be fitted in all light weight automobiles. The project works on hydraulic power provided by battery. Maintenance and service of the vehicle can be easily done by this project. With this project the usage of automobile can be made easy for women and old people. The inbuilt jack is operated by battery so it can also be used when the vehicle engine is not started.

V. ACKNOWLEDGMENT

This project would not have completed if our guide Assistant Professor Robinson.P had not helped us. We had only the idea, but our guide gave us the correct direction so that this project can be completed. I am thankful to him for all his guidance and giving his time for us.

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