DESIGN AND FABRICATION OF IOT BASED MOTORIZED SCREW JACK

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ABSTRACT

In the present time, a vehicle has become the vital part of our life. Even after the presentation of new scope of tubeless tires, a most normal issue with us is the penetrated wheel which is actually a bulky and monotonous undertaking and the most tiring among the entire interaction is putting jack and lifting it. However imagine a scenario where this tiring is finished by only a single tick. Our paper named "DESIGN AND FABRICATION OF IOT BASED MOTORIZED SCREW JACK" is the answer for this Problem. The whole get together is constrained by application which is made on IOT application creator and the cerebrum of this venture is the NodeMCU ESP8266, which controls screw jack operations, by getting signals from the assistance of a WIFI module. IOT application is using To Control All Operation by Wireless Communication.

Keywords: Motorized Screw Jack, Dc Motor, Dc Battery, Iot.

I. INTRODUCTION

1.1 SCREW JACK

At the point when we are going in the street for a specific work, if assume tire get cut, it will be a major difficult task to eliminate the tire and repairing it. For elimination of tires, it is difficult to lift the jack physically in the workshop. This makes the laborer to get drained. To beat this difficult we have planned and fostered a framework called motorized screw jack [1] working through keypad by having full control of the jack, we can undoubtedly lift it here and there by utilizing the on/off. This assists with decreasing the work weight of the laborer. A jackscrew's compressive power is acquired through the pressure power applied by its lead screw. A Top string is regularly utilized, as this string is extremely solid and can oppose the huge burdens forced on most jackscrews while not being drastically debilitated by wear over numerous revolutions. These sorts are self-locking, which makes them more characteristically protected than other jack advances like water driven actuators which require nonstop strain to stay in a bolted position.

1.1.1 TYPES OF SCREW JACK

There are 3 main types of screw jacks
1. Machine/worm gear screw jacks
2. Ball screw jacks,

We are using Machine/worm gear screw jack.

1.1.2 TYPES OF THREADS

1. British standard whitworth (B.S.W) thread
2. British association (BA) thread
3. American national standard thread
4. Unified standard thread
5. Square thread
6. Acme thread
7. Knuckle thread
8. Buttress thread
9. Metric thread

We are using Square thread.

1.2 ULTIMATE AIM

The motorized screw jack can be widely used in low cost automation in manufacturing industries. The weight lifting is quick and effortless, which reduces the physical fatigue (tiredness) felt by the worker.

1.3 NEED FOR AUTOMATION
➢ To increase the efficiency of the device.
➢ To reduce the work load.
➢ To reduce the overall operation (lifting & lowering) time.
➢ To reduce the handling and fatigue of workers

1.4 EXISTING METHOD

The vehicle should be lifted for certain type of works. This cannot be done manually. To avoid such problem a jack was invented. To make the work easier than a screw jack we have introduced a new concept called motorized screw jack. We can easily lift the vehicle up and down by using the ON/OFF switch. This helps to reduce the burden of the worker.

1.5 PROPOSED SYSTEM

We innovated a new concept in motorized screw jack, that is the motorized screw jack is operating in wireless connection, which is done by nodeMCU ESP8266 microcontroller connected with IOT. We are using 12v DC secondary battery for power required to work all electrical components. We are using two relays for lifting and lowering of screw jack. At the point when the beginning key is squeezed the screw jack is worked forward way and the when the stop key is squeezed the screw jack is stops consequently.

II. DESCRIPTION OF EQUIPMENT

2.1 MOTOR

![12V DC Wiper Motor](image)

We are using 12v wiper motor. It works on gear reduction mechanism, for different loads on screw jack wiper motor changing its gear inside in the motor.

2.1.1 MOTOR CALCULATION

MOTOR SPECIFICATION

<table>
<thead>
<tr>
<th>Speed</th>
<th>Voltage</th>
<th>Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>30RMP</td>
<td>12V</td>
<td>1.5 A</td>
<td>18W</td>
</tr>
</tbody>
</table>

Electrical power equation, Power \( P = I \times V \)

\[
I = \frac{18}{12} \quad \text{A}
\]

To find the torque of the motor, \( \text{H.P} = 0.02414 \)

\[
T = \frac{5252 \times \text{H.P}}{\text{rpm}} \\
= 4.22 \text{ lb/ft} \\
\text{T} = 5.722 \text{ Nm}
\]

2.2 SCREW JACK

![Big Red Torin Scissor Jack Steel](image)
A jackscrew is a kind of jack which is worked by turning a lead screw. It is otherwise called a screw jack, and is generally utilized as vehicle jacks a jackscrew’s compressive power is acquired through the pressure power applied by its lead screw. A Summit string is frequently utilized, as this string is solid and can oppose the enormous burdens forced on most jackscrews while not being drastically debilitated by wear over numerous turns.

2.2.1 SPECIFICATIONS OF SCREW JACK
- Rugged alloyed steel construction with heavy-duty steel frame and saddle
- Protective, high impact-resistant coating helps to prevent rust
- Oversize 4 1/2 inch wide base provides maximum support and stability
- Lift range : 3 3/4 inches to 15 3/8 inches
- Meets ASME PALD standards

2.3 RELAY

We are using SPST (Single-Pole Single-Throw) relay. Two relays are used for backward and forward motion of motor.

A relay is an electrically worked switch. Current moving through the loop of the transfer makes an attractive field which draws in a switch and changes the switch contacts. The curl current can be on or off. So transfers have two switch positions and they are twofold toss (changeover) switches. Transfers permit one circuit to switch a second circuit which can be totally discrete from the first. The connection is attractive and mechanical.

2.4 MICRO CONTROLLER (NodeMCU ESP8266)


Nodemcu Helps Us To Operate, Motorized Screw Jack In Wireless Mode Using BLUETOOTH

2.4.1 BLOCK DIAGRAM
2.5 12V DC BATTERY
In our project we are utilizing optional sort battery. It is battery-powered sort. It store substance energy and make it accessible as electric flow. There are two kinds of batteries, essential (expendable) and optional (battery-powered), the two of which convert compound energy to electrical energy. Essential batteries must be utilized once on the grounds that they go through their synthetic compounds in an irreversible response. Auxiliary batteries can be re-energized in light of the fact that the compound responses they use are reversible; they are re-energized by running a charging current through the battery, however the other way of the release current. Optional, likewise called battery-powered batteries can be charged and released often previously wearing out. Subsequent to destroying a few batteries can be reused.

![Figure 2.5 12V DC Battery](image)

III. DESIGN AND DRAWING

![Figure 3.1 Motorized Jack](image)

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>PART NAME</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>MOTOR</td>
<td>1</td>
</tr>
<tr>
<td>02</td>
<td>JACK</td>
<td>1</td>
</tr>
<tr>
<td>03</td>
<td>SCREW ROD</td>
<td>1</td>
</tr>
</tbody>
</table>
IV. FABRICATION

Figure 3.2 Frames by Cad Drawing

Figure 4.1 Electrical Assemblies And Motor Coupling

Figure 4.2 Final Project Setup

V. WORKING PRINCIPLE

This project is designed with Driver circuit with 12v battery, microcontroller relay, IOT APP (remote), Dc motor and jack model. When battery connection is ON mode it supplies power to all components. The IOT app (mobile) keypad is connected with nodeMCU ESP8266 microcontroller. IOT is control the operations of motorized screw jack. Relay is directly connected with the DC motor. When the start key is pressed the motor is operated in forward direction and the when the stop key is pressed the motor is stops automatically. The forward and reverse button in the remote is used to operate the motor is required directions.
VI. CONCLUSION

This project did by us made an intriguing errand in the field of vehicle and car workshops. It is helpfully for the laborers to work in the car workshop are in the assistance station. This project has additionally diminished the expense engaged with the worry. Venture has been intended to play out the whole necessity task which has likewise been given.

VII. REFERENCES


