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Fabrication of Motorized screw Jack

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Abstract

The project aims in designing a Screw Jack system which helps in lifting the vehicles easily using bluetooth. This system finds very useful in automobile industry as this eliminates manual lifting mechanisms used now-a-days.

Keywords: ATMEGA328Micro controller (ARDUINO), DC motor, Bluetooth module.

1. Introduction

In this device, the motorized screw jack for automobile garages has been developed to alter the needs of small and medium automobile garages, who are normally man powered with very minimum of skilled labours. In most of the garages the vehicles are lifted by using screw jack. This needs high man power and skilled labours.

In order to avoid all such disadvantages. This, motorized screw jack has been designed in such a way that it can be used to lift the vehicle very smoothly without any impact force. The operation is made to be simple that even an unskilled labour can handle, by just demonstrating the working of the motorized screw jack once. The d.c motor is coupled with the screw jack by spur gear mechanism. 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 an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

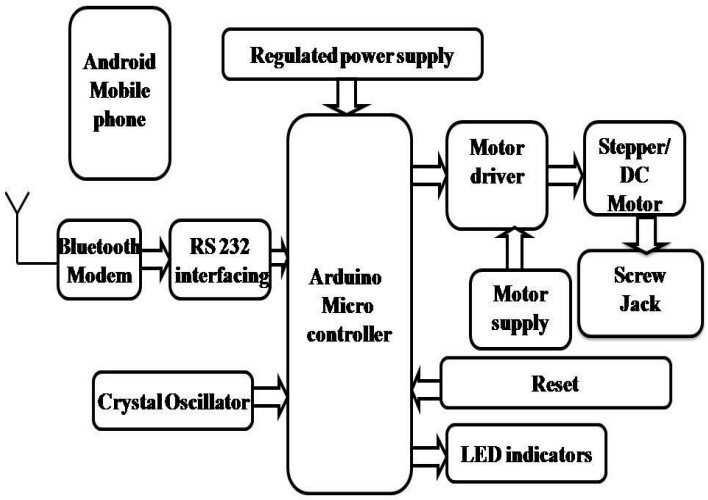
2. LITERATURE SURVEY

Screw type mechanical jacks were very common for jeeps and trucks of World War II vintage. For example, the World War II jeeps (Willys MB and Ford GPW) were issued the "Jack, Automobile, Screw type. This jacks and similar jacks for trucks were activated by using the lug

wrench as a handle for the jack's ratchet action to the jack. Screw type jack's continued in use for small capacity requirements due to low cost of production and ease of mobility. The virtues of using a screw as a machine, essentially an inclined plane wound round a cylinder, was first demonstrated by Archimedes in 200BC with his device used for pumping water. There is evidence of the use of screws in the Ancient Roman world but it was the great Leonardo da Vinci, in the late 1400s, who first demonstrated the use of a screw jack for lifting loads Leonardo's design used a threaded worm gear, supported on bearings, that rotated by the turning of a worm shaft to drive a lifting screw to move the load - instantly recognizable as the principle we use today. During the early 1880s in Coaticook, a small town near Quebec, a 24- year-old inventor named Frank Henry Sleeper designed a lifting jack. Like Da Vince's jack, it was a technological innovation because it was based on the principle of the ball bearing for supporting a load and transferred rotary motion, through gearing and a screw, into linear motion for moving the load. The device was efficient, reliable and easy to operate. It was used in the construction of bridges, but mostly by the railroad industry, where it was able to lift locomotives and railway cars. 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 inches. More recent developments have concentrated on improved efficiency and durability, resulting in changes in both lead screw and gearbox design options for screw jacks.

3. Implementation:

Fabrication of Motorized Screw Jack



In this project, we use an application in android phone enabled with Bluetooth through which the controlling of screwjack can be done. There is a Bluetooth module with which it can control the screwjack depending on the instructions given to the Arduino.

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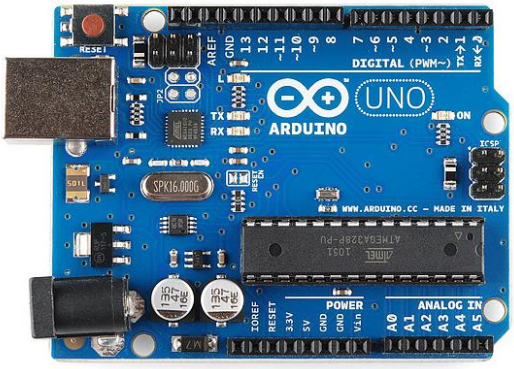
Correspondingly, DC Motors are enabled. Accordingly, screwjack is operated.

The above figure shows the screwjack which is controlled by the Bluetooth enabled smartphone to lift the loads

4. Related Work:

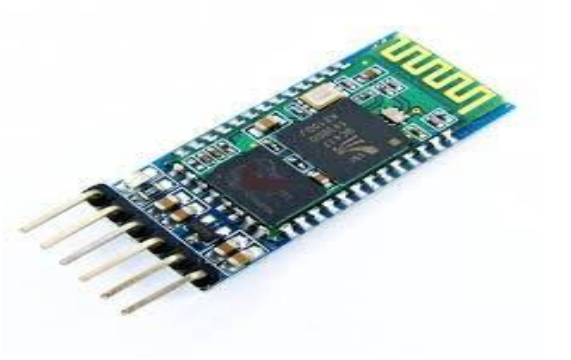
The brief introduction of different modules used in this project is discussed below:

ARDUINO:ATMEGA328 MICROCONTROLLER



The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels
in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz

Bluetooth module:



Description

HC-05 module is an easy to use **Bluetooth SPP (Serial Port Protocol) module**, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified **Bluetooth V2.0+EDR (Enhanced Data Rate)** 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses **CSR Blue core 04**-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

DC MOTOR:

A dc motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors. The reverse process, producing electrical energy from mechanical energy, is accomplished by an alternator, generator or dynamo. Many types of electric motors can be run as generators, and vice versa. The input of a DC motor is current/voltage and its output is torque (speed).

The DC motor you will find in modem industrial applications operates very similarly to the simple DC motor described earlier in this chapter. Figure 12-9 shows an electrical diagram of a simple DC motor. Notice that the DC voltage is applied directly to the field winding and the brushes. The armature and the field are both shown as a coil of wire. In later diagrams, a field resistor will be added in series with the field to control the motor

speed.

5. CONCLUSION:

Screw Jacks are the ideal product to push, pull, lift, lower and position loads of anything from a couple of kilograms to hundreds of tonnes.

The need has long existed for an improved portable jack for automotive vehicles.

It is highly desirable that a jack become available that can be operated alternatively from inside the vehicle or from a location of safety off the road on which the vehicle is located.

Such a jack should desirably be light enough and be compact enough so that it can be stored in an automobile trunk, can be lifted up and carried by most adults to its position of use, and yet be capable of lifting a wheel of a 4,000-5,000 pound vehicle off the ground.

Further, it should be stable and easily controllable by a switch so that jacking can be done from a position of safety.

It should be easily movable either to a position underneath the axle of the vehicle or some other reinforced support surface designed to be engaged by a jack.

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PROJECT IMAGE