



Power Generator Forearm Machine

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ABSTRACT

Man has needed and used energy at an increasing rate for his sustenance and wellbeing ever since he came on earth for few million year ago. Due to this lot of energy resources have been exhausted and wasted. Proposal for the utilization of waste energy of power generation by gym pulley is very much relevant and important for highly populated countries like India and china the people are crazy about gym. In this project we are generating electrical power as non-conventional method by simply pull up and pull down. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using pull up pull down is converting mechanical energy into electrical energy. In this project the conversion of force energy into electrical energy. The use of human-power in more efficient manner for generation has been possible due to modern technology. Pull up pull down power is an excellent source of energy, 95 percentage of the exertion put into pull up pull down power converted into energy. A human-powered electricity generation has been unveiled by company. In this apparatus, the user has to pull up pull down the gym equipment's for generating power. Another one is a foot- powered device that allows individuals to pump out power at a 40-watt clip to charge its own internal battery. Then this battery can be used for powering ac and dc devices, car batteries etc.

1.INTRODUCTION

In today's jargon, pull up pull down power is the transmission of energy from a human source via a rack and pinion system. This technology is most typically utilised in gyms and homes. Gym power is also utilised to power agricultural and hand equipment, as well as to create energy. Some applications include household appliance battery charging.

The articles on this page are about the many wonderful application for power generation by gym technology. Whenever the person is allowed to pass over the gym pull up pull down. As the spring are attached to gym equipment's, they get compressed and the rack, which is attached to, the bottom of the rod moves down reciprocating motion of rack in to rotary with certain RPM these shafts are connected through a chain drive to the dynamos, which converts the mechanical energy into electrical energy. Man has needed and used energy at an increasing rate for his sustenance and well-being ever since he came on earth for few million years ago. Due to this lot of energy resources have been exhausted and wasted. Proposal for the utilization of waste energy of power generation by gym is very much relevant and important for highly populated countries like India and china the people are crazy about gym. In this project we are generating electrical power as nonconventional method by simply pull up and pull down. Nonconventional energy system is very essential at this time to our nation. Nonconventional energy using pull up pull down is converting mechanical energy into electrical energy. In this project the conversion of force energy into electrical energy.

Purpose of the Project

The 'Power generation through forearm machine' Project has developed an enhanced exercise system focused on improving the efficiency of current energy-harvesting equipment. This report has been created for the purpose of presenting all information regarding the research, design, processes, materials, work schedule, and completed model of the project. The central concept involves harnessing energy from an exercise machine through the use of a generator.

2. WORKING PRINCIPLE

A rack and pinion is a type of linear actuator that comprises a circular gear (the pinion) engaging a linear gear (the rack), which operate to translate rotational motion into linear motion. Driving the pinion into rotation causes the rack to be driven linearly. Driving the rack linearly will cause the pinion to be driven into a rotation. A rack and pinion drive can use both straight and helical gears. Helical gears are preferred due to their quieter operation and higher load bearing capacity. The maximum force that can be transmitted in a rack and pinion mechanism is determined by the tooth pitch and the size of the pinion.

A gym powered electric generator provides a method of generating electricity by means of a modified stationary gym equipment for use in electrical energy storage and running household or other appliances. Human/mechanical energy is converted into electrical by means of an electric generator that is connected to exercise equipment. As result the energy created by the generator can be stored in various types of lead-acid batteries which may then be tapped at a later time, after dark for example, when the energy is needed to power lights or else. If AC appliances are in place, then an inverter must be used to transfer the DC current into the standard 230 volts of AC current for usage by these appliances.

We hereby make use of an energy harvester system that moves in response to movement of the motion of a gym exercise machine for converting kinetic energy of the exercise equipment into electrical power. Our system makes use of the gripping rod connected to spring based motorized mechanism having rack pinion arrangement and multiple motors to power the system and generate power. The system aims to provide resistance to exercise movement while generating power from the same thus serving dual purpose. The machine makes use of 1-3 motor arrangement to provide 3 levels of generation capability. The machine aims to generate electricity through horizontal motion created while workout. The spring based mechanism



Fig:1 FRONT VIEW



Fig:2 SIDE VIEW

3. LITERATURE SURVEY

When the energy intake of humans is considered, a large potential seems apparent. Considering the standard 2000kcal of daily consumption (97W of power in, on average), humans take in about 8.368MJ or 2324Wh of energy every single day. This is approximately the same amount of energy stored in the typical car battery (2400Wh). However, the expenditure of energy for common tasks is relatively high as well as seen International Research Journal of Engineering and Technology shows some values for maximum power that can be captured as a result of human activity.

The obvious impracticality of this figure shows why the scope thus far in human power generation has been limited to lower power applications such as consumer electronics Producing 1800 watts for a few seconds should be within the range of the best power lifters and perhaps for up to a minute. Remember 1 watt means applying a force of 1 Newton through a distance of 1 meter in 1 second. So, if you lifted 1 kg, that's 9.8, Newton's of force, about 10newtons, for 1 meter in 1 second that would be 10 watts. So, lifting 180 kg, 1 meter high in 1 second would be 1800 watts. The best power lifters can do squats of several times their body weight for 1 rep. Let's say the power lifter weighed 100 kg, about 220 lbs.

He might be able to do 3 times his weight for a single rep. That would be 300 kg. But remember he's actually raising his own weight as well. So he's actually lifting 4 times his weight, 400 kg for this one rep. For a male of average height, he might be raising this over a distance of 1 meter. So doing 1800 watts of power for one minute would be like giving this power lifter a weight of only 60 kg (for a total weight of 180 kg) and doing squats with this light weight for the high number of reps of 1 per second over one minute. This would be possible for a weight so much lighter than their usual 1 rep maximum weight.

3.1 Calories to Watts

First keep in mind that Watts and Calories are two different units of measurement that can't be directly converted back and forth. However, if you use Watt-Hours instead of just "Watts" you then have a way to convert to calories. Here are the steps: Convert Watt-Hours to Watt Seconds (Joules), then convert Joules to Calories, and then adjust Calories with human body efficiency factor. So for this example let's assume that 11 you provide pedal power to a 100 Watt television for one hour. Since one Joule is equal to one Watts X Seconds you perform dimensional analysis and get:

$$100\text{Watt-hours} \times (3600 \text{ seconds} / 1 \text{ Hour}) = 360,000 \text{ J}$$

Now use the conversion factor:

$$1 \text{ Cal} = 4.184 \text{ J to convert Joules to Calories}$$

$$360,000 \text{ J} / 4.184 = 86,042 \text{ Calories}$$

When you look at the label of Oreo cookies or other food items at the store, the term "Calories" is really (kilocalories). So, you divide by 1000 to get 86 Calories. Assuming that your body is about 25% efficient when cycling you divide by 0.25: Calories burned running a 100 Watt Television for 1 hour = $86 / 0.25 = 344$ which is about equivalent to one piece of pizza.

4. COMPONENTS USED FOR POWER GENERATION

4.1 DC Motor with Gearbox

1000RPM 12V DC geared motors for robotics applications. Very easy to use and available in standard size. Nut and threads on shaft to easily connect and internal threaded shaft for easily connecting it to wheel.



Fig: 3 DC Motor with gearbox

Fig 2: DC Motor with Gearbox These motors are simple DC Motors featuring gears for the shaft for obtaining the optimal performance characteristics. They are known as Center Shaft DC Geared Motors because their shaft extends through the center of their gearbox assembly. Nut and threads on the shaft to easily connect and internally threaded shaft for easily connecting it to the wheels This DC Motor – 1000RPM – 12Volts can be used in all-terrain robots and a variety of robotic applications. These motors have a 3 mm threaded drill hole in the middle of the shaft thus making it simple to connect it to the wheels or any other mechanical assembly.

4.2 Rack and Pinion

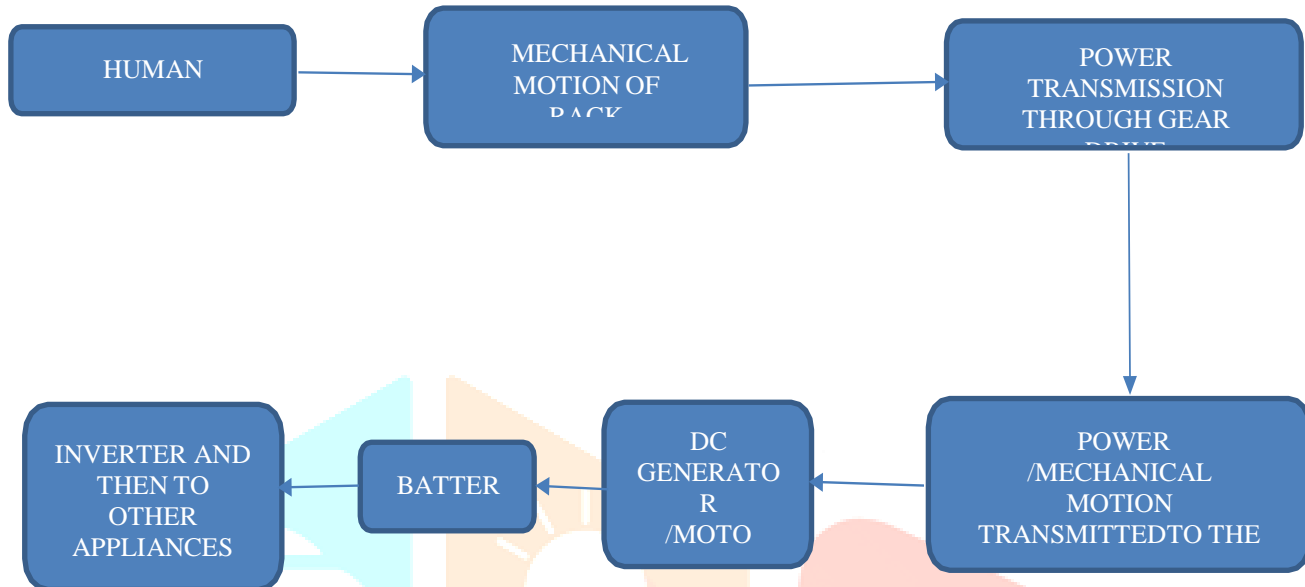
A **rack and pinion** is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. The circular pinion engages teeth on a linear "gear" bar—the rack. Rotational motion applied to the pinion will cause the rack to move to the side, up to the limit of its travel. For example, in a rack railway, the rotation of a pinion mounted on a locomotive or a railcar engages a rack between the rails and pulls a train along a steep slope.

The rack and pinion arrangement is commonly found in the steering mechanism of cars or other wheeled, steered vehicles. This arrangement provides a lesser mechanical advantage than other mechanisms such as recirculating ball, but much less backlash and greater feedback, or steering "feel". The use of a variable rack (still using a normal pinion) was invented by Arthur E Bishop, so as to improve vehicle response and steering "feel" especially at high speeds, and that has been fitted to many new vehicles, after he created a specialized version of a net-shape warm press forging process to manufacture the racks to their final form.



Fig : 4.2 Rack and Pinion

5.METHODOLOGY



- The human workout or exercise generates energy in the form of mechanical energy.
- With the help of rack and pinion this mechanical energy is transmitted to the output shaft through gear drives.
- The output shaft rotates the generator or motor which in turn generates electrical energy.
- This energy can be stored in battery or in inverter and use it to other appliances

6.RESULT

The project “Power Generator Forearms Machine” was designed such that to generate electrical power as non-conventional method by simply applying force by forearm. Non-conventional energy using forearm is converting mechanical energy into the electrical energy using reciprocating mechanism.

For this project the conversion of the force energy in to electrical energy. The control mechanism carries Rack and pinion, D.C generator, battery, simple reciprocating mechanism control. We have discussed the various applications and further extension also. The D.C generator used in this project is Permanent Magnet D.C generator. This DC geared motor such that its output is given to the reverse polarity preventer cum polarity corrector.

7.CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC’s with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully fabricated and tested.

In this day where the world is challenged to be more responsible in its sourcing of electrical power, the method of human power generation could be a solution that also helps mitigate the issue of obesity and overweight. If additional design and study of this concept proves it effective in energy use reduction, localized energy delivery and sustainability education, it could efficiently answer the three great challenges: source of electrical power, reducing the emission of CO₂ to the atmosphere.

8.FUTURE SCOPE

Our project "Power Generator Forearms Machine" is mainly intended to generate electrical power as non-conventional method by simply walking or running on the forearm. Non-conventional energy using Forearm is converting mechanical energy into the electrical energy. In future we can implement this system in the buildings to generate electrical power with the help of simple spring mechanism or else with the help of generators which can give a high watt output power.

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