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Performance Analysis of Human Energized Battery Charger

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Abstract: ***Human energised energy generator is a device that utilises human energy to produce electricity to charge battery. Our study focused on analysing the performance of the human energy to generate electricity. We designed and fabricated a pedal powered mechanism to analyse the same. Most components of the pedal power generator are based upon existing inventions, both recent and historic. This research brings together the ability of pedal power generation with exercising feasibility thus helping towards wellbeing. In many countries it can be used in rural and urban areas as a useful source of energy for conjugal family where the family members can itself charge the device for a short period of time or in public places such as parks and playgrounds where one can pedal and charge their electronic device in unison. This will not only produce electricity when needed but also an alternate way of physical exercise for them.***

Devices like mobiles, laptops have a 12 V battery. But the problem is how to charge a mobile phone when the local power is not available. The project was designed to be cheap, simple, durable, portable and easily be maintained. It was fabricated using local materials. The purpose of this project is to efficiently transfer human power to develop a pedal power battery charger system.

Keywords: Energy, mobile phone, pedal power, generator, battery

I. INTRODUCTION

The Pedal operated power generation utilizes human energy to produce electricity quickly and efficiently. This energy can be harness by using human efforts through the movement of human feet and hands in some cases for the generation of electricity. The use of pedal power also used for leg exercise and reduces the stiffness of the muscles. The use of pedal power developed over a time period. These days it has become a useful and viable option and an alternative source of generating energy. The energy generated in this process is also used to produce electricity. Usually in developing countries or least-developed countries (LDCs) use of pedal operated machines are still the key to run industry. These types of practices are most commonly used in order to frugal electricity and cut labour cost. The energy obtained from Pedal power has been employ in a really coherent manner and really special tools have been introduced essentially, flywheel helps to smooths out delivery of power for electrical energy and storages energy with a rotating mass whose function is to regulate the voltage of the lines attached to the flywheel. Historically these devices haven't used by humans to produce energy, but over the years it has proved to be a reliable source of energy production/generation. Another astonishing creation to utilize pedal power is through a pedal power generator. Pedal power generators produce electricity in a moment and allow one to charge the batteries of all kinds. Various forms of batteries which can be charged include laptop, mobile, cameras and ipod batteries. The aim of this project is to design and fabricate a pedal powered generation using flywheel apparatus and the battery charging widget. Pedal power is the source of getting energy from human beings. It can be explain as the transfer of energy generated through pedal operation using the movement of human feet and hands. The use of pedal power also strengths the muscles.

II. AIM & OBJECTIVE

Any project at its starting stage starts with setting of objectives followed by the ideas compared to get the best method to achieve the objective. Similarly for this project a lot of good ideas resulted in the model of Pedal Operated Flywheel Based Battery Charger.

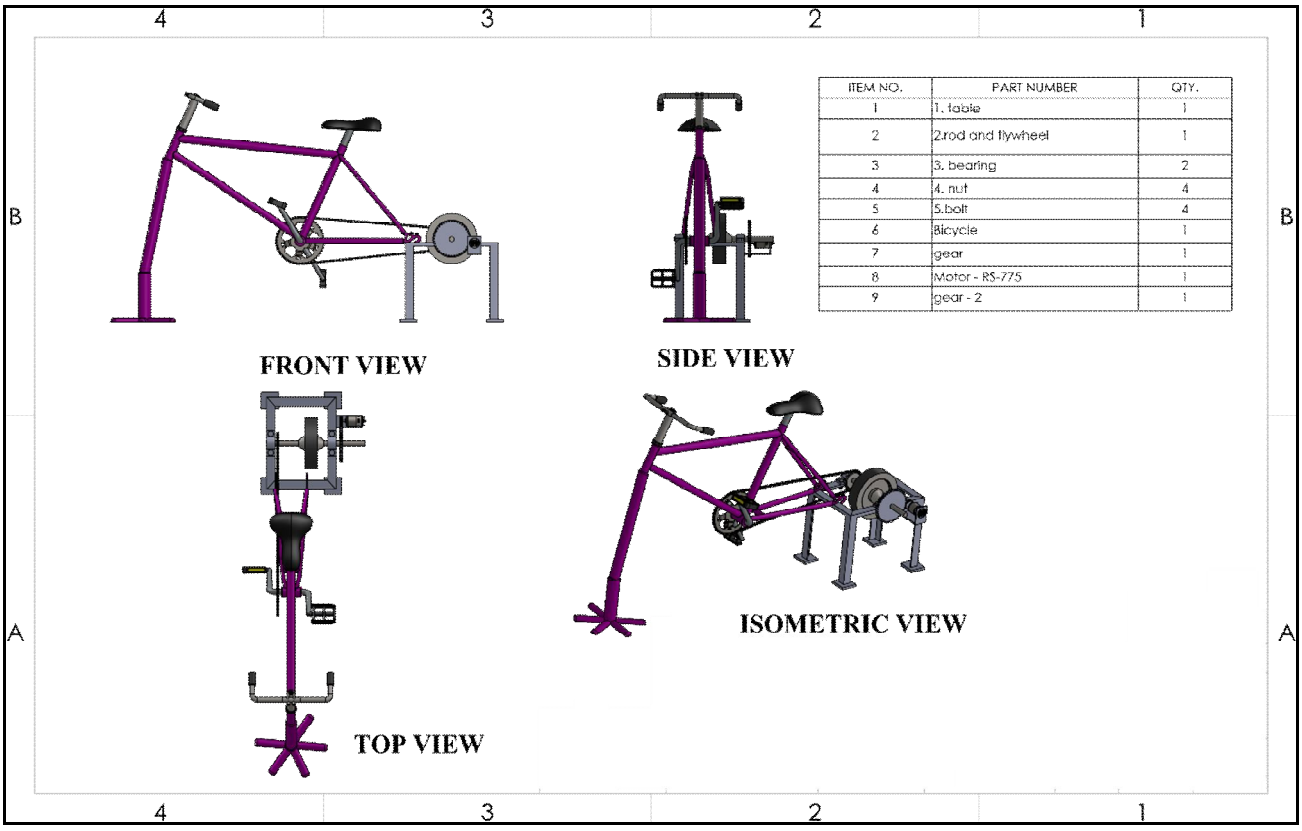
From the literature we found out that its better and efficient to use a DC GENERATOR compared to alternator as it requires less torque. With discussion and research, we concluded that a battery charger along with a physical exercise will benefit the user as well as the physical health of the user, to enhance this idea towards reality we framed the following objectives for our project:

- To develop Flywheel driven battery charger pedal operated for a source of electricity in the rural area.
- To provide provision for mobile battery charging along with the charging of 12v battery.
- Serve the dual purpose of power generation and helping the person to maintain physical fitness through exercise.

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III.DESIGN



ITEM NO.	PART NUMBER	QTY.
1	1. table	1
2	2.rod and flywheel	1
3	3. bearing	2
4	4. nut	4
5	5.bolt	4
6	Bicycle	1
7	gear	1
8	Motor - RS-775	1
9	gear - 2	1

IV.WORKING PRINCIPLE

The pedal mechanism rotates the larger sprocket which in turn drives the smaller sprocket with a chain drive. A flywheel is attached to the shaft of the rear sprocket with the help of a hub. A pair of gear is used to increase the rpm of the shaft. A DC motor generator is connected to the gears and electricity is produced.

V. WORKING

When the pedal is rotated the chain drives the rear freewheel which is mounted on the rear shaft. The flywheel which is mounted on the shaft also rotates and stores the kinetic energy and provides it whenever required. A pair of gear having teeth 59 & 14 is used to get a shaft rpm of approx. 400. The DC motor when rotates at above 300 rpm produces a 12votl. This generated electricity is DC and needs to be converted into AC, a DC-AC convertor is used to further use the electricity produced.

VI.ADVANTAGES

1) Low maintenance
2) Low life
3) Low environmental impact
4) Excellent load following characteristics
5) No fuel or any other resources consumed

VII. APPLICATION

1) This human energized machine can be used in rural areas where there is no electricity and availability of any form of power source is absent.
2) It can also be used in public spaces to work out and charge their cellphone battery at the same time.
3) This machine can store electricity when connected to a battery and be used when required.
4) It can be used in military sectors and hilly areas where availability of power source is limited.

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VIII. CALCULATION

First when the user pedals the machine the large sprocket is rotated at a speed equal to the rotation of the pedal. This large Sprocket has 44 teeth. The large sprocket is connected by a chain with the small sprocket of 16 teeth.
Let the large sprocket rotates at a speed N1 and the small sprocket rotates at a speed N2. So the relation of the rotation of the two sprockets is N2/N1=44/16
Now the small sprocket has the same shaft with the large gear
So the larger gear rotates at the same speed as the small sprocket. So, if the speed of the large gear is N3 then N2=N3 = 165rpm
Here no of teeth on large gear is 59 and small gear is 14 and let the speed of the small gear be N4. So.
N4/N3=61/26= 2.3
Now, N4/165=2.34
N4=2.34 x 165=386.1rpm
Motor rpm =386.1rpm

Flywheel stores the kinetic energy and supplies it when needed.
Mass, m=3.2kg
Radius, R=101.5mm
W=Ɵ/t

N1= 204rpm
$W = \frac{204 \times 2\pi}{60}$
W= 21.36 rps

$I=mR^2$
$I=2.2 \times (0.1015)^2$
I= 0.0032

$KE = \frac{1}{2} \times I \times W^2$
KE=7.2 J

IX. EXPERIMENT RESULTS



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SR NO.	RPM (AT GENERATOR SHAFT)	GENERATOR VOLTAGE	REGULATED VOLTAGE
1	308	12.5	20
2	306	12.4	20
3	312	12.6	20
4	320	13.5	20

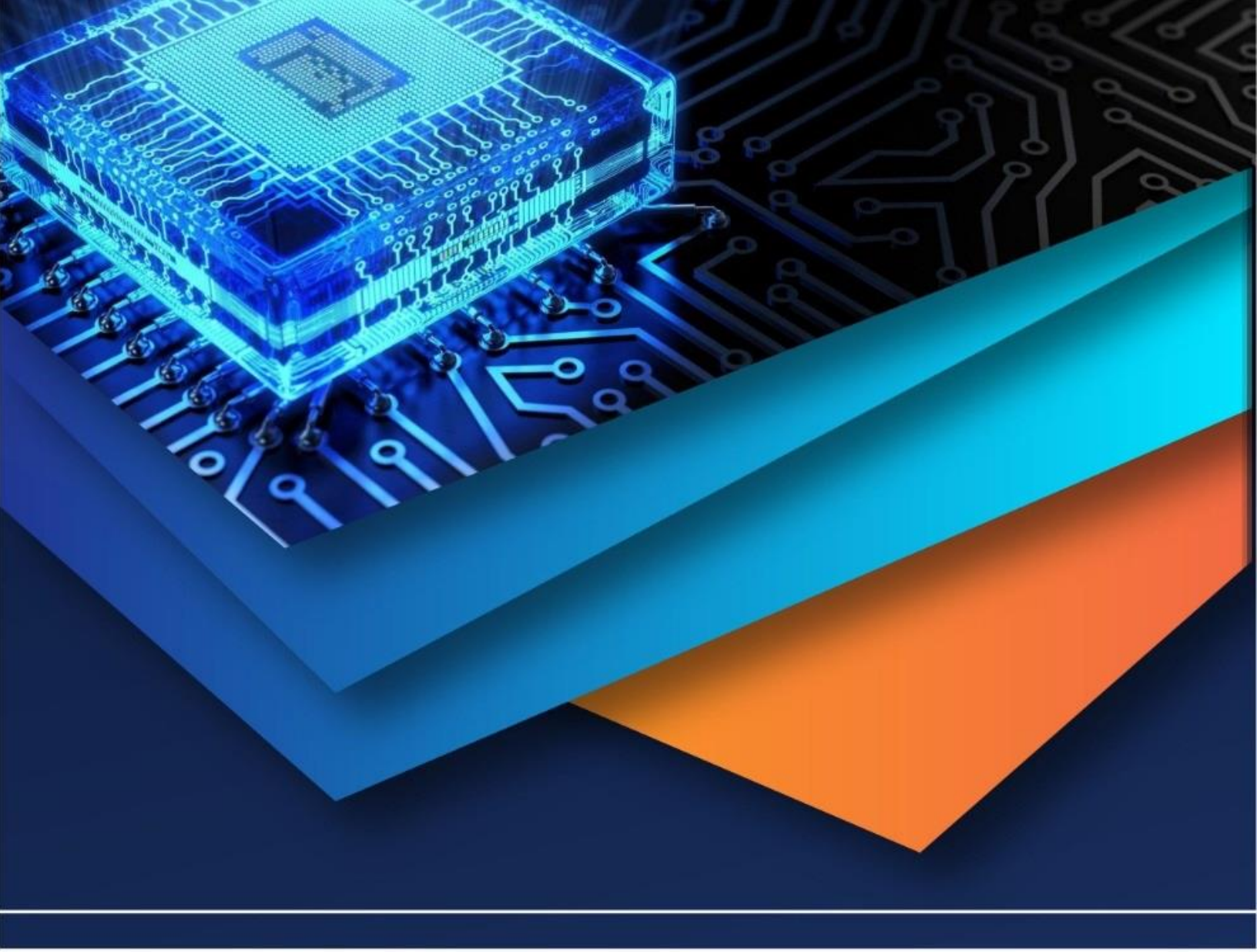
X. CONCLUSION

This machine is mobile. At a time, it works as a battery charging device and also a exercising device. Due to having a simple mechanism and working this machine can be used by people of any ages easily. Charging and wellbeing of a person can be done simultaneously. Thus after performing the experiment result we got is- at a an average speed of 310 rpm, 12 volts can be generated easily and be maintained. The energy the flywheel stores helps in regulating the fluctuation of electricity. The performance of human powered machine is efficient for long duration of time. With the conventional method of charging a battery , human energy utilizes less effort and can charge at the same rate. This system is also useful for the health purpose as pedaling is a act of exercise.

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