

Frictionless Energy Generation using Flywheel

Dr. P. Nagasankar, Harzathkumar N, Dilipkumar K, Saranraj. KR

Department of Mechanical Engineering, VelTech HighTech Dr. Rangarajan Dr. Sakunthala Engineering College, Chennai, Tamilnadu, India

ABSTRACT

Electricity is one of the most significant gifts that science has bestowed upon humanity. It has also become an integral part of modern life such that it is difficult to imagine a world without it. Electricity has numerous applications in our daily lives. Energy is usually produced by non-renewable sources such as petrol, Kerosene and nuclear which unfortunately create pollution. These methods are inconvenient in many ways. Burning of nonrenewable sources are hazardous to environment as it produces harmful gases. The batteries which are used to produce electricity is also manufactured using harmful substaces. Using high pressure steam and batteries are expensive and hard to maintain. The intention of this project is to producing energy without creating pollution and use it to power light bulbs, cell phones, laptops, and other small appliances. This project is great help to develop our engineering skills while learning about a clean way of generating electricity and satisfying our basic requirement. We are going to use the hard drive, magnet and inductive coil to generate electricity due to which our mobile phone will be charge and followed by ac to dc converter. This is totally clean way of generating energy. As fuel is not a renewable energy source and the prices are increasing day by day. It will not be affordable by a common man after some period. Here no fuel is required to generate electricity, so everybody can afford this method for power generation also it eliminates the emission of CO₂ which will reduces the pollution. Conventional methods for generating electricity make use of dynamo and wind turbine, but they have disadvantage that they produce friction and reduces speed which require more efforts For the project to work we need strong electromagnets so we have used Neodymium magnets and also used.

Keywords : Frictionless Energy, Flywheel

Article Info

Publication Issue :

Volume 10, Issue 1

January-February-2023

Page Number : 191-196

Article History

Accepted : 10 Jan 2023

Published: 30 Jan 2023

I. INTRODUCTION

When the car or bike wheel shaft rotates it rotates the flywheel shaft which is connected parallely with the

help of freewheel sprocket and chain.As the break apply or wheel stops ,here the flywheel takes a part still it rotates as its work to save energy.we are utilizing this rotary energy of flywheel to generate electricity .

by using neodymium magnet-coil arrangement, there is no physical contact like dynamo with flywheel. just small coin size magnets are placed on flywheel when Tyre rotates with flywheel Neodymium magnet will start rotating coil is steady. So here e.m.f is produce from magnet and coil arrangement. By this way power will generate and store it into batteries

II. Literature Survey

Akshay Sawant , Pratik Solanke, Mandar Deshpande presented paper on “Frictionless power generation using bicycle”. The paper describes the research and analysis of frictionless power generation using magnets. The intention of this project is to build a straight forward human powered generator from a used bicycle and to use it to power light bulbs, cell phones, laptops, and other small appliances. This project will help to develop engineering skills while learning about a clean way of generating electricity and satisfying our basic requirement. We are going to use the hard drive magnet and inductive coil to generate electricity due to which our mobile phone will be charge and followed by ac to dc converter. This is totally clean way of generating energy. As fuel is not a renewable energy source and the prices are increasing day by day. It will not be affordable by a common man after some period. Here no fuel is required to generate electricity, so everybody can afford this method for power generation also it eliminates the emission of CO₂ which will reduces the pollution. Conventional methods for generating electricity make use of dynamo and wind turbine, but they have disadvantage that they produce friction and reduces speed which require more efforts

Santosh Bawage, Akash Khote, et all presented paper on “Design and fabrication of contactless energy generation using flywheel for EV”. In this paper the author tells how we can design and fabricate a model of contactless energy generation using flywheel for electric vehicle. As per the Government

announcement of electrifying the vehicles upto 2030 there will be need of Charging Stations everywhere from metropolitan cities to remote areas. The practical scenario is that there will be many problems in fully development of charging stations across the country. This is the main reason the idea behind the generation of energy within the vehicle itself without any contact and to avoid the pollution.

Yuvraj Lad, Suraj Pendhe, Sagar Raut et all presented paper on “Free energy generation using flywheel”. This paper tells us about new idea for the frictionless energy generation using flywheel by converting kinetic energy directly to electric energy to generates electricity without using dynamo. The production and use of energy are vital to the economies of all countries and it is needed for many activities such as lighting and phone charging and driving the bike and lot of other stuff, Energy is usually produced by non-renewable sources such as petrol, kerosene and nuclear which unfortunately create pollution, this is the main reason the idea of producing energy using a bike or Cycle tyre. Since there are cycling competitions that are conducted throughout the year we could Generates sufficient energy to charge small and large devices. But the problem is lots of other existing energy generation mechanism or generators generate energy by taking some physical contact

Kumad Pant, Jyoti Mehra, Ketan Naula, et all presented paper on “Electricity generation using flywheel”. This paper presents an analysis which shows that FES (Flywheel Energy Storage) is a promising alternative for mitigating energy storage problem. Flywheel Energy Storage (FES) technology works by accelerating a flywheel to a very high speed and maintaining the energy in the system as rotational energy. Most FES system uses electricity to accelerate the flywheel. In this work we use mechanical energy. To achieve our target in this work we use a DC generator to convert a rotational energy into DC electrical output.

Akhil Bhat, Shrikrushna Borbale, S.H. Joshi presented paper on “Contactless energy generation using flywheel”. This Paper represents the investigation of free energy using flywheel arrangement. The energy lost due to the friction in dynamo is utilised to generate free energy. This extra free energy is used to run other electrical devices. It comprises of A.C. engine of half strength limit which is utilized to drive an arrangement of belt and pulley drive which in turn rotates the shaft on which the wheel is mounted. The interesting thing about this framework is that more prominent electrical yield power can be acquired from the alternator that gives off an impression of being drawn from the information engine. It is finished with the assistance of Gravity wheel. The gravity wheel or flywheel is combined with the rigging train so as to create free energy. This free energy is free of cost

Anand Babu K., Hemant Dayalu D., M Hariprasad, et all presented paper on “Design and fabrication of magnetic generator using neodymium magnets.” Generally, a generator made of coils circuits powered by the current. But there is a generator that generates and stores energy in the battery without the help of initial current. This generator is made by using neodymium magnets to run and generate energy and store it in the battery. There is no effect on the environment while generating this kind of energy. We have used the 3D modeled roller to reduce the weight of the entire setup which in turn helps us gain more voltage. Such a generator can produce up to 5 volts that can be increased by a step-up transformer. The energy generated by this generator can be used for different purposes like to charge mobile phones, Laptops, to operate a table fan, etc. This generator can also be used as an electricity generator for electrical vehicles.

III. COMPONENTS

3.1 fly wheel

Flywheel is main component of our System. Flywheel rotates even though brakes are applied. Flywheel is

another main component of assembly. Material of flywheel is selected on basis of energy storage requirements. The component property has indirect effect on output voltage.

3.2 Neodymium Magnets

It's also known as NdFeB magnet and these are strong permanent magnet widely used for many applications for example electric motors, electric generator for wind turbine, magnetic coupling and bearing, headphones and speakers, electrical power steering system etc. Neodymium magnets has good magnetic properties, the strength of the magnetic field is high it is known as remanence. They have higher coercivity and energy product but curie temperature is lower than the other types of the magnets. We can use N30 to N55 grade NdFeB magnets for this project, N52 grade magnet is suitable for our model setup

3.3 Coil

In our project coil means an electromagnetic coil is an electrical conductor wire in the shape of coil or spiral. These coil uses where magnetic field and electric current interact with each other, in appliances such as electrical generators, motor, transformer. Electric current flows through the coil wire and generate the magnetic field, in conductor the external magnetic field through the arrangement of the coil generate an electromotive force. Due to Ampere's law magnetic field create around the conductor when current passes through that conductor. Coil shape winding increase the magnetic field strength. More number of turns of wire produce the stronger field, in conductor voltage is induced by external magnetic flux changing conversely due to Faraday's law of induction. This induced voltage can increase with help of coil or winding the wire because circuit and field lines intersect with each other multiple times. Coil produces magnetic field; the magnetic field direction can be determined by right hand grip rule, magnetic field lines direction showed by the thumb and other fingers

shows current direction. Different types of coils used in electronic and electric appliances.

3.4 Gear

A gear is a cylindrical, toothed component of a machine that resembles a roller and meshes with another cylindrical, toothed component to transfer power from one shaft to another. It is primarily utilised to obtain various torque and speed ratios or to reverse the shafts that are being driven and being driven. The fundamental benefit of the gear system is that there is little to no slippage between the driver and the driven member, compared to other power transmission instruments like belt drives, chain drives, rope drives, etc. Wherever there is a short distance between the axis driving and the driven shaft, such as in a bicycle, motorcycle, vehicle, etc., gears are typically utilised.

3.5 Battery

An object that stores energy and releases it by transforming chemical energy into electricity is a battery. Typical batteries typically employ one or more electrochemical cells to chemically generate electricity. [2] Alkaline, lithium-ion, lithium-polymer, and nickel-metal hydride batteries are the most typical battery types, while many other materials can and have been used in batteries. Batteries can be linked to one another in a parallel or series circuit.

3.6 Axial Flux Generator

Axial flux generator construction is similar to the axial flux motor where the gap between the stator and rotor. Magnetic flux direction between rotor and stator is parallel with rotation axis. To build this type of generator permanent magnet requires.

Some axial designs allow the geometry considerations those are not practical in radial geometry but some operating principles, design and applications are possible to achieve. Axial flux generators used for low power or medium power applications. Rotor is placed parallel to the stator setup with equal distance. When the rotor rotates the electricity generates and passes

through the circuit and stored in the battery. We are select this type of generator because it can build on flat structure and reduce the rotor weight, the structural parts are also flat.

IV. METHODOLOGY

This mechanical device stores energy in the form of inertia using a flywheel. In this method, we used an additional energy source, such as electricity, to start the main motor. In this system, the main motor is used to drive a set of pulley and belt arrangements that together make a gear train arrangement that causes the generator shaft to rotate at double or three times its normal speed. The system's important feature is that it produces more electricity at the shaft's output than it does at its input. By increasing the flywheel's radius and weight, the inertia of the flywheel can be raised. First and foremost, a good flywheel with a big diameter and the great majority of the weight near to the rim are necessary for an efficient system. Ideally, the construction should be strong and solid. The weight on the flywheel is concentrated outward of the rim, which must be precisely at right angles to the axle on which it rotates and precisely centred on the axle, causing the rotation rate to be as high as feasible. The generator runs at a high speed with a high voltage output while the main motor operates at a low speed and low voltage input. As a result, the primary motor starts to work when we add extra energy, which causes the flywheel to rotate. We employ the electrical energy produced by the generator to switch the power when the motor reaches its maximum speed (constant speed). To run the system and get the most efficiency out of it, we add more components like transformers, rectifiers, inverters, etc.

V. DESIGN CALCULATIONS

5.1 Belt drives transmission

Motor RPM = 1440 (standard motor)

Motor pulley Diameter (Input) = 75mm

Large pulley Diameter (output) = 85mm

Centre Distance = 250mm

Output Rpm = to find

Formula:

$$\frac{\text{RPM of Motor}}{\text{RPM of shaft 1}} = \frac{\text{Diameter of shaft pulley}}{\text{Diameter of Motor pulley}}$$

1440/RPM of shaft 1 = 85/75

RPM of shaft 1 = 1270.58

RPM of shaft 1 = N2 = 1270.58

5.2 Chain drives transmission

Rpm output of belt drive is input rpm of chain drive therefore,

Large sprocket RPM = 1270

Large Sprocket diameter = 120mm Small Sprocket diameter = 80mm Large sprocket teeth (input) = 22

Small sprocket teeth (output) = 14

Centre Distance = 400mm Chain length = 1000mm

Formula:

$$\frac{\text{RPM of Shaft 1}}{\text{RPM of shaft 2}} = \frac{\text{No of teeth on larger pulley}}{\text{No of teeth on smaller pulley}}$$

RPM output = 808

Hence the input speed of 1440 RPM is converted to 808 RPM to flywheel through a belt drive and chain drive. According to design Magnets will also rotate with same speed as flywheel.

5.3 Calculation of maximum B.M

MA = 0Nm

MC = RA X 150 = 1.19X150

MC = 178.5 N mm

MD = 1.19X250 – 2 X 100

MD = 97.5Nmm

MB = 1.19 x 400- 2 x 150 -15 x50

MB = 101 N mm

ME = 0

Maximum bending moment at point C = 178.5 N mm = 0.178 Nm

Combine Twisting and Bending

WHATS NEW?

Electric motors and batteries are used to power electric trains, autos, and other electric vehicles. As we travel along, power from the batteries is transferred to the motors, which turn the wheels and give us the kinetic energy we need to move. Electronic circuits disconnect the power to the motors when we stop and apply the brakes, which puts the entire operation into reverse. Now that the wheels are being turned by our kinetic energy and momentum, the motors act as generators and begin to produce power rather than consuming it. These motor-generators provide power back to the batteries, charging them. Therefore, a significant percentage of the energy we lose when braking is transferred back to the batteries and is usable when we restart. Because regenerative brakes in actual use require some time to slow things down, in our system there is minimal friction and no physical contact between the car and the flywheel plate, which allows us to generate good output even when the vehicle is braking.

VI. RESULT AND DISCUSSION

The system configuration generates power without any flywheel friction and allows for optimal use. The voltage output from the assembly is entirely reliant on the rpm of the wheels, causing voltage to fluctuate. To maintain a steady supply of electricity for a charging vehicle or appliance, a battery is necessary. When the shaft moves, a battery attached to the generator assembly is continuously charged. This experiment's findings are based on a method of trial and error. Therefore, the output voltage from design is equal to 12 V with the aid of the iteration process.

VII. CONCLUSION

Production of clean energy from garbage is environmentally friendly. The magnetic flywheel system satisfies the need for the EV system in the dynamic operating circumstances. Additionally, it will lessen the strain on non-renewable resources like kerosene, diesel, and gasoline. It will advance the use of environmentally friendly energy in our country.

VIII. REFERENCES

- [1]. S. M. Mousavi G, F aramarz Faraji, Abbas Majazi, Kamal Al-Haddad A comprehensive review of flywheel energy storage system journal on renewable and sustainable energy review 67 (2017) 477-490
- [2]. Elisa Isotahdon, Elina Huttunen-Saarivirta, Veli-Tapani Kuokkala Characterization of the microstructure and corrosion performance of Ce-alloyed Nd-Fe-B magnets on journal of alloys and compounds 692 (2017) 190-197
- [3]. Michel A Conteh, Emmanuel C. Nsofor Composite flywheel material design of high-speed energy storage on journal of applied research and technology 14 (2016) 184-190
- [4]. Chung-Neng Huang, Yui-Sung Chen Design of magnetic flywheel control for performance improvement of fuel cells used in vehicles journal on Energy (2016) 1-13
- [5]. Jingying Huang, Datong Qin, Zhiyuan Peng Effect of energy-regenerative braking on electric vehicle battery thermal management and control method based on simulation investigation on journal of Energy conversion and management 105 (2015) 1157-1165
- [6]. Magnus Hedlund, Johan Lundin:- "Flywheel Energy Storage for Automotive Applications" by Energies 2015, 8,10636-10663
- [7]. Akhilesh Barwahe, Electricity Generation Using Flywheel Volume 4 Issue IV, April 2016 IC Value: 13.98 ISSN: 2321-9653
- [8]. Jamie Patterson, 2004, Flywheel Energy Storage System, California Energy Commission Public Interest Energy Research Program
- [9]. Michael Mathew , Design of flywheel for improved energy storage using computer aided analysis, Department of Mechanical Engineering National Institute of Technology Rourkela,769008 (2008-2009)
- [10]. B.Sneha , Dr.M.Damodar Reddy, "Generation of Power from Bicycle Pedal", October 2015

Cite this article as :

Dr. P. Nagasankar, Harzathkumar N, Dilipkumar K, Saranraj. KR, "Frictionless Energy Generation using Flywheel", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 10 Issue 1, pp. 191-196, January-February 2023. Available at doi : <https://doi.org/10.32628/IJSRSET2310125>
Journal URL : <https://ijsrset.com/IJSRSET2310125>