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DESIGN AND FABRICATION OF CONTACTLESS ENERGY GENERATION SYSTEM WITH FLYWHEEL

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ABSTRACT— 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 contactless flywheel. As per the Government announcement of electrifying the vehicles up to 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.

Keywords- Flywheel, Electricity, Energy, Battery, Magnet etc.

I. INTRODUCTION

The flywheel is an old means of storing energy and smoothing out power variations. The potter's wheel and the spinning wheel are examples of historical uses of flywheels. The focus in this review is on applications where flywheels are used as significant intermediate energy storage in automotive applications. This is a mechanical device which uses the flywheel to store energy in the form of inertia. In this system we applied an additional energy source to start the main motor like electricity. In this system main motor is used to drive a series of pulley and belt arrangement which forms a gear train arrangement which produce a twice/ thrice speed at the shaft of generator. The significant thing about the system is that the electricity generated at the output of the shaft is more than that of input.

The inertia of flywheel can be increased by increasing the radius of flywheel and weight of flywheel. It also increase if the flywheel weight is concentrated as far out toward the rim of the flywheel as is possible. Firstly, the requirement for an effective system needs to be a suitable flywheel with a large diameter and vast majority of the weight needs to be close to rim. The construction needs to be robust and secure as ideally.

The rate of rotation will be as high as possible as the weight on the flywheel is concentrated outward of the rim which needs to be exactly at right angles to the axle on which it rotates and exactly centered on the axle. The main motor is at low speed, low voltage input motor, the generator is high speed, and high voltage output generator. Therefore, when we apply an extra energy to the main motor it starts running, which causes to rotate the flywheel. When the motor is reaches the highest speed (constant speed) we switch the power by applying the electrical energy generated by the generator. We add the extra thing in the system like transformers, rectifier, inverter etc. to run the system and take the efficiency output.

Electric trains, cars, and other electric vehicles are powered by electric motors connected to batteries. When we're driving along, energy flows from the batteries to the motors, turning the wheels and providing us with the kinetic energy we need to move. When we stop and hit the brakes, the whole process goes into reverse: electronic circuits cut the power to the motors. Now, our kinetic energy and momentum makes the wheels turn the motors, so the motors work like generators and start producing electricity instead of consuming it. Power flows back from these motor-generators to the batteries, charging them up. So a good proportion of the energy we lose by braking is returned to the batteries and can be reused when we start off again.

In practice, regenerative brakes take time to slow things down, so here our system zero friction no physical contact of vehicle connected, the flywheel plate just connected parallel with the type shaft to get the good output continuously even when there is braking. Due to the friction more amount of heat is generated in the system and also it causes wear and tear of the material, also this heat cause the deflection of material. Due to the friction we have to exert more power to the machine it opposes the motion due to friction noise also produce in the machine. Due to friction engine consumed more fuel so there is a wastage of energy.so we cannot convert all input power to the output energy.

II. USE IN AUTOMOBILE SECTOR

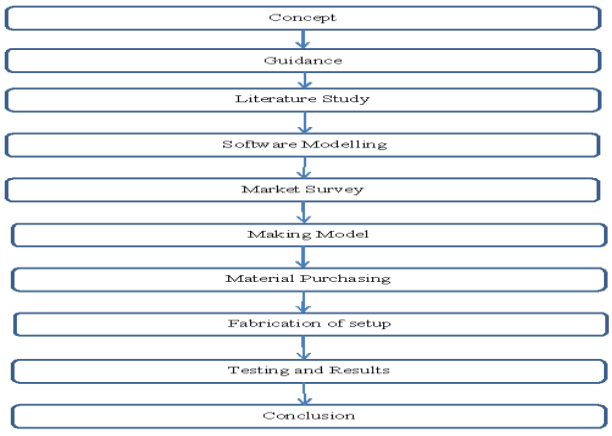
A. Main aim this project

By use of this project we are generating power from the wheel without any loss of friction. By use of this project fuel cost reduces, and also save the energy. Waste K.E is being used in this project to produce power. Flywheel is used in this project due to which kinetic energy is saved while breaking the vehicle. Gear mechanism is not used in the project due to which friction is reduced. No fuel is required to run the project due to which no exhaust of pollutants take place. In our project some effective parameter which are Save energy, Reduce friction, No air & environment pollution, No maintances cost, Easy power generation The overall aim of the research is to design and analyses at system level a hybrid energy storage system for an electrical vehicle power train for a modern passenger car application. It would also be referred as a hybrid vehicle (HV) since it has two sources of energy.

B. Working principle

When the vehicle wheel shaft rotates it rotates the flywheel with the help of freewheel chain and sprocket, 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 to generate electricity .by using some coils and strong magnets which are different from normal magnets called as neodymium magnets, there is no physical contact like dynamo with flywheel , just small coin size magnets are placed on flywheel when Tyre rotates with flywheel emf induced in a coil. And it generates electricity this energy is up to 230 volt. We can easily charge the battery with this.

C. Methodology



We have used the wheel which is connected to the pulley mounted on the same shaft and its diameter is less than the wheel diameter due to which its speed of rotation will be increased. On another shaft connected to the pulley is having the assembly of flywheel and neodymium magnet-coil arrangement. Flywheel will store the kinetic energy while wheel is in running condition and will release the K.E when the brake is applied on the wheel. So the use of flywheel provides such kind of energy which help to run the cycle by less efficient power. Neodymium magnet will start rotating shaft and coil is steady. So here variable e.m.f is produce from magnet and coil arrangement. By this way power will be generated and stored into battery.

III. REVIEW

In recent year, [1] Akhilesh barwahe april 2016 ''electricity generation using flywheel'' for electric Vehicle. He can conclude that, the system arrangement generates electricity without any friction with flywheel and it can be utilized to maximum amount .He has successfully designed and implemented design. A battery connected to generator continuously charged when shaft moves. [2]B.Sneha, Dr.M.Damodar Reddy, October 2015“Generation of Power from flywheel”. It is known that the supply of fossil fuels are scarce and their usage as energy source cause environmental degradation, in addition to this as the world population increases the energy demand is also increasing day by day, so we are in a search of new renewable energy sources in latest coming vehicles. [3]V. Praveen, M. Arun (Dec2014), “kinetic energy recovery system in vehicle” Kinetic Energy Recovery System (KERS) is a system for recovering the moving vehicle's kinetic energy under braking and also to convert the usual loss in kinetic energy into gain in kinetic energy. When riding a vehicle, a great amount of kinetic energy is lost while braking, making start up fairly strenuous. [4]Suraj A.Sevatkar, Eknath M. Pise 2010 “design and fabrication of flywheel on a
Bicycle used as kinetic energy recovery system” When riding a bicycle a great amount of kinetic energy is lost while breaking. [5]Michael Mathew, 2009, “Flywheels serve as kinetic energy storage and retrieval devices with the ability to deliver high output power at high rotational speeds as being one of the emerging energy storage technologies available today in various stages of development, especially in advanced technological areas, i.e., spacecraft’s. [6]Cross & Hilton (2008), mechanical KERS has longer lifespan as compared an electrical KERS which runs on batteries. In terms of safety, a mechanical KERS is safer as flywheels are Established technology and guaranteed safe with the implementation of technologies provided by Flybrid. [7] John Hilton (2007), the overall in-out efficiency of a mechanical drivetrain feeding
Energy into a flywheel and back out to the vehicle again via an ancillary transmission system is approximately 65-70 per cent compared with 35-45 per cent for a hybrid battery-electric
System. [8] Jamie Patterson, 2004, “The broad goal of this project was the development and demonstration of a complete prototype Flywheel Power System (FPS) and successful proof of the feasibility of this energy storage technology.

IV. COMPONENT OF SYSTEM

Freewheel is main component of our System. Freewheel 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. Therefore, we choose the material wisely.

The Specification of Components used in system is as follows:

Table 1 : Component of System

Sr. No.	Component	Specification
1.	Motor	1440 rpm
2.	Main flywheel diameter	16 cm
3.	Small pulley diameter	75mm
4.	Large pulley diameter	85 mm
5.	Centre distance b/w two shafts	400 mm
6.	Large sprocket dia & teeth	120 mm & 22
7.	Smaller sprocket dia and teeth	80 mm & 14
8.	Neodymium magnet	40×20×10 mm
9.	Copper Coils	36 gauge

A. Experimental setup

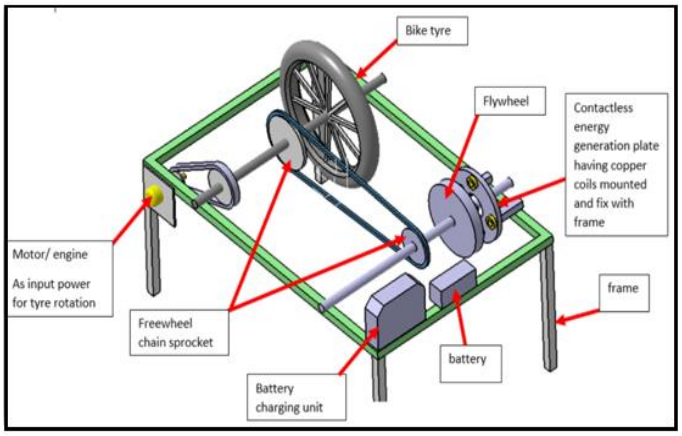


Figure 1: 3D Model of frictionless electricity generation by using flywheel (front view)

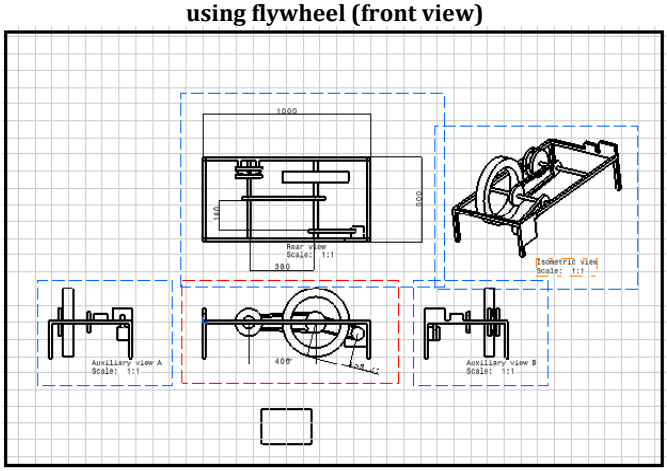


Figure 2: Drafting Model of frictionless electricity generation by using flywheel

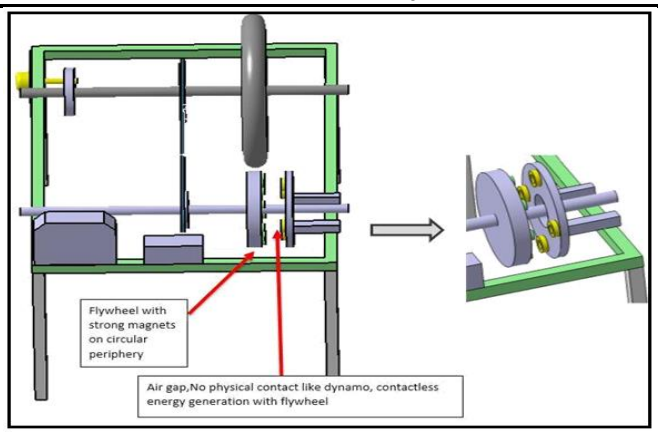
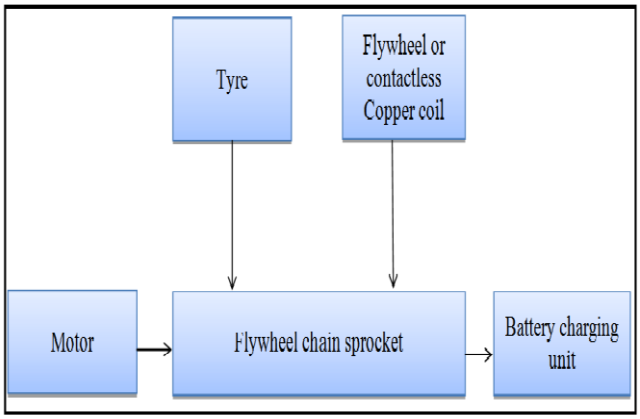


Figure 3: 3D Model of frictionless electricity generation by using flywheel (Side view)

B. Layout of system



C. Part design in software with calculation

i. Flywheel

A flywheel is a mechanical device specifically designed to efficiently store rotational energy. Flywheels resist changes in rotational speed by their moment of inertia. The amount of energy stored in a flywheel is proportional to the square of its rotational speed. The way tochange a flywheel's stored energy is by increasing or decreasing its rotational speed applying a torque aligned with its axis of symmetry.

- Dimension of flywheel

  Large diameter of flywheel = 160 mm
  Small diameter of flywheel = 20 mm
  Width of flywheel = 30 mm

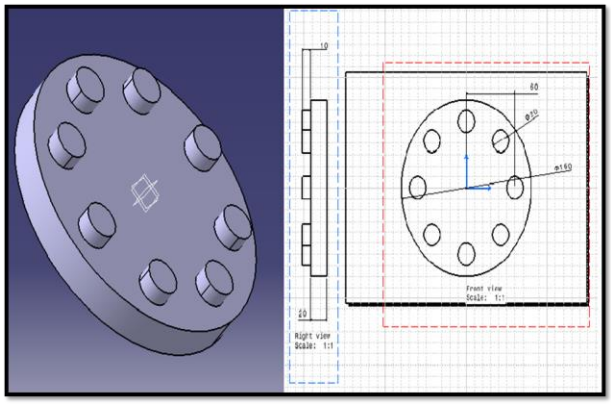


Figure 4: 3D and drafting of first flywheel

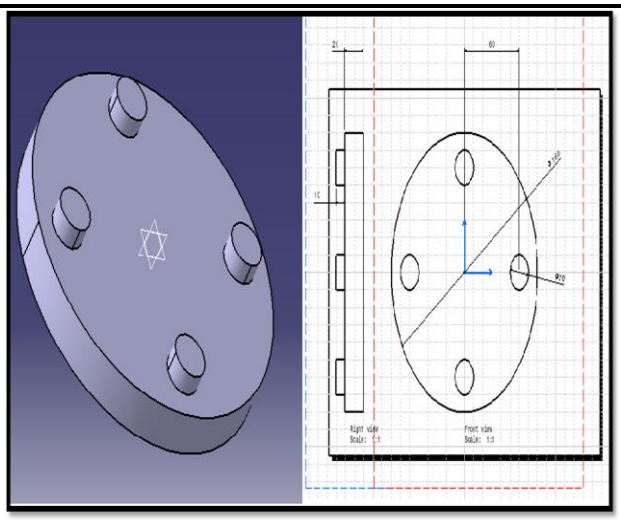


Figure 5: 3D and drafting of second flywheel

ii. Pulley

- Dimension of pulley

Diameter of pulley = 80 mm
Width of pulley = 20 mm

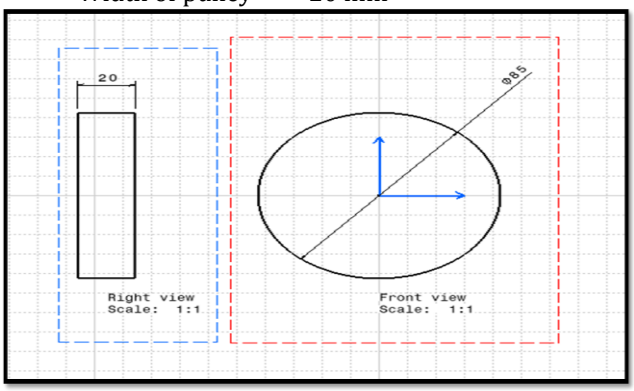


Figure 6: drafting of pulley

iii. Sprocket

- Dimension of sprocket

I. Large sprocket

Diameter of large sprocket = 120 mm
Width of large sprocket = 60 mm

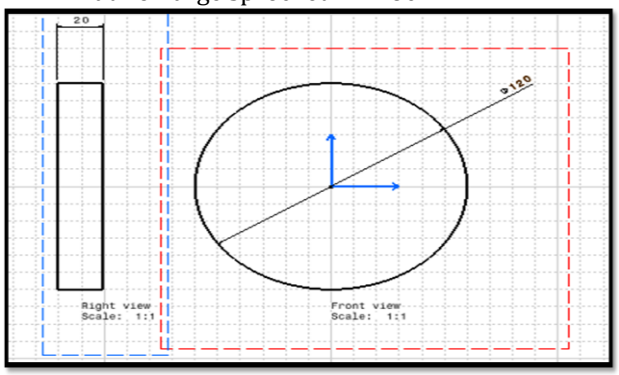


Figure 7: drafting of large sprocket

II. small sprocket

Diameter of small sprocket = 80 mm
Width of small sprocket = 20 mm

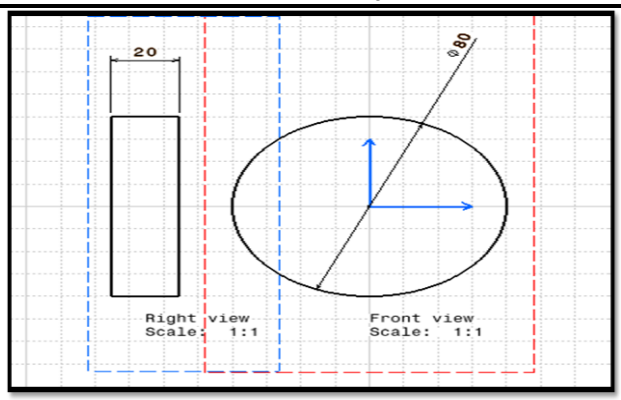


Figure 8: drafting of small sprocket

iv. Motor Pulley

- Dimension of Motor Pulley

Diameter of motor pulley = 75 mm
Width of motor pulley = 20 mm

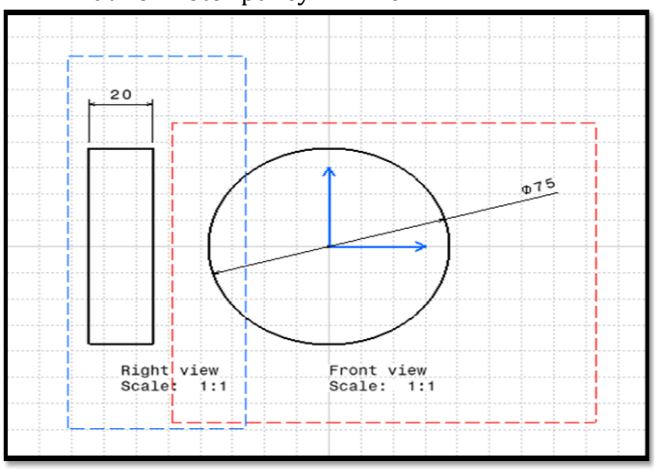


Figure 9: drafting of motor pulley

V. RESULT

After rotation of wheel, the magnets rotates about stationary coil, e.m.f. induce which gives output of 0.3 to 0.5 volt.

So after increasing the thickness of coil of 36 gauge and 6 mm thickness wire, we are now getting almost 1 to 2 volt from 1 coil.

Number of coils used will give the voltage as per requirement.

VI. CONCULSION

We can study that, the system arrangement generates electricity without any friction with flywheel and it can be utilized in the maximum amount. We have successfully designed the project and implemented on frame, the generated power is utilized to charge the mobile phones and mobile devices; we also understand the concept of electromagnetism and how to generate power by just placing the magnet and coil of equal quantity on different disks without making any contact. The voltage output taken from the assembly is totally dependent on the rpm of the wheels so voltage is fluctuating so a battery is used to provide a constant power supply to charging vehicle or appliance.

A battery connected to the generator assembly is continuously charged when shaft moves at 80- 90 rpm which is normal speed of bike. By this assembly battery is continuously charging.

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