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Smart Energy

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Abstract: *The aim of the project is to design a smart energy which can save a lot energy Using the electro magnetic principles by the low electrical energy into mechanical and after that to electrical with 2 times then the input power. In this we are using an extra gear from the engine or motor shaft that will transmit the power to the generator. In motor vehicles, the transmission generally is connected to the engine crankshaft via a flywheel or clutch or fluid coupling, partly because internal combustion engines cannot run below a particular speed. The output of the transmission is transmitted via the driveshaft to one or more differentials, which drive the wheels. While a differential may also provide gear reduction, its primary purpose is to permit the wheels at either end of an axle to rotate at different speeds (essential to avoid wheel slippage on turns) as it changes the direction of rotation. Conventional gear/belt transmissions are not the only mechanism for speed/torque adaptation. Alternative mechanisms include torque converters and power transformation (e.g. diesel-electric transmission and hydraulic drive system). Hybrid configurations also exist. Automatic transmissions use a valve body to shift gears using fluid pressures in response to engine RPM, speed, and throttle input. The main methods of attaching gears to shafts are adhesives, press-fitting, cross drilled holes, compression, set screws, keyways, involute splines and taper lock bushings. Most industrial applications will use keyways and / or set screws. While adhesives and press fitting are usually done on low torque or hobby applications. Adhesives are mostly used in hobby applications with plastic gearing. Not only because plastic gears cannot handle much torque, but also because the shaft sizes remain small in diameter. In this battery will be connect to the ac motor the battery will be 12v and the motor rotate after the shaft of the motor is connect to the gears and that process is like a normal gear box function in that one gear is attached to the driven shaft of generator. It will produce the electric energy and it will connect to the any other electric supply or home application and one of the output will be connect to the same ac motor to avoid the battery and it can be cut power supply of battery after few minutes then the motor and generator will be work like a loop.*

Keywords: Smart Energy

I. INTRODUCTION

In this we are making invention which can give as electrical energy. The input power of the circuit will be 12 volt and the output will be 110 voltage. A motor is an electrical machine that converts electrical energy into mechanical energy. It works exactly opposite to generator that converts mechanical energy to electrical energy.

The use of information and communication technology (ICT) and control systems in power systems has led to the creation of a concept called the smart grid. The development of this concept in power networks leads to optimal network control, optimal use of equipment, increased quality and reliability of power supply, facilitation of the integration of renewable energy sources (RES), optimal planning of the transmission and distribution systems, the development of the use of distributed generation (DG) and reduced system's costs.

However, in the past years, this concept has only been developed on the power grid and does not provide an accurate understanding of real energy systems. In real energy systems, different energy carriers and technologies interact, and a real energy system is a collection of these carriers and technologies. Therefore, the models presented for future sustainable energy systems should consider the integration of different energy infrastructure and the interaction of different energy carriers.

In this regard, the concept of energy hub, in which the production, conversion, storage, and consumption of different energy carriers are considered in an intelligent framework, can provide a comprehensive model of future smart energy

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systems (SES). The main purpose of this chapter is to introduce the concept of smart energy hub (SHE). In this regard, an introduction to the concept of the smart grid, its definitions, features, and main challenges are presented. Finally, it discusses the framework of SEHs and their potential role in achieving a comprehensive model of SES in the future.

An electric generator (Long ago, a machine that generated electricity was named "dynamo" today's preferred term is "generator") is a device for converting mechanical energy into electrical energy. The process is based on the relationship between magnetism and electricity.

When a wire or any other electrically conductive material moves across a magnetic field, an electric current occurs in the wire. The large generators used by the electric utility industry have a stationary conductor. A magnet attached to the end of a rotating shaft is positioned inside a stationary conducting ring that is wrapped with a long, continuous piece of wire. When the magnet rotates, it induces a small electric current in each section of wire as it passes. Each section of wire constitutes a small, separate electric conductor. All the small currents of individual sections add up to one current of considerable size. This current is what is used for electric power. An electric utility power station uses either a turbine, engine, water wheel, or other similar machine to drive an electric generator or device that converts mechanical or chemical energy to electricity. Steam turbines, internal-combustion engines, gas combustion turbines, water turbines, and wind turbines are the most common methods to generate electricity.

II. COMPONENT

2.1. Battery

A battery is a source of electric power consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of single cell

Fig 2.1.Battery

Battery Type: VRLA Model Number: Bikerz 2.5L
Hero Motor: Maestro,HfDelux,Passion 10,Glamour (New),Glamour F1(New),Cd

2.2. DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

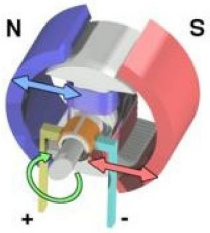

Fig 2.2.1.DC motor

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Workings of a brushed electric motor with a two-pole rotor (armature) and permanent magnet stator. "N" and "S" designate polarities on the inside axis faces of the magnets; the outside faces have opposite polarities. The + and - signs show where the DC current is applied to the commutator which supplies current to the armature coils. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

DC 12V/24V round shaft 775 electric motors, with both side bush, Mounting Screw Hole Diameter: 4mm, Distance between Screw Holes: 30mm, Diameter of the Motor: 44mm.

Type: Micro DC Motor; Rated voltage: 12V 2 Amp, No Load Speed: 7000RPM, 12V 5Amp No-Load Speed: 10000 RPM; Rated voltage: 24V No- Load Speed: 19800 RPM.

Shaft Diameter: 5 mm; Shaft length: 17 mm Length of the Motor (Body): 67mm, Motor Diameter : 45mm, Color : Silver Tone.

With copper wire production, durable for using. Easy to wire and install. Durable construction for long-lasting performance. Wide applied to electric tools, electric fans, electric cleaners, etc. Small size but large torque.

Note: The motor starting current needs to be 10A, Net Weight: 315gm, Package

Fig 2.2.2. Model of DC motor

2.3 Generator

Generator will be made up us by modifying an motor by using strong magnet. that will be inserted in the stator. If the motor will rotate then there will be more current will be produce.

A. Generator Working

Electrical generators are standalone machines that provide electricity when power from the local grid is unavailable. Industrial generators are often used to supply backup power to facilities, businesses, or homes during power outages but they can also be used as a primary power source in areas where a local electrical grid is unavailable or difficult to access such as mining and farming operations or even new developments and construction.

It's possible to buy a generator for just about any need. Some electrical generators are small, portable devices that are used for camping or hobbies to provide small amounts of power for just a few devices. Others are permanent installations

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that can power an entire house. Industrial generators are even more powerful, capable of maintaining full power to manufacturing facilities, hospitals, and office complexes.

There are diesel generators, natural gas generators, propane generators, and bi- fuel generators. Below, we'll take a look at how electrical generators work and what you need to know to install and maintain a generator.

B. Creation of Electricity by Generation

Generators don't actually create electricity. Instead, they convert mechanical or chemical energy into electrical energy. They do this by capturing the power of motion and turning it into electrical energy by forcing electrons from the external source through an electrical circuit. A generator is essentially an electrical motor working in reverse.

Some electrical generators, such as those at Hoover Dam, for example, are huge and provide enormous amounts of energy by transferring the power created by water turning turbines into electricity. Residential and commercial generators, however, are much smaller and rely on more traditional fuel sources like diesel, gas, and propane to create mechanical power that can then be forced into a circuit and induce an electrical current.

Once an electrical current has been established, it is directed through copper wires to power external machines, devices, or entire electrical systems.

Modern generators can be attributed to Michael Faraday's principle of electromagnetic induction. Faraday discovered that when a conductor moves in a magnetic field, electrical charges could be created and directed to create a flow of current. At its most basic, an electrical generator is nothing more than an electromagnet – moving wire near a magnet to direct the flow of electricity. It's similar to how a pump pushes water through a pipe.

Bulb or other
It is used for to show how the current is flow
Wire: it is use to connect the motor from battery and other

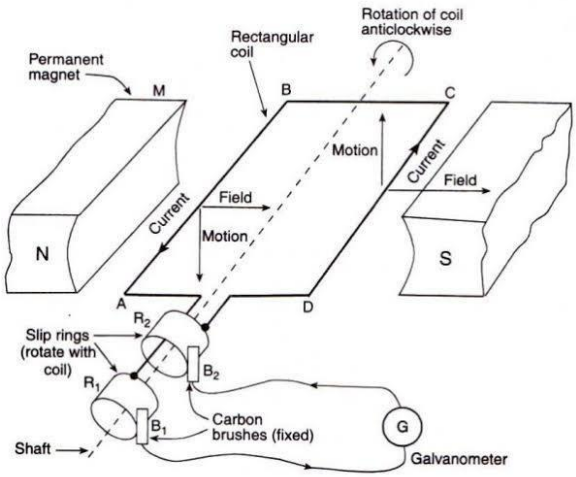

Fig 2.3. Working of Generator

2.4 Gear

We are using two types of gear. The gear ratio will be 2:1.it is metal Gear. Gears are mechanisms that mesh together via teeth and are used to transmit rotary motion from one shaft to another. Gears are defined by two important items: radius and number of teeth. They are typically mounted, or connected to other parts, via a shaft or base.

Radius: The gear radius is defined differently depending on the particular section of the gear being discussed. The two most relevant measurements, however, are the root radius and the addendum radius. The root radius is the distance from the center of the gear to the base of the teeth while the addendum radius (also called the "pitch" radius) is the distance from the center of the gear to the outside of the teeth.

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Teeth: The teeth are the portion of the gear that makes contact with another gear. In order for two gears to mesh together the pitch must be the same for all mating pairs. The pitch of a gear is the distance between equivalent points of adjacent teeth. When the teeth of gears mesh properly they prevent slipping and can exhibit efficiencies of up to 98%.

Fig 2.4. Types of Gear

A. Spur Gear

Spur Gear The most common type of gear is a spur gear. Spur gears have teeth that protrude outward from the perimeter of the gear. They are mounted on parallel axes and can be used to create a wide range of gear ratios. One drawback of this mechanism is that the collisions between each tooth cause a potentially objectionable noise since the entirety of each tooth meshes at once.

B. Helical Gears

Helical Gears: In an effort to reduce the noise from spur gears, helical gears can be utilized. The teeth of helical gears are cut at an angle to the face of the gear so that the tooth engagement begins at one end and gradually transfers to the rest of the tooth as the gear rotates. This design leads to noise reduction and an overall smoother system. The helical pattern of the gears creates a thrust load as the gear teeth come into contact with each other at an angle that is not perpendicular to the shaft axis. Bearings are often incorporated into mechanisms with helical gears in order to support that thrust load.

C. Bevel Gears

Bevel Gears: Bevel gears can be used in mechanisms to change the axis of rotation. Although they can be designed to work at other angles, they are most often used to change the axis of rotation by 90 degrees. Similar to spur gears, bevel gears may also feature straight or helical teeth. Additionally, hypoid bevel gears can be used when the input and output shafts' axes do not intersect.

D. Worm Gears

Worm Gears: In mechanisms where large gear reductions are needed, worm gears can be used to achieve gear ratios of greater than 300:1 if necessary. Worm gears also possess a natural locking feature in that the worm can easily turn the gear, but the gear cannot turn the worm due to the shallow angle of the worm causing high friction between the gears. These mechanisms also change the axis of rotation by 90 degrees, but in a different manner than bevel gears. Unlike other gears where the teeth are cut parallel, worm gear teeth are cut almost perpendicular to the shaft's axis of rotation while mating with a more traditional gear profile.

E. Planetary Gears

Planetary Gears: Planetary gear sets may be the most interesting mechanism in the gear world. These mechanisms have three main components: the sun gear, the planet gears and carrier, and the ring gear. Each of these components can serve as the input, output, or can be held stationary. The functional designation of each component determines the gear ratio of the

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entire system. A set of bands or clutches is often used in order to lock different parts of the device. The direction of rotation can even be reversed by having the sun gear as the input, the ring gear as the output, and the planet gears stationary. Additionally, locking any two components of the mechanisms will lock the whole system into a 1:1 gear ratio. This one set of gears can produce several gear ratios and the most common application for this mechanism is in the transmission of automatic cars.

2.5. Shafts

A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power.

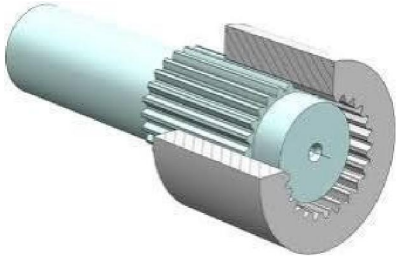

Fig. 2.5. Shaft

A. Types

They are mainly classified into two type. Transmission shafts are used to transmit power between the source and the machine absorbing power; e.g. counter shafts and line shafts. Machine shafts are the integral part of the machine itself; e.g. crankshaft. Axle shaft, Spindle shaft.

B. Materials

The material used for ordinary shafts is mild steel. When high strength is required, an alloy steel such as nickel, nickel-chromium or chromium-vanadium steel is used. Shafts are generally formed by hot rolling and finished to size by cold drawing or turning and grinding

2.6 Electric Supply Devices:

Electric supply devices are light, motors, home application etc… DC motors play a vital role across all industries, and the shafts that go into these motors are a critical component of their performance. If you would like to learn more about equipping your AC/DC motors with our high-quality shafts, we invite you to contact us today.

2.7 Connecting Wires

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum.

III. CIRCUIT DIAGRAM

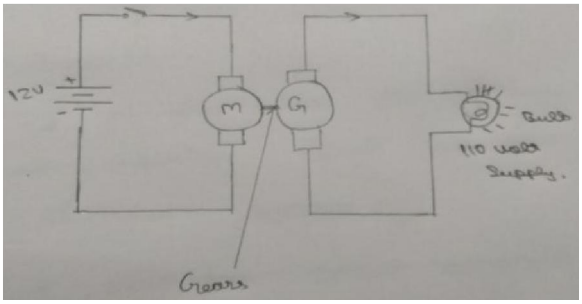

Fig. 3. Circuit diagram

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In this Circuit diagram the battery will be connect to the ac motor the battery will be 12v and the motor rotate after the shaft of the motor is connect to the gears and that process is like a normal gear box function in that one gear is attached to the driven shaft of generator and it will produce the electric energy and it will connect to the any other electric supply or home application and one of the output will be connect to the same ac motor to avoid the battery and it can be cut power supply of battery after few minutes then the motor and generator will be work like a loop

IV. WORKING

12volt battery is connect to a 12volt supply DC motor is attached with the 1st gear and pitch of the gear will be 6 cm meter and the 1st gear is connect to second gear it's pitch will be 3 cm Generator will be connect to 2nd gear from the generator we can get 110 volt and can given to output supply. In this battery will be connect to the ac motor the battery will be 12v and the motor rotate after the shaft of the motor is connect to the gears and that process is like a normal gear box function in that one gear is attached to the driven shaft of generator and it will produce the electric energy and it will connect to the any other electric supply or home application and one of the output will be connect to the same ac motor to avoid the battery and it can be cut power supply of battery after few minutes then the motor and generator will be work like a loop. A battery is a device that stores chemical energy and converts it to electrical energy.

The chemical reactions in a battery involve the flow of electrons from one material (electrode) to another, through an external circuit. The flow of electrons provides an electric current that can be used to do work. AC Motor depends on the principle of magnetism. The simple AC Motor contains a coil of wire and two fixed magnets surrounding a shaft. When an electric (AC) charge applies to the coil of wire, it becomes an electromagnet. This electromagnet generates a magnetic field. Gear machine component consisting of a toothed wheel attached to a rotating shaft.

Gears operate in pairs to transmit and modify rotary motion and torque (turning force) without slip, the teeth of one gear engaging the teeth on a mating gear.

Electric generators work on the principle of electromagnetic induction. A conductor coil (a copper coil tightly wound onto a metal core) is rotated rapidly between the poles of a horseshoe type magnet. The magnetic field will interfere with the electrons in the conductor to induce a flow of electric current inside it.

V. PRINCIPLE

5.1. Conversion of Electrical Energy into Mechanical Energy

The electric motor working principle mainly depends on the interaction between electric current and magnetic field which is nothing but a Faraday's law of electromagnetic induction that read.

"Whenever a current-carrying conductor is placed in the magnetic field, flux is induced in the circuit, due to which a current starts to flow which is called induced current". In simple words, when the electric current is passed through a coil it generates a magnetic field that allows the coil to rotate its own axis.

Fleming's left-hand rule is applicable for motors and is different than Fleming's right-hand role which is mainly defined for generators. The magnitude of the generated force is given by F = BIL

Where B = magnetic flux density I = current in amperes

L = length of the conductor within the generated magnetic field Components of Electric Motor

Here are the main parts of the motor: Rotor, Stator, Bearings, Air gap, Windings, Commutator

A. Rotor

It is the rotating part of the motor that is mainly responsible for delivering the mechanical motion to the shaft or subject attached to it. The rotor comes with conductors that interact with the stator magnetic field to produce the force for turning the shaft.

B. Stator

It is the stationary part (body) of the motor that is mainly composed of permanent magnet or windings. Laminations made up of thin metal are used in stator core for minimizing the energy losses. Both rotor and stator, come under the influence of the magnetic field that interacts with an electric current. One magnetic field is generated by permanent magnetic and another is generated by the electromagnet. Introduction to electric motors, motors working principle, applications of motors, types of motors

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C. Bearings

The machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts.

Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts. Rotary bearings hold rotating components such as shafts or axles within mechanical systems, and transfer axial and radial loads from the source of the load to the structure supporting it. The simplest form of bearing, the plain bearing, consists of a shaft rotating in a hole. Lubrication is used to reduce friction.

In the ball bearing and roller bearing, to reduce sliding friction, rolling elements such as rollers or balls with a circular cross-section are located between the races or journals of the bearing assembly. A wide variety of bearing designs exists to allow the demands of the application to be correctly met for maximum efficiency, reliability, durability and performance.

The term "bearing" is derived from the verb "to bear", a bearing being a machine element that allows one part to bear (i.e., to support) another. The simplest bearings are bearing surfaces, cut or formed into a part, with varying degrees of control over the form, size, roughness and location of the surface. Other bearings are separate devices installed into a machine or machine part.

D. Air Gap

The air gap of a motor is the gap between the stator teeth or core and the rotor magnets. This gap is a key component in the motor design, and affects the overall strength of the magnetic circuit and motor efficiency. The standard air gap in an electric motor is typically about 0.020-0.050 inches. In most design processes, there is give-and-take to the amount of air gap designed into the motor. A wider air gap increases the rotor-stator alignment tolerances, easing installation. However, a wider air gap leads to a weaker magnetic circuit and will reduce the efficiency of the motor. This is detrimental to applications such as surgical robotics, exoskeletons, and satellite communications, where high torque output is required in a compact form-factor.

Motor design engineers are tasked with balancing these effects, to provide a motor that offers both high torque density and ease of installation.

E. Commutator

A commutator is a rotary electrical switch in certain types of electric motors and electrical generators that periodically reverses the current direction between the rotor and the external circuit. It consists of a cylinder composed of multiple metal contact segments on the rotating armature of the machine.

Two or more electrical contacts called "brushes" made of a soft conductive material like carbon press against the commutator, making sliding contact with successive segments of the commutator as it rotates. The windings (coils of wire) on the armature are connected to the commutator segments.

Commutators are used in direct current (DC) machines: dynamos (DC generators) and many DC motors as well as universal motors. In a motor the commutator applies electric current to the windings. By reversing the current direction in the rotating windings each half turn, a steady rotating force (torque) is produced.

In a generator the commutator picks off the current generated in the windings, reversing the direction of the current with each half turn, serving as a mechanical rectifier to convert the alternating current from the windings to unidirectional direct current The electric motor winding definition is, windings in electric motors are wires that are placed within coils, generally enclosed around a coated flexible iron magnetic core to shape magnetic poles while strengthened with the current. Electric machines are available in two fundamental magnet field pole configurations namely salient pole as well as a non-salient pole.

The salient pole configuration machine, the magnetic field pole can be generated produced with a winding wound approximately under the pole face. In the non- salient pole configuration, the winding can be dispersed within slots of pole face. A shaded pole motor includes a winding which is placed around the pole part that holds up the magnetic field phase.

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5.2. Principle of Generator

In electricity generation, a generator is a device that converts motive power (mechanical energy) into electrical power for use in an external circuit. Sources of mechanical energy include steam turbines, gas turbines, water turbines, internal combustion engines, wind turbines and even hand cranks.

An Electric generator is a device which is used to produce electric energy, which can be stored in batteries or can be directly supplied to the homes, shops, offices, etc.

Electric generators work on the principle of electromagnetic induction. A conductor coil (a copper coil tightly wound onto a metal core) is rotated rapidly between the poles of a horseshoe type magnet. The conductor coil along with its core is known as an armature. The armature is connected to a shaft of a mechanical energy source such as a motor and rotated.

The mechanical energy required can be provided by engines operating on fuels such as diesel, petrol, natural gas, etc. or via renewable energy sources such as a wind turbine, water turbine, solar-powered turbine, etc.

When the coil rotates, it cuts the magnetic field which lies between the two poles of the magnet. The magnetic field will interfere with the electrons in the conductor to induce a flow of electric current inside it.

VI. CONCLUSION

- From the minimum current we can get the Maximum current
- We can use this invention in electric bike, home applications, etc... It can be used in the area where there is no electricity
- It is used in the electric car, bike and bus etc…
- This method is used in agriculture field to get the current for the pumb This method of electric current can be used in the mountains Area

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