SELF-PROCLAIMING GENERATOR FOR AUTOMOBILES

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Abstract— **in the current world especially INDIA has an acute shortage of power & fuel .If the price of power & fuel fluctuates the entire human community is upset and the entire system confused. Since most of the fuel energy is consumed by automobiles we focus on the need to find out different ways to harness energy and act as substitute to the fuel that is being exhausted. The aim of our project is to design and fabricate a self-proclaiming generator in an automobile which synthesizes energy by itself or increases the efficiency of the battery. It harnesses thee energy which in turn is utilized by the automobile. Initially the vehicle uses electrical charge to start. Then the dc motor is connected to the wheels, which in turn is connected to a charging circuit to drive the wheels. Another circuit with generator and generator driving motor is connected to the battery. When power is supplied to the generator setup it drives the generator and output is maximized and this output is fed to the battery so that the efficiency of the battery is exhausted. The generator is designed in such a way that the output is doubled with given input. This generator setup is useful in all the fields where the battery plays a main role.**

Keywords: Self-proclaiming, Battery , Generator , power saving.

I. INTRODUCTION

In the current world especially INDIA has an acute shortage of power & fuel. Power and fuel as you all know is the heart of any industry. Constant researches have been carried out to find new ways of generating energy. Self-proclaiming generators are one among those where energy source during the action is recovered and used for running the machine for the long time. The generator consists of a low weight shaft which is insulated by a magnet which can produce sufficient magnetic flux. Without disturbing the torque .Which is run through a coil with decent number of windings. Solar energy is been used as the secondary source of energy in the system.

With the new concepts like Self proclaiming generators maximum efficiency producing automobiles can be produced which results in greater save of energy. Since, there is no fuel consumption in this method pollution through automobiles can be reduced to very large extent. Through this process the huge demand of fossils throughout the world can be met. By the method of self-proclaiming lesser energy is required to drive the setup which turns out to be a very economical process.

1.1 Self-proclaiming energy

Self-proclaiming energy or Self generating energy is a mode of reclaiming and storing the kinetic energy in a reusable manner. Through this method the energy loss in the system can be reduced completely by building generator of suitable design.

In this project, we aim to design and fabricate a self-proclaiming generator in an automobile, which would require initial power supply to operate and further reuses the same energy.

1.2 Need for Self proclaiming energy

Diesel accounts for more than 40percent of fuel demand, or about 1.4 million barrels per day (bpd), and the bulk of that is used by trucks, farmers and industry, which needs back-up generators to cope with frequent power blackouts.

Alternate sources to fossil fuels are non-conventional source of energy. Energy generated by using wind, tides, solar, geothermal heat, and biomass including farm and animal waste as well as human excreta are non-conventional energy.

1. The growing consumption of energy has resulted in the country becoming increasingly dependent on fossil fuels such as coal, oil and gas.
2. Rising prices of oil and gas and their potential shortages have raised uncertainties about the security of energy supply in future, which has serious repercussions on the growth of the national economy.
3. Increasing use of fossil fuels also causes serious environmental problems.

Hence, there is a primary need to use renewable energy sources like self-generating methods, solar, wind, tidal, biomass and energy from waste material.

II. OBJECTIVE AND METHODOLOGY

2.1 Objective

The main objectives of the project were to:

1. Identify the suitable design for self-proclaiming generator .
2. Determine the costs of manufacturing a generator setup.
3. Modeling of an automobile with self-proclaiming generator.
4. Increase the efficiency of the self-proclaiming generator automobile and comparing it to the traditional one.

2.2 Methodology

The methodology can be outlined as:

1. The idea of self-proclaiming generator in automobile was proposed by one the group members while we discussed about hybrid vehicles which could have been our project if not this one.
2. This idea is discussed further and literature survey is done to explore more about the concept. Unluckily we could not find much related surveys about it.
3. Many journals and papers were studied to know the most important components required and the conclusion was drawn that generator designing is the most important part of the whole project.
4. The study led us to the conceptual design of generator.
5. Quite a few ideas were generated for the design but we selected the best concept available to us.
6. We prepared a design for building the automobile and discussed it with the guide and the fabricator about the complications we might face. After everything seemed right we built the automobile according to the design with the mild steel bars of required gauge and size. We covered the outer layers using sheet metals of required thickness.
7. The concept of chain and gear mechanism was introduced to drive the wheel from the motor. In order to ease the movement right gear with accurate length of chain is used.
8. Next big question was selecting designing of the generator. We approached many people in and around Bangalore but they were unable to provide us the quality we required. We headed to Coimbatore and found fabricators who could do our project.
9. Dimensions were finalized of various components and modeling was done using CATIA software.
10. Components were purchased and some were machined further to suit the design.
11. Electronic parts which needed wiring connections were done with the external help.
12. Relay PCB was used to controls the movements of the device.
13. The whole setup was tested for glitches and troubleshooting was done to fix the glitches.
14. A fully functional conceptual SELF-PROCLAIMING GENERATOR FOR AUTOMOBILES was accomplished.

Literature Survey

Problem Defnition

Design and Drawings

Fabrication and Equipments

Trials and Tabulating the Results

Analysis of Results
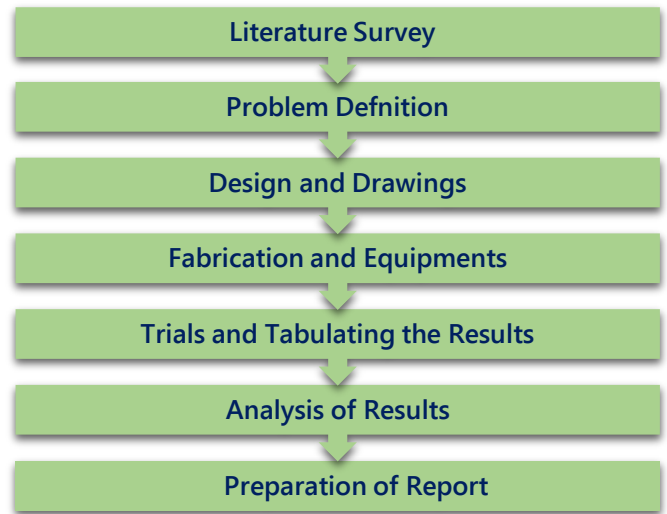
Preparation of Report

Fig.3.1 Flow Chart

III. CONSTRUCTION

3.1 Requirements:

The following requirements were identified and listed:
- A strong chassis which can withstand the load.
- Movement in X and Y directions.
- Platform to mount the motors and electronic circuit.
- Driving unit, Relay PCB and power supply.

Depending on the above requirements the self-proclaiming generator contain following parts:
- Chassis
- Sheet metal
- Welding
- DC Gear Motor
- DC Generator
- Wheel drive
- Chain and gear assembly
- Solar Panel
- Power supply
- Controller Unit
- Painting

3.1.1 Chassis

Chassis consists of an internal framework that supports a man-made object in its construction and use. It is analogous to an animal's skeleton. An example of a chassis is the under part of a motor vehicle, consisting of the frame (on which the body is mounted). If the running gear such as wheels and transmission, and sometimes even the driver's seat, are included then the assembly is described as a rolling chassis.

In this case the chassis consist of two free wheels at the front and two rear driven wheels. Mild steel rods are used mainly to build the chassis and mild steel sheet metal plates of gauge 10 and 18 are used to cover the outer parts.

In our project, Mild steel rods of various gauge was used to build the automobile with the help of fabricators. Time consumption to build the model was about Two to Three days. The rods were attached using most common method of welding i.e. Metal arc welding process. For better Surface finish grinding process was carried out using grinding tool.

3.1.2 Sheet Metal

Sheet metal is metal formed by an industrial process into thin, flat pieces. It is one of the fundamental forms used in metalworking and it can be cut and bent into a variety of shapes. Countless everyday objects are constructed with sheet metal. Thicknesses can vary significantly; extremely thin thicknesses are considered foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate. Sheet metal is available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a roll slitter.

The thickness of sheet metal is commonly specified by a traditional, non-linear measure known as its gauge. The larger the gauge number, the thinner the metal. Commonly used steel sheet metal ranges from 30 gauges to about 8 gauges. Gauge differs between ferrous (iron based) metals and nonferrous metals such as aluminum or copper; copper thickness, for example are measured in ounces (and represent the thickness of 1 ounce of copper rolled out to an area of 1 square foot). There are many different metals that can be made into sheet metal, such as aluminum, brass, copper, steel, tin, nickel and titanium. For decorative uses, important sheet metals include silver, gold, and platinum (platinum sheet metal is also utilized as a catalyst.) Sheet metal is used for car bodies, airplane wings, medical tables, roofs for buildings (architecture) and many other applications. Sheet metal of iron and other materials with high magnetic permeability, also known as laminated steel cores, has applications in transformers and electric machines.

In our Project, Sheet metals of two various thickness and gauges are used respectively on their dimension and demand. Sheet metals were cut to required dimension using Metal cutter and were fitted through welding process and through several rivets.

3.1.3 DC Gear Motor

Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major

details that make the gear head and hence the working of geared DC motor.

For this project, we have used two permanent magnet DC Gear motor of 12V input with 50 RPM.

3.1.4 Generator

An electric generator is a machine that converts mechanical energy into electrical energy. An electric generator is based on the principle that whenever flux is cut by a conductor, an e.m.f. is induced which will cause a current to flow if the conductor

Mechanical properties	Metric
Hardness, Brinell	126
Hardness, Vickers	71
Tensile Strength, Ultimate	440 MPa
Tensile Strength, Yield	370 MPa
Elongation at Break (In 50 mm)	15.0 %
Reduction of Area	40.0 %
Modulus of Elasticity(Typical for steel)	205 GPa
Bulk Modulus (Typical for steel)	140 GPa
Poisson's Ratio (Typical For Steel)	0.290
Machinability (Based on AISI 1212 steel. as 100% Machinability)	70 %
Shear Modulus (Typical for steel)	80.0 GPa

circuit is closed. The direction of induced e.m.f. (and hence current) is given by Fleming's right hand rule.

Therefore, the essential components of a generator are:
(a) A magnetic field
(b) Conductor or a group of conductors
(c) Motion of conductor with respect to magnetic field

Although a far greater percentage of the electrical machines in service are AC machines, the DC machines are of considerable industrial importance. The principal advantage of the D.C. machine, particularly the D.C. motor, is that it provides a fine control of speed. Such an advantage is not claimed by any A.C. motor. However, DC generators are not as common as they used to be, because direct current, when required, is mainly obtained from an AC supply by the use of rectifiers. Nevertheless, an understanding of DC Generator is important because it represents a logical introduction to the behaviour of D.C. motors. Indeed many D.C. motors in industry actually operate as DC Generators for a brief period. In this chapter, we shall deal with various aspects of DC Generators.

Generator Principle

An electric generator is a machine that converts mechanical energy into electrical energy. An electric generator is based on the principle that whenever flux is cut by a conductor, an e.m.f. is induced which will cause a current to flow if the conductor circuit is closed. The direction of induced e.m.f. (and hence current) is given by Fleming's right hand rule. Therefore, the essential components of a generator are:
(a) A magnetic field

(b) Conductor or a group of conductors

(c) Motion of conductor w.r.t. magnetic field.

 Simple Loop Generator

Consider a single turn loop ABCD rotating clockwise in a uniform magnetic field with a constant speed as shown in Fig.(4.5)As the loop rotates, the flux linking the coil sides AB and CD changes continuously. Hence the e.m.f. induced in these coil sides also changes but the e.m.f. induced in one coil side adds to that induced in the other.

I.   When the loop is in position no. 1 the generated e.m.f. is zero because the coil sides (AB and CD) are cutting no flux but are moving parallel to it.

II.   When the loop is in position no. 2, the coil sides are moving at an angle to the flux and, therefore, a low e.m.f. is generated as indicated by point2

III.   When the loop is in position no. 3, the coil sides (AB and CD) are at right angle to the flux and are, therefore, cutting the flux at a maximum rate. Hence at this instant, the generated e.m.f. is maximum as indicated by point 3

IV.   At position 4, the generated e.m.f. is less because the coil sides are cutting the flux at an angle.

V.   At position 5, no magnetic lines are cut and hence induced e.m.f. is zero as indicated by point 5

VI.   At position 6, the coil sides move under a pole of opposite polarity and hence the direction of generated e.m.f. is reversed. The maximum e.m.f.in this direction (i.e., reverse direction, Se will be when the loop is at position 7 and zero when at position 1. This cycle repeats with each revolution of the coil.
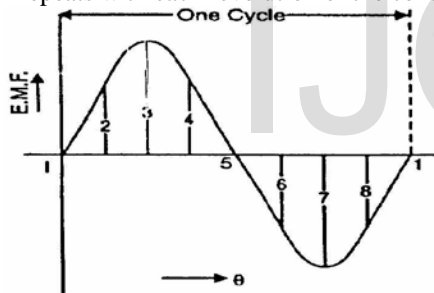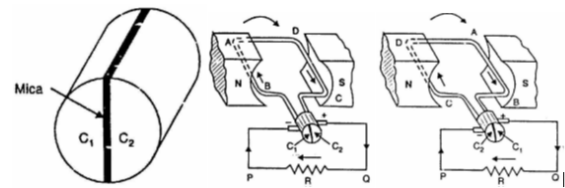

Action of Commutator

If, somehow, connection of the coil side to the external load is reversed at the same instant the current in the coil side reverses, the current through the load will be direct current. This is what a commutator does. Fig. shows a commutator having two segments C1 and C2. It consists of a cylindrical metal ring cut into two halves or segments C1 and C2 respectively separated by a thin sheet of mica. The commutator is mounted on but insulated from the rotor shaft. The ends of coil sides AB and CD are connected to the segments C1 and C2respectively. Two stationary carbon brushes rest on the commutator and lead current to the external load. With this arrangement, the commutator at all times connects the coil side under S-pole to the +ve brush and that under N-pole to the -ve brush

(i)   The coil sides AB and CD are under N-pole and S-pole respectively. Note that segment C1 connects the coil side AB to point Pof the load resistance R and the segment C2 connects the coil side CD to point Q of the load. Also note the direction of current through load. It is from Q to P.

(ii)   After half a revolution of the loop (i.e., 180° rotation), the coil side AB is under S-pole and the coil side CD under N-pole as shown. The currents in the coil sides now flow in the reverse direction but the segments C1 and C2 have also moved through 180° i.e., segment C1 is now in contact with +ve brush and segment C2 in contact with -ve brush. Note that commutator has reversed the coil connections to the load i.e., coil side AB is now connected to point Q of the load and coil side CD to the point P of the load. Also note the direction of current through the load. It is again from Q to P.

Thus the alternating voltage generated in the loop will appear as direct voltage across the brushes. The reader may note that e.m.f. generated in the armature winding of a DC generator is alternating one. It is by the use of commutator that we convert the generated alternating e.m.f. into direct voltage. The purpose of brushes is simply to lead current from the rotating loop or winding to the external stationary load.

Voltage vs. angle
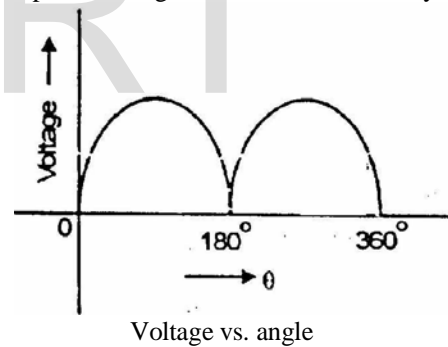
The variation of voltage across the brushes with the angular displacement of the loop will be as shown. This is not a steady direct voltage but has a pulsating character. It is because the voltage appearing across the brushes varies from zero to maximum value and back to zero twice for each revolution of the loop. A pulsating direct voltage such as is produced by a single loop is not suitable for many commercial uses. What we require is the steady direct voltage. This can be achieved by using a large number of coils connected in series. The resulting arrangement is known as armature winding.

Construction of DC Generator

The DC generators and DC motors have the same general construction. In fact, when the machine is being assembled, the

workmen usually do not know whether it is a DC generator or motor. Any DC generator can be run as a DC motor and vice-versa. All DC machines have five principal components viz.

- Field
- System
- Armature
- Core armature
- Winding
- Commutator
- brushes

Types of D.C Generators

The magnetic field in a D.C. generator is normally produced by electromagnets rather than permanent magnets. Generators are generally classified according to their methods of field excitation. On this basis, D.C. generators are divided into the following two classes:

(i) Separately excited D.C. generators
(ii) Self-excited D.C. generators

The behaviour of a D.C. generator on load depends upon the method of field excitation adopted.

BASIC PRINCIPLES OF MACHINE OPERATION

Basic principles were presented showing how a current flowing in a conductor produces a magnetic field. In this section three important laws of electromagnetism will be presented. These laws, together with the law of energy conservation, constitute the basic theoretical bricks on which the operation of any electrical machine can be explained.

Faraday's Law of Electromagnetic Induction

This basic law, due to the genius of the great English chemist and physicist Michael Faraday (1791–1867), presents itself in two different forms:

1. A moving conductor cutting the lines of force (flux) of a constant magnetic field has a voltage induced in it.

2. A changing magnetic flux inside a loop made from a conductor material will induce a voltage in the loop. In both instances the rate of change is the critical determinant of the resulting differential of potential. Below figure illustrates both cases of electromagnetic induction, and also provides the basic relationship between the changing flux and the voltage induced in the loop, for the first case, and the relationship between the induced voltages in a wire moving across a constant field, for the second case. The simple rules that can be used to determine the direction of the induced voltage in the moving conductor.

Ampere-Biot-Savant's Law of Electromagnetic Induced Forces

This basic law is attributed to the French physicists Andre Marie Ampere (1775–1836), Jean Baptise Biot (1774–1862), and Victor Savart (1803–1862). In its simplest form this law can be seen as the "reverse" of Faraday's law. While Faraday predicts a voltage induced in a conductor moving across a magnetic field, the Ampere-Biot-Savart law establishes that a force is generated on a current carrying conductor located in a magnetic field. Below Figure presents the basic elements of the Ampere-Biot-Savart's law as applicable to electric machines. The figure also shows the existing numerical relationships, and a simple hand-rule to determine the direction of the resultant force.

Lenz's Law of Action and Reaction

Both Faraday's law and Ampere-Biot-Savart's law neatly come together in Lenz'slaw written in 1835 by the Estonian-born physicist Heinrich Lenz (1804–1865).Lenz's law states that electromagnetic-induced currents and forces will try to cancel the originating cause.

Losses in a D.C. Machine

The losses in a DC machine (generator or motor) may be divided into three classes viz

(i)   copper losses
(ii)   iron or core losses and
(iii)   Mechanical losses.

3.1.5   Wheel drive

A drive wheel is a road wheel in an automotive vehicle that receives torque from the power train, and provides the final driving force for a vehicle.[1] In motor vehicles, "getting power to the ground" is most important because "traction caused by friction between the driven tires and road surface is what makes a car move.

The wheel is the most common moving element among other possibilities including legs, flying, swimming and rolling. A wheel provides speed, accuracy and stability for a robot, three characteristics very important in designing and building robots. Finding inspiration in everything, the researchers design many types of wheels including standard, orientable, ball and Omni-directional wheels.

Depending on the design and requirements, standard wheels are used especially for classical methods of driving and steering while orientable and ball wheels are included in the same category and user for balancing a robot. Omni-directional wheels are very good for driving and steering and are used when the robot should have the ability to move in all the directions.

For our model we are using a 4 wheel set up. The reason of choosing 4 wheel set up is to distribute whole load on the base and the bending of base plate from the centre due to painting unit load. However, only two wheels will be rotated with help of DC motors.

In our Project, We have used two different pairs of wheels at the front and rear. The wheels at front are free moving and are smaller in diameter. The wheels at the back are larger in diameter and are connected parallel to the gear drive which is in turn connected to the chain which will drive the wheel.

3.1.6   Chain and Gear assembly

A gear assembly is a machine component that is used to transmit power from one adjacent machine component to

another like windmills, axles, pumps, millstones and other gear assemblies. This allows the transfer of vertical motion (z-axis) to horizontal (x and y-axis) and vice versa, that is, a change in direction of 90°.Gear assemblies requires 5 units of power each. Gear assemblies do not block unit movement and can be crossed by dwarves without being spooled around them. But digging a channel to transfer the power (such as for an axle or a pump) below a gear assembly can result in a hole that cannot be crossed.

After the gear assembly has been constructed, it will automatically draw power from an adjacent power source. Further components can then be connected to the other available sides (East, West, North, South, Above, Below) of the gear assembly, and will automatically draw power from the power source via the assembly. Note that gear assemblies do not transfer power diagonally; they only work orthogonally (N-S, E-W, up-down).

Spur gears or straight-cut gears are the simplest type of gear. They consist of a cylinder or disk with the teeth projecting radially, and although they are not straight-sided in form (they are usually of special form to achieve constant drive ratio, mainly involute), the edge of each tooth is straight and aligned parallel to the axis of rotation. These gears can be meshed together correctly only if they are fitted to parallel shafts.

A chain is a roller chain that transfers power from the pedals to the drive-wheel of a bicycle, thus propelling it. Most bicycle chains are made from plain carbon or alloy steel, but some are nickel to prevent rust, or simply for aesthetics.

In order to reduce weight, chains have been manufactured with hollow pins and with cut-outs in the links.[10] Chains have also been made of stainless steel for corrosion resistance and titanium for weight reduction, but they are expensive. A bicycle chain can be very energy efficient: one study reported efficiencies as high as 98.6%.The study, performed in a clean laboratory environment, found that efficiency was not greatly affected by the state of lubrication. A larger sprocket will give a more efficient drive, reducing the movement angle of the links. Higher chain tension was found to be more efficient.

Solar Panel

Photovoltaic is a term in solar technology that describes a solar cell's ability to convert light from the sun directly into electric power. When photons in the sun light collide with the silicon solar cell, one of three things can happen:

• The photon can be reflected at the surface of the silicon.
• The photon can be absorbed by the silicon.
• The photon can pass right through the silicon.

As the photons hits the atoms in the silicon, the energy is absorbed by the electrons and excited into a higher state of energy. When these free electrons flow through the material, electricity arises.

Every metal has its own band gap that describes how strong the electrons are bonded to the atoms. For semiconductors, such as silicon, the band gap refers to the energy difference between the valence band and the conduction band. When a negative electron is excited, it leaves behind a void which is called a positive hole. The presence of a missing covalent bond allows the bonded electrons of neighbouring atoms to jump into the hole, leaving another hole behind. Because of this, holes also move through the lattice. When photons are absorbed in the semiconductor, it can be said they create mobile electron-hole pairs.

The holes move to the negative layer of the cell, and the negative excited electrons move to the positive layer. This will be described by the p-n junction technique later. When placing a circuit between the two layers, a path of continuous flow of electrons is established.

Due to the concept conservation of energy, the excited electrons cannot have greater nor less energy than that of the incident rays from the sun. Photons with less energy than the energy gap will go straight through the semiconductor and no electrons will be excited. Photons with greater energy than the energy gap will be absorbed, but the difference in energy between the photons and the energy gap is converted into heat by lattice vibration.

3.1.8 Power Supply

Batteries are accumulators of electrical energy. Battery stores electrical energy in chemical form. Battery specification consists of their voltage and ampere-hour (AH) capacity. Thus 12v – 100AH battery means one can draw 10 Amperes for about 10 hours. This relationship is actually non-liner. In other words you cannot draw 100 amperes from 100 AH battery for one hour. Typically battery manufacturers give discharge curves as per their design specification for each rating. A 12V battery typically consists of 6 cells of 2 volts each connected in series and mounted in hard rubber or PP container. Charging methods for these batteries are also specified by manufacturers and one has to follow them strictly to get maximum life out of these batteries.
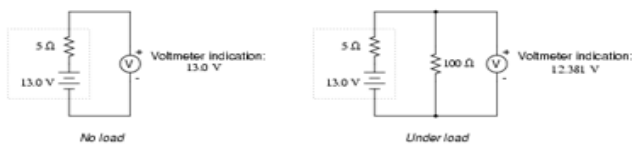
Fully charged battery:
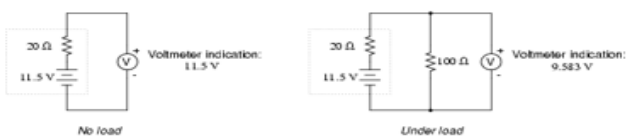
Scenario for a fully charged battery
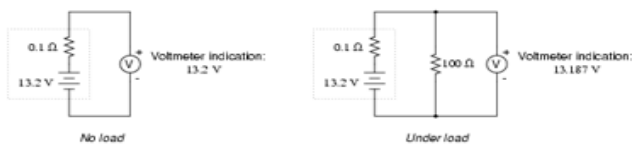
Now, if the battery discharges a bit . . .

Scenario for a slightly discharged battery
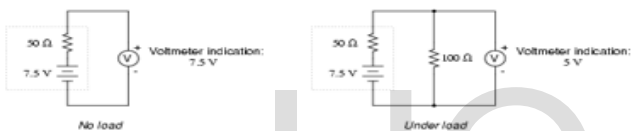

And discharges a bit further . . .

Scenario for a moderately discharged battery

And a bit further until it's dead . . .

Scenario for a dead battery

Notice how much better the battery's true condition is revealed when its voltage is checked under load as opposed to without a load. Does this mean that it's pointless to check a battery with just a voltmeter (no load)? Well, no. If a simple voltmeter check reveals only 7.5 volts for a 13.2 volt battery, then you know without a doubt that it's dead. However, if the voltmeter were to indicate 12.5 volts, it may be near full charge or somewhat depleted -- you couldn't tell without a load check. Bear in mind also that the resistance used to place a battery under load must be rated for the amount of power expected to be dissipated. For checking large batteries such as an automobile (12 volt nominal) lead-acid battery, this may mean a resistor with a power rating of several hundred watts.

3.1.5 Controller Unit

Relay PCB: A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

Controller PCB: A PCB from another source can be used in replacing the electronics in a standard device, or giving communications to a custom controller.

The simple goal in wiring is to have the grounds and signals of each device linked to the ground and desired corresponding signals on the PCB. Each device has switches; when the switch is engaged, a circuit between the ground and signal should complete and send the signal from the PCB through a cord or remote to the computer or console. Wires and connectors, solder, and/or twisting are used to link the devices to the PCB.

For quality PCB wiring, the main goals are having required signals covered by the PCB, corresponding ground and signal connections and circuits, solid and secure connections, connections that will not cross or interfere, insulation, and some level of organization. While this wiring concept is simple, implementing it can be more difficult as you can see by the size of this section. Circuits are at the heart of electronics. In order to compact, organize, and exploit many circuits, they are often printed on a board, making a printed circuit board, i.e. a PCB. Numerous and detailed conductive paths lay out the circuits and functions for a device.

The bulk of most PCBs are made of a light, highly durable, nonconductive substance with a texture similar to fibreglass. On this another nonconductive layer (usually dark-green) that bonds well to metal is added. On this is added the conductive metal (usually copper) that makes up all the paths in the PCB. On the metal that does not need to be exposed, a nonconductive protective layer (usually light-green and called a solder mask) is used.

3.1.8 Painting

Mild steel, for its strength to weight ratio and cheapness, is one of the most widely used construction materials. However, it readily rusts and must be painted to prevent this corrosion and to give it a decorative appearance. Rust is a mixture of oxides of iron formed by the action of air and water. It is voluminous and occupies about one and three quarters times the volume of the steel from which it originated. It may cost a little more for a well prepared surface, but as the paint coating will last many times longer, the overall cost saving in maintenance will justify the initial expense.

Following are the advantages of painting mild steel:
• The main advantage of painting is that the protection is relatively convenient to apply and the paint can be tailored to suit the duty.
• Paints can be engineered for convenience of decontamination and provide a degree of surface protection

against the environment in addition to the required corrosion protection.

•   Paint is also used to enhance the physical appearance of the structure and equipment identification.

•   Paint will be prevent from the corrosion of the metal

IV. DESIGNING AND CALCULATION

4.1 Solar Panel

4.1.1 Angle of solar panel placed

This solar angle tells you the optimum angle to get the best out of your system. To get the best out of your photovoltaic panels, you need to angle them towards the sun. The optimum angle varies throughout the year, depending on the seasons and your location.

4.1.2 Solar panel Connections

To increase their output, many individual PV cells can be connected together in a sealed, weather proof package called a module. When two modules are wired together in series, their voltage is doubled while the current stays constant. When two modules are wired in parallel, their current is doubled while the voltage stays constant. To achieve the desired voltage and current, modules are wired in series and parallel into what is called a PV array.
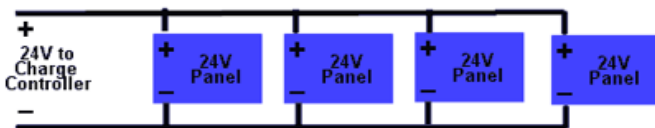

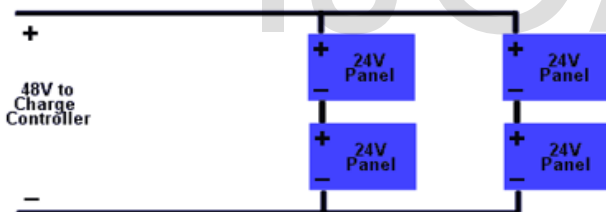Fig.4.1 Solar panel connected in parallel

Fig.4.2 Solar panel connected in series

5.1.3 Calculation of Time required charging battery using solar panel alone

Maximum power current obtained from a 10 Watt Solar panel = 1.0 Amperes

Average power current obtained during a 12 hour daylight period = 0.8 Amperes

Considering a 90% discharged battery,

Charging time of battery $= \dfrac{\text{Battery capacity in Amperes-hour}}{\text{Charging current}} = \dfrac{42}{1.0}$

Charging time of battery $= 42$ hours

But due to internal resistance and transmission resistance, about 20% losses are incurred during charging.

Charging time of battery $=$

$\dfrac{\text{Battery capacity in Amperes-hour}}{\text{Charging current}}$ x 1.2

Charging time of battery = 42 x 1.2 = <u>50 hours</u>

4.2. Battery

4.2.1 Selection of the battery

Selecting the right type of battery can have a significant impact on the performance, durability and total cost of a system. The battery bank in an off-grid PV system often represents a considerable percentage of the overall equipment cost, so careful attention to proper selection and maintenance of batteries is important in order to maximize the return on your investment. Among various rechargeable batteries, lead acid battery was chosen because of the following advantages over its counterparts:

•   Capable of high discharge rates.
•   Low maintenance requirements.
•   Self-discharge rate of lead acid battery is the lowest among rechargeable battery systems.
•   Simple and inexpensive to manufacture.
•   They are durable and dependable when used correctly.

4.2.2 Calculation of Ampere-hour capacity of the battery

Rated efficiency = 100%

Load factor = 0.7

Actual efficiency = Rated Efficiency x Load factor = 100 x 0.7

Therefore, Actual efficiency = 70% or 0.7

Power rating of the motors = 85 Watts (3 motors)

Power required to run the apparatus $= \dfrac{\text{Power rating of the compressor}}{\text{Efficiency of the inverter}} = \dfrac{85}{0.7} = 121.42$ Watts

Maximum battery voltage capacity = 12 volts

Therefore, average current delivered by the battery $= \dfrac{\text{Power drawn from the inverter}}{\text{Maximum battery voltage capacity}} = \dfrac{121.42}{12} = 10.7118$ Amperes

Capacity in Ampere-hours required considering a 4 hour $= 10.118$ x 4 $\underline{= 40.472 \text{ Ah}}$

Thus, a 42 Ampere hour battery would be sufficient to supply the required current capacity for the compressor.

4.4 Generator

•   The newly designed generator consists of 6 pieces of magnets inside it.
•   These magnets are of semi-hemispherical shape and are place in three pairs one opposite to another.
•   The magnets are of one inch width and each pair of magnets are placed about 1.17 inch apart.
•   Main shaft in the middle is surrounded through three smaller cores of lesser diameter on which copper turning are winded.
•   Each core is winded with around 900-1200 windings of copper coil.
•   These three cores are placed such that they cover the main shaft completely.

- This main shaft is further coupled to the smaller shaft which is seen outside.
- Each magnet has two poles and when the main shaft rotates each magnet produces magnetic flux of 40 Webbers and through this the output of higher efficiency can be achieved.

V. RESULTS AND ANALYSIS

After designing and fabricating the Self Proclaiming Generator for automobile, several tests were conducted and the graphs of the respective tests are plotted.

The important parameters that affect the outcome of the model are:

Speed of the DC motor   : 3000 rpm
Sunlight   : Solar Panel
Speed of Gear DC Motor: 50 rpm

The tests conducted are:

1) Running of two DC gear motor of 12 volts, 4 amps without connecting the Generator and Solar Panel source. Input to the motors was provided through the battery and checking for battery drainage.

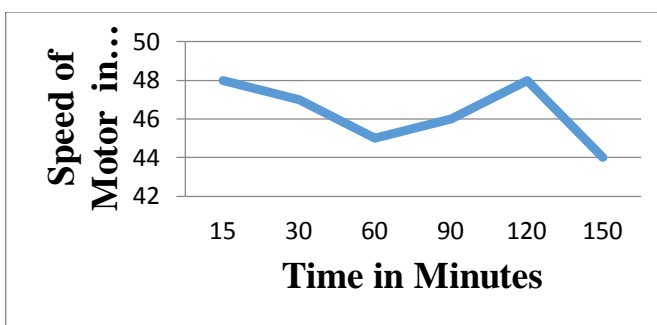| Time in Minutes	Voltage of Battery	Speed in RPM
0	12.88	-
15	12.88	48
30	12.87	47
60	12.86	45
90	12.85	46
120	12.83	48
150	12.81	44
180	12.80	46
210	12.78	48
240	12.78	48

Table. Voltage of Battery V/S Speed without generator

Fig. Speed of Motor V/S Time without generator

RESULT: The apparatus was put into test for four continuous hours under testing conditions and we found the reduction in the voltage of battery which represents the draining of the battery.

Initial Voltage Reading   : 12.88 Volts
Final Voltage Reading   : 12.78 Volts
Voltage Reading when Battery is fully drained
******

2) Running of two DC gear motor of 12 volts, 4 amps with the Generator and Solar Panel. Input to the motors and Generator setup was provided through the battery and the output from the solar panel and the Generator was fed back to the battery Source.

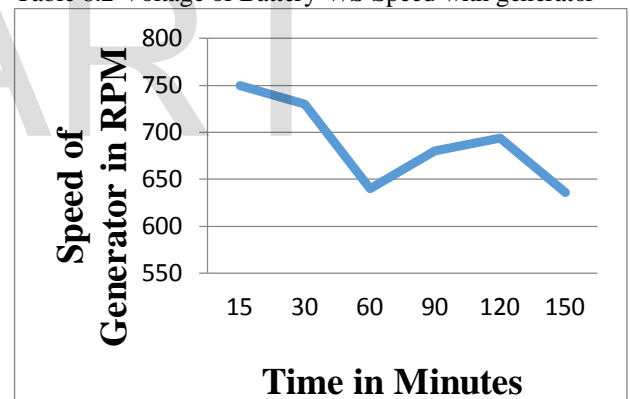| Time in Minutes	Voltage of Battery	Speed in RPM
0	12.65	-
15	12.65	752
30	12.65	730
60	12.64	640
90	12.64	680
120	12.63	584
150	12.61	630
180	12.60	696
210	12.59	642
240	12.58	668

Table 8.2 Voltage of Battery V/S Speed with generator

Fig. 8.2 Speed of Generator V/S Time with generator

RESULT: The apparatus was put into test for four continuous hours under testing conditions and we found the reduction in the voltage of battery which represents the draining of the battery. The Battery Draining speed was found to be little slower when DC generator and Solar Panel was connected.

Initial Voltage Reading   : 12.64 Volts
Final Voltage Reading   : 12.58 Volts
Voltage Reading when Battery fully drained:10.5 Volts

3) Running of two DC Generator and Solar Panel. Input to the was provided through the battery and the output from the solar panel and the Generator was feedback to the battery Source.
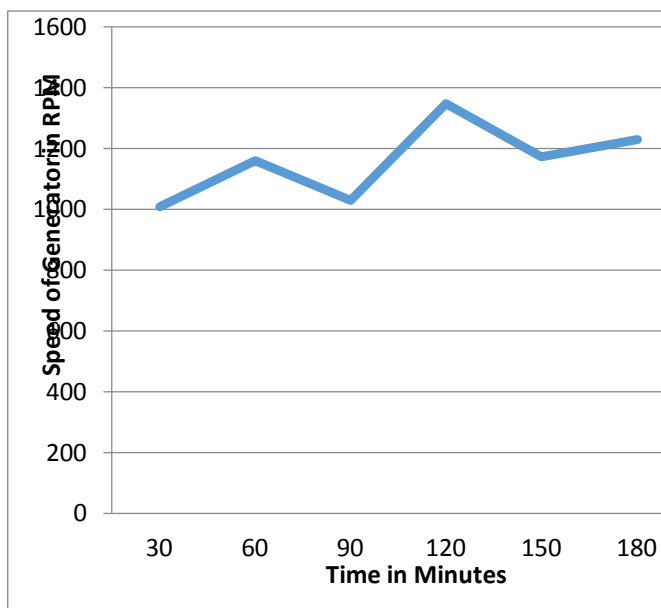
Table 8.3 Tabular of Results

Fig. 8.3 Speed of Generator V/S Time

RESULT: The apparatus was put into test for four continuous hours under testing conditions and we found the reduction in the voltage of battery which represents the draining of the battery. The Battery Draining speed was found to be much slower than the above two tests and results were very good.

4) The Results of Test 1 and Test 2 are plotted together to know the difference in the battery draining.

RESULT: From the Graph plotted of the two tests conducted. The battery drained very fast without Generator setup. With the Generator setup in the 2 test it proves the efficiency of the Battery is improved by restoring of energy produced by the Generator and the Solar Panel. Thus, it shows us the generator setup has made an impact

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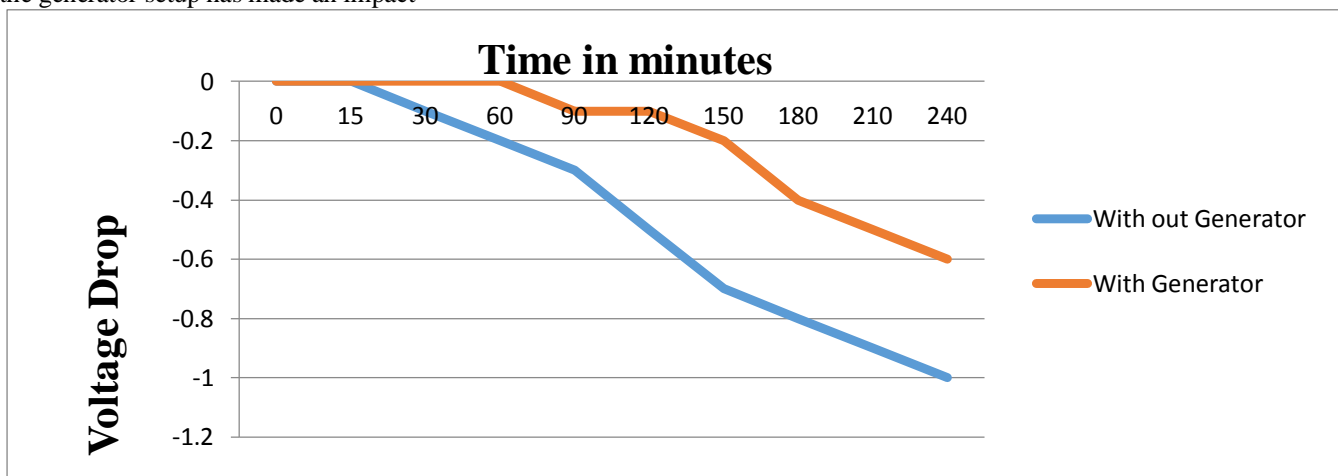
From Test 1,
Total voltage drop= Initial-final

Time in minutes	Voltage of DC Generator in Volts	Current of DC Generator in Amps	Speed in RPM	Voltage of Battery
0	16	0.6	1100	12.43
15	17	0.5	1068	12.43
30	21	0.6	1021	12.43
60	20	0.5	1098	12.42
90	18	0.5	1069	12.42
120	23	0.5	968	12.42
150	19	0.6	1101	12.41
180	26	0.6	1108	12.41
210	24	0.7	1002	12.40
240	26	0.6	1098	12.40

=12.88-12.78= 0.10 Volts

Considering dead battery voltage= 10.5 Volts

Battery Voltage= 12.88-10.5= 2.38 Volts

Battery % Consumption during test= $\frac{\text{Total Voltage drop}}{\text{Battery Voltage}}$

$$= \frac{0.10}{2.38} \times 100 = \underline{4.20 \%}$$

From Test 2,
Total voltage drop= Initial-final

=12.65-12.58= 0.07 Volts

Considering dead battery voltage= 10.5 Volts

Battery Voltage= 12.65-10.5= 2.15 Volts

Battery % Consumption during test= $\frac{\text{Total Voltage drop}}{\text{Battery Voltage}}$

$$= \frac{0.07}{2.15} \times 100 = \underline{3.25\%}$$

Therefore, Efficiency increased during 2nd test =Battery % Consumption of $\left(\frac{\text{Test 1} - \text{Test 2}}{\text{Test 2}}\right) = \left(\frac{4.2 - 3.25}{3.25}\right) \times 100 = \underline{29.23\%}$

RESULT- From the above calculations we know that the battery during the 2nd test i.e. motors with the generator and solar panel was 29.23% more efficient than the 1st test i.e. motors without generator and solar panel. Also, 29.23% energy was restored to the battery with the help of Self Proclaiming

Generator Setup.

VII. CONCLUSION

The Project aims at preparing a conceptual design of a Self-Proclaiming Generator for automobiles which is feasible as well as economical. The main component of Self Proclaiming concept is Generator device which increases the efficiency of the vehicle. Modelling of the device was done using CAD and CATIA software. Load was applied on the vehicle and was checked practically and worked as per our aims and objectives.

• Self-Proclaiming Generator automobile provide multiple advantages over other vehicles: First and most important, Self Proclaiming concept increases the efficiency of the battery. By increasing the efficiency of the battery the automobile is capable of running for longer period than normal electrical vehicles.

• By using electrical current and solar power to run the vehicle, the automobile does not emit any hazardous smoke so it's eco-friendly, its helps in building greener environment and reduces the global warming which is the main threat for the next generation.

• The generator setup is designed in such a way that it is capable of running and generating the electricity even when the automobile is in resting position. By this way additional current is produced.

• The main problem faced in the electric vehicles is frequent draining of battery which is overcome through this concept.

• The whole concept of Self proclaiming generator is very economical and could be properly designed and attached to all the electrical cars and bikes in order to gain all the above advantages.

VIII. FUTURE SCOPE

In our Automobile, we have front wheels to keep the setup moving and change its position but the perfect movement of the device on a designated or desired path is not assured because the front wheels are nowhere controlled and are let free. Hence, to counter this issue either staring as in other automobiles or motor can be fixed to them for perfect movement of the device on a desired path, also assuring steady and uniform movement.

• As said earlier, we have intended to a build an automobile which can move around for less distance and is capable of proving our concept. With no brakes in them and with low RPM it cannot be travelled to long distance. In future, motors with high RPM can be tried along with the marginal brakes and seating facility can be improved.

• Our automobile is without any locking system, for better safety measures locking system can be implemented.

• To make the system much more efficient, solar panels of higher current producing capacity can be boarded on the automobile.

• With continuous attempts in designing the generator we achieved something which was not practical. In future, innovative ideas and through developing existing design higher outputs can be achieved.

• The concept of self-proclaiming generator can be implemented on all the electrical cars and bikes to increase the efficiency of the battery in coming days.

• Not only automobiles, self-proclaiming generator can be implemented in all the fields where batteries play a role like in solar refrigerator, battery driven lights, battery driven machines Etc.

• This concept of generator can be used in aerospace where the satellites can be driven continuously for required amount of time which will further lead us to many innovations.

• By studying more on the components used in generator, the price of the generator can be reduced so that it can be used everywhere.

• Our concept has only one generator setup and hence produces less energy. To increase the efficiency for more, multiple generators can be used.In the current world especially INDIA has an acute shortage of power & fuel. Power and fuel as you all know is the heart of any industry. Constant researches have been carried out to find new ways of generating energy. Self-proclaiming generators are one among those where energy source during the action is recovered and used for running the machine for the long time. The generator consists of a low weight shaft which is insulated by a magnet which can produce sufficient magnetic flux. Without disturbing the torque .Which is run through a coil with decent number of windings. Solar energy is been used as the secondary source of energy in the system.

With the new concepts like Self proclaiming generators maximum efficiency producing automobiles can be produced which results in greater save of energy. Since, there is no fuel consumption in this method pollution through automobiles can be reduced to very large extent. Through this process the huge demand of fossils throughout the world can be met. By the method of self-proclaiming lesser energy is required to drive the setup which turns out to be a very economical process.

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