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Ceiling Fan with Permanent Magnet Generator

1. Pradeep Deepak Nandani, 2. Rohit Nandkumar Sapkal, 3. Vaibhav Amol Savale, 4. Shubham Satish Kadam, 5 Mahesh M Kambale

Students

Department of electrical Engineering
Sanjay Bhokare Group of Institute Miraj, India

Abstract

The aim of this project is to recycle the energy wasted by us which is used by ceiling fan. Here we are using fans for only cooling effect but within that energy consumption we can achieve too much even what we never think of. The scope of this project is not to waste this precious energy and just reuse it.

Now a days different technologies are being demonstrated to use alternate sources instead of conventional energy sources. This project leads a step forward towards the conservation of energy i.e. The mechanical energy of the rotating ceiling fan is used to generate energy. This has been designed as a generator set on the ceiling fan. For this certain experiment generator played a major role in it which provide us further energy supply through the rotational movement of fan. Generator convert the mechanical energy into electrical energy by using the electromagnetic induction principle. i.e. the magnets (neodymium) are placed with alternate poles on the stator. By using the principle of Faraday's law of electromagnetic induction the emf is being induced in the coil which further depends on the magnetic field strength and the relative motion between the magnetic field and the coil. Design process is simple, effective, reliable, economical and efficient. The main benefit is that generation of energy is possible without affecting the normal operation and parameters of the ceiling fan. Generated voltage can be stored in a battery, led bulbs can be glow as required or it can be stepped up using step up transformer and it can be further used for various applications.

Introduction

Electricity is a peculiar characteristic that cannot be stored in large amounts. As the demands are high the electric utilities have realized that consumer demands cannot be met satisfactorily. Due to increasing fuel prices and energy cost, it has made us think alternate methods which will be a contribution to existing utilities. The increasing humidity level due to global warming. It has become difficult to get Natural cool air from the environment, so it has become necessity of fan at domestic and commercial places. So thought why can't use that rotations of the fan for the generation and "conserve" the energy. What is conservation? It is defined as "Reduction in amount of energy consumed in a process or system or by an organization or society through economy, elimination of waste, and rational use". Energy conservation is a process of saving of energy without affecting to the actual work with or without investment.

In this model we are using the ceiling fan (prime mover) to generate electricity. "When this idea was given everybody starts thinking that just an alternator is connected to the fan which is worthless", because with above method no new energy can be created. Just the input which is given to fan will be transformed two times and will be getting as output. The output should be such that normal operation of the ceiling fan should not be disturbed but also extra energy should be extracted from it without any losses. Simply saying the main and original purpose of fan is to "give cool air", so without disturbing it we should get extra energy which can be stored in to the battery and can be used for further purpose.

In our project we are making a combine device which is a simple ceiling fan with internal generator unit. The conventional fans on utilize the energy from supply but we are designing a fan with can generate energy and which can be feed to other application. This project saves our energy with feeding other load through it.

LITERATURE REVIEW

MD Saquib Gadkari, et.al (2014) has shown the method of generating energy by a ceiling fan. The generated energy can be either used or can be stored in a battery for energy some other devices. The rotational energy of the dynamo can be used to operate several small energized devices. Both dynamo and alternator can be used. The various applications where this energy can be used are charging of laptops, cell phones etc.

Vainy Pattanashetti, et.al (2015) has proved that designed as a generator set on the ceiling fan i.e. the magnets (neodymium) are placed with alternate poles on the stator. By using the principle of Faraday's law of electromagnetic induction the emf is being induced in the coil which further depends on the magnetic field strength and the relative motion between the magnetic field and the coil. The main benefit is that generation of energy is possible without affecting the normal operation and parameters of the ceiling fan. Generated voltage can be stored in a battery, LED Bulbs can be glow as required or it can be stepped up using step up transformer and it can be further used for various applications. It regenerates nearly 40% of the total energy consumed by fan.

Akash Narayan Deshmukh (2016) they used energy generative assembly which is fitted on the rod of fan for the production of electricity. The electricity generative fan works on the faraday's law of electromagnetic induction. When fan is in working period, by using fan rotation energy rotates the magnets which placed around the copper winding in the energy generative assembly. With the help of energy generative assembly they produced electricity from the fan in its working period. By using this assembly they produce electricity more effectively and efficiently.

Wakchaure Mahesh et.al (2016) has concluded that spinning energy of the dynamo, can be used to operate several small energy devices like a air conditioning compressor Both dynamo and alternator can be used. The various applications where this energy can be used are charging of laptops, magnetic braking system, cell phones, semi-electric cars etc. this system used in car to increase the efficiency of engine more than today cars.

Neelesh Kumar (2017) has stated that Ceiling fan convert electrical energy into mechanical energy. In order to achieve the motive we have to convert this mechanical energy into electrical energy. This can be achieved with the help of Faraday Law of Electromagnetic Induction. According to Michael Faraday "whenever there is a relative motion between the coil and a magnet then an e.m.f is induced in the coil". He also stated that "the magnitude of emf induced in the coil is equal to the rate of change of flux that linkages with the coil. The flux linkage of the coil is the product of number of turns in the coil and flux associated with the coil".

Objects

Fan is used for cooling purpose. Fan is made to need of humans, in every house of India we see the fan. In all season we need fan. We know the function of fan which use die-electricity and give air for the cooling purpose. For this fan used electrical energy. But at the time of electricity cut off we are not able to use fan and in Indian percentage of load shedding is high. So, there is no solution to use fan in load shedding period without buying the generator or inverter. The main object of the Energy Fan is to give a way to use fan at the time of load shedding. For that I transform the fan into the generator. The main aim of this fan is produced electricity at the time of working period and stored into battery. This stored energy is used in the load shedding period.

Block Diagram:

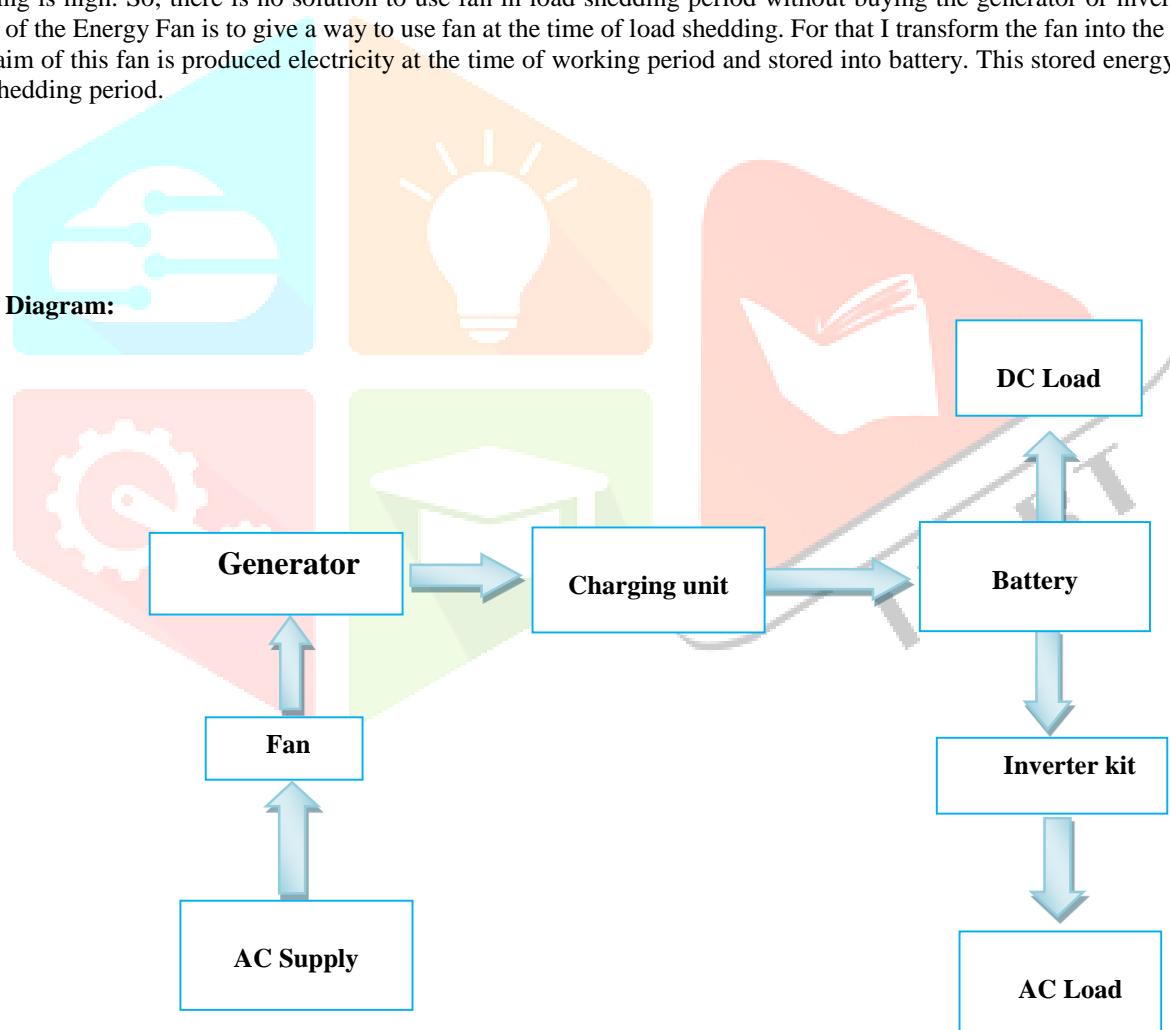


Figure: Block diagram

Component Details

Fan: As we know that we are doing a designing and implementation of generating fan. So in case we are taking the regular fan which has a regular stator and rotor winding. This regular stator and rotor will be used as prime mover and we will design permanent magnet alternator which will be installed in fan as secondary stator and rotor.



Fig: Ceiling Fan

Neo- Dynamic Magnet:

Above figure shows the ma-dynamic magnets. We are using N52 series magnets as it has high magnetic field and it has high temperature withstand capacity which is about 200°C. By using these magnets we are creating 4 poles so that we can get more magnetic flux from rotor to stator to achieve high generation. A neodymium magnet (also known as NdFeB, NIB or Neo magnet) is the most widely used type of rare-earth magnet.

It is a permanent magnet made from an alloy of neodymium, iron, and boron to form the Nd₂Fe₁₄B tetragonal crystalline structure. Developed independently in 1982 by General Motors and Sumitomo Special Metals, neodymium magnets are the strongest type of permanent magnet available commercially. Developed independently in 1982 by General Motors and Sumitomo Special Metals, neodymium magnets are the strongest type of permanent magnet available commercially. Due to different manufacturing processes, they are also divided into two subcategories, namely sintered NdFeB magnets and bonded NdFeB magnets. They have replaced other types of magnets in many applications in modern products that require strong permanent magnets, such as motors in cordless tools, hard disk drives and magnetic fasteners.



Fig: Neo- Dynamic Magnet

Copper Coils:

Nearly all electricity today is produced by spinning coils of wire next to strong magnets. Much effort is put into making efficient generators, but the electricity itself is a result of the mechanical work done in spinning the generator.



Fig. copper coils

Battery:

Lead-acid batteries are based on electrochemical reactions of lead and lead dioxide in sulfuric acid medium. The energy is formed as a result from lead oxidation by sulfuric acid to sulfate. A generate electricity through ceiling fan to the store battery in DC voltage & pass through the Inverter. A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars.

Inverter kit: The working of an inverter is, it converts DC to AC, and these devices never generate any kind of power because the power is generated by the DC source. In some situation like when the DC voltage is low then we cannot use the low DC voltage in a home appliance. A battery comes DC voltage is convert AC & fed to the LED kit OR lamp. A power inverter, is a power electronic device or circuitry that changes direct current (DC) to alternating current (AC).

Advantages

1. We produced electricity from fan.
2. Simple in construction.
3. The cost of manufacturing is cheap.
4. Not much affect the speed of fan, because copper winding is less magnetized.
5. Do not affect the main work of fan, means give air for cooling.

Disadvantages

1. Unable to produce electricity when fan is in stationary condition means not in working condition.

Applications

1. It's used in ceiling fan, table fan, coolers.
2. Motors, blower, exhaust.
3. In robotics & industrial area.

Results

Firstly, we will give the electricity supply to our regular ceiling fan then fan is rotated due to this rotation of fan permanent magnet secondary rotor is rotated with constant secondary stator, due to Faraday's law of electromagnetic induction the flux is produced and this flux links with secondary stator of ceiling fan. So due to this electricity will generate in the ceiling fan. Thus, this generated energy can be utilized as a generated supply and we can feed another load connected to our alternator as well as we can store this generated energy in battery source and can be utilized as per requirement.

Conclusion

In this project we have designed a process of project which shows that our project is economical with smooth operation, quick response and user friendly. The concept of project is designed in Cad Software. This report shows the all operating conditions of project is good.

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