Design of an Inverter Using Ceiling Fan

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Abstract – A fan is a machine used to create flow within a fluid, typically a gas such as air. The fan consists of a rotating arrangement of vanes or blades which act on the fluid. The rotating assembly of blades and hub is known as an impeller, a rotor or a runner. Usually, it is contained within some form of housing or case. Fans are the most used items in India despite the widespread availability of Coolers and air conditioners. Since the initial capital cost of solar systems is still quite high. When it comes to generate power for a domestic use and energy saving. Since energy generating is a major issue for mankind .This paper presents method of generating power by a ceiling fan. The generated power can be either used or can be stored in a battery for powering some other devices.

Index Terms – Dynamo, Magnetism, Alternative.

1. INTRODUCTION

We know that energy can neither be created nor be destroyed but it can be transformed from one form to another. But we are wasting resources that can produce energy as if they are limitless. If we can renew and Reuse the energy we waste, it would help in some way to the problem of scarcity of energy, which is the major threat of present world.

The project aims at developing a system which makes use of wind energy for rural electrification using ceiling fan set up. Wind energy is treated as nonrenewable source of energy. Wind energy has been used since the earliest civilization to grind grain, pump water from deep wells, and power sailboats. Wind mills in preindustrial Europe were used for many things, including irrigation or drainage pumping, grain-grinding, sawmilling of timber, and the processing of other commodities such as spices, cocoa, paints, dyes and tobacco. Before the U.S. installed an infrastructure of electricity wires, both water pumping windmills and small wind electric turbines wind chargers were vital to farming and developing the American Great Plains and west. In recent decades, the industry has been perfecting the wind turbine to convert the power of the wind into electricity. The wind turbine has many advantages that make it an attractive energy source, especially in parts of the world where the transmission infrastructure is not fully developed. It is modular and can be installed relatively quickly, so it is easy to match electricity supply and demand. The fuel and the wind are free and plentiful, which eliminates or reduces the need to purchase, ship, and store expensive fuels. It is flexible with the power generated, households use can use appliances, such as lighting and refrigeration, schools can use computers and televisions and industries can access a reliable power source. Perhaps most importantly, the generator does not produce any harmful emissions in the process of generating the electricity, unlike many other generation sources.

The project makes use of a turbine design connected to the ceiling fan. The wind energy obtained while ceiling fan rotates is stored to a battery. The battery supply is fed to pulse generator and in turn to a MOSFET which is capable of generating ON/OFF pulses of different frequencies. This is fed to a step up transformer to generate a low voltage AC. This AC is fed to electrical appliance.

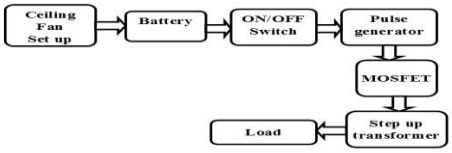

Fig.1.1.block diagram of an inverter using ceiling fan

1.1. Embedded Systems.

An embedded system is a computer system designed to perform one or a few dedicated functions often with real time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general purpose computer, such as a personal computer is designed to be flexible and to meet a wide range of end user needs. Embedded systems control many devices in common use today.

In general, embedded system is not a strictly definable term, as most systems have some element of extensibility or programmability. For example, handheld computers share some elements with embedded systems such as the operating systems and microprocessors which power them, but they allow different applications to be loaded and peripherals to be connected. Moreover, even systems which don't expose programmability as a primary feature generally need to support software updates. On a continuum from general purpose to embedded, large application systems will have subcomponents at most points even if the system as a whole is designed to perform one or a few dedicated functions, and is thus appropriate to call embedded.

Embedded systems programming is not like normal PC programming. In many ways, programming for an embedded system is like programming PC 15 years ago. The hardware for

the system is usually chosen to make the device as cheap as possible. Spending an extra dollar a unit in order to make things easier to program can cost millions. Hiring a programmer for an extra month is cheap in comparison. This means the programmer must make do with slow processors and low memory, while at the same time battling a need for efficiency not seen in most PC applications. Below is a list of issues specific to the embedded field.

1.3. Need For Embedded Systems.

The uses of embedded systems are virtually limitless, because every day new products are introduced to the market that utilizes embedded computers in novel ways. In recent years, hardware such as microprocessors, microcontrollers, and FPGA chips have become much cheaper. So when implementing a new form of control, it's wiser to just buy the generic chip and write your own custom software for it. Producing a custom made chip to handle a particular task or set of tasks costs far more time and money. Many embedded computers even come with extensive libraries, so that writing your own software becomes a very trivial task indeed. From an implementation viewpoint, there is a major difference between a computer and an embedded system. Embedded systems are often required to provide Real Time response. The main elements that make embedded systems unique are its reliability and ease in debugging.

1.4. Transformers

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors without changing its frequency. A varying current in the first or primary winding creates a varying magnetic flux in the transformer's core, and thus a varying magnetic field through the secondary winding. This varying magnetic field induces a varying electromotive force (EMF) or voltage in the secondary winding. This effect is called mutual induction.

1.4. Battery power supply

A battery is a type of linear power supply that offers benefits that traditional line operated power supplies lack mobility, portability and reliability. A battery consists of multiple electrochemical cells connected to provide the voltage desired.

2. LITERATURE SURVEY

MD Saquib Gadkari, et.al (2014) has shown the method of generating power by a ceiling fan. The generated power can be either used or can be stored in a battery for powering some other devices. The rotational energy of the dynamo can be used to operate several small powered devices. Both dynamo and alternator can be used. The various applications where this power 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 power 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 power 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 power generative assembly. With the help of power generative assembly they produced electricity from the fan in it' s 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 powered devices like a air conditioning compressor Both dynamo and alternator can be used. The various applications where this power 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".

3. METHODOLOGY

3.1. Working Principle

A motor converts electrical energy into mechanical energy of rotation. Some motors can be operated as generators to convert mechanical energy into electrical energy.

Wind turbine motor is used to generate electricity. Permanent magnet motor can be used as a generator for battery charging. The spinning shaft turns the electromagnets that are surrounded by heavy coils of copper wire inside generators. This creates a magnetic field, which causes the electrons in the copper wire

to move from atom to atom, creating electricity. The voltage produced by a generator depends upon the number of turns in its coils, the strength of the magnet and the rate at which the magnet turns. The more turns in the coils, the more voltage is produced.

AC dynamo which is used to generate current as shown in the Fig.3.1, it will be interconnected with a ceiling fan through a mechanism in which the rotating ceiling fan motor will rotate dynamo' s shaft. It will be connected in such a way that as the number of rotations of ceiling fan increases the rotation of the shaft of AC dynamo increases, by the mean time the voltage is also generated. The voltage generated will be given to the charging circuit which will be converted to dc .Then it will be given to the 1 volt battery and by using an inverter circuit and a step up transformer this 1 volt may be converted to around 250 volts and used for other external purpose.

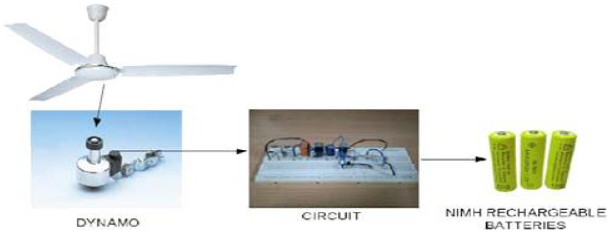

Fig.3.1. Generation of electricity using ceiling fan

3.2. Dynamo

Fig.3.2. Structure of a dynamo

A dynamo is an electrical generator that produces direct current with the use of a commutator. Dynamos were the first electrical generators capable of delivering power for industry and the foundation upon which many other later electric power conversion devices were based, including the electric motor, the alternating current alternator and the rotary converter. Today, the simpler alternator dominates large scale power generation, for efficiency, reliability and cost reasons. A dynamo has the disadvantages of a mechanical commutator. Also, converting alternating to direct current using power rectification devices is effective and usually economical.

4. MODIFICATION

It is contemplated that the appended claims will cover all modifications that fall within the true scope of the invention. What is claimed is:

1 .A ceiling fan motor with a generator winding comprising a stator and a rotor, wherein the stator is fixed on a motor axle and surrounded with a plurality of first magnetizing coils, each of which is winded with a second magnetizing coil With a generator winding; the rotor is pivotally mounted on the motor axle and has a plurality of magnetic objects around the stator; each of the first magnetizing coils is driven by an input voltage to generate an induced magnetic field for the rotor to rotate with respect to the stator; and the second magnetizing coil of the stator detects and receives a back electromotive force (EMF) produced as the rotor rotates and cuts through the magnetic lines and generates electrical power.

2. Winds around the corresponding concave section of the coil arm.

3. The ceiling fan motor with a generator winding of claim further comprising an energy-saving driver controlling circuit and a power distribution controlling circuit, wherein the energy-saving driver controlling circuit is electrically connected with the first magnetizing coils and receives the input voltage to control the electrical current phases of the first magnetizing coils, driving the rotor to rotate with respect to the stator and build up an inertia, the power distribution controlling circuit is electrically connected with the second magnetizing coils for converting the back EMF detected and received by the second magnetizing coils into electrical power for output.

4. The ceiling fan motor with a generator winding of claim 3, wherein the energy- saving driver controlling circuit detects the position of the rotor in rotation and thereby determines and controls the electrical current phase of each of the magnetizing coils.

5. The ceiling fan motor with a generator winding of claim 3, where in the electrical power output from the power distribution controlling circuit drives an illuminating unit.

6. The ceiling fan motor with a generator winding of claim 3 wherein the electrical power output from the power distribution controlling circuit charges a chargeable battery that is electrically connected with the energy saving driver controlling circuit.

7. The ceiling fan motor with a generator winding , wherein the electrical power output from the power distribution controlling circuit drives an illuminating unit and charges a chargeable battery, the chargeable battery being electrically connected with the energy-saving driver controlling circuit and the illuminating unit.

8. The ceiling fan motor with a generator winding of claim, wherein the energy-saving driver controlling circuit has an energy saving control means that uses the input voltage to inter-mediate start the energy-saving driver controlling circuit; the energy- saving driver controlling circuit controls the ON time of the first magnetizing coils when receiving the input voltage, driving the rotor to rotate with respect to the stator and maintain its inertia; and the rotor continues to rotate With respect to the stator due to inertia when the energy-saving driver controlling circuit does not receive the input voltage, and the rotor still cuts through magnetic lines and produces a back EMF so that the power distribution controlling circuit uses the back EMF detected and received by the second magnetizing coil to generate electrical power.

Fig.4.1. Set up of dynamo with fan motor

5. CONCLUSION & FUTURE WORK

The initial design of the product is adopted by rahul chowbatry which is design of an inverter using ceiling fan with our renovation and the main emphasis of this project is focused on generation of electricity and convenient redesigning which provides significant chances of adopting a new method for the generation of electricity. The design is developed by considering rotational area of the fan which is used for the movement of a dynamo with the rotation of fan. In future we can expect a step further in the development of energy using fan by changing the equipments or improving it by means of a dynamo or other similar equipment.

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