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Lighting The Lamp With Waste Rotational Energy-A Case Study On Ceiling Fan

Mr. R. Yogiswara Raju, Mr. S. Sivasankar Reddy, Mr. S. Akib Basha, Mr. B. Venkateswara Reddy, Mr. O. Chandra Subhaskar Reddy , Dr.K.Mallikarjuna
[1]*IV ME Student GPCET, Kurnool*
[2]*Professor,Department of ME , GPCET,Kurnool*

Abstract *-The mutual induction concept serves as the foundation for this method. To generate energy, we employed a power producing assembly that is mounted on the fan rod. The electromagnetic induction principle of Faraday's law governs how the electricity generating fan operates. The magnets that are positioned around the Cu winding in order to generating power with assembly rotate when the fan is operating. We generated electricity from fan while it was operating with the aid of the power producing assembly. We can generate electricity more effectively and efficiently by employing this assembly.*
Keywords: *back EMF, ceiling fan, permanent-magnet.*

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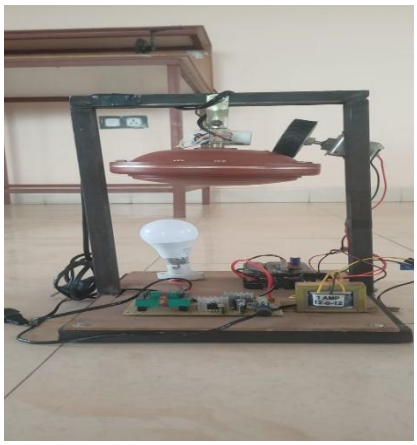
I. INTRODUCTION

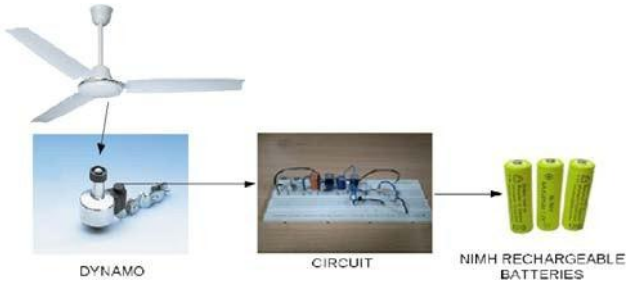
The world serves as a vast reservoir of abandoned energy in the nature. It is widely acknowledged that the energy can't be created or destroyed; rather, it can only be converted from one form to another. However, we are squandering resources capable of generating energy as if they were infinite. By renewing and reusing the energy we waste, we could contribute to alleviating the pressing issue of energy scarcity, which poses a significant threat in today's world. Utilizing wind turbines, we can harness wind-generated electricity for purposes such as power charging and integration with the power grid. Additionally, each components like fan is equipped with a mechanism, either within its motor or through a belt, that can illuminate a tube light or store energy in a battery for use in powering other devices. The energy consumption of each building or household is influenced by the using of various electrical appliances, including lighting systems, electronic devices, and cooling systems, which tend to consume substantial amounts of electricity. However, the rate of electricity consumption is contingent upon various things like, such as the occupants, management practices, environmental standards, building design and construction, mechanical and electrical equipment, and climate conditions.

Fans are primarily utilized for cooling purposes and are a common necessity in households across India. Throughout the year, the demand for fans remains constant. While fans operate on electricity to provide cooling, power outages hinder their use, and India experiences a significant percentage of load shedding. Consequently, without investing in a generator or inverter, there is no viable solution for operating fans during these outages. The primary objective of the Power Fan is to enable the use of fans during load shedding. To achieve this, the fan is transformed into a generator. The main goal of this innovation is to generate electricity while the fan is in operation, which can then be stored in a battery for use during power outages. The Power Fan operates based on the principles of a generator, adhering to Faraday's law of electromagnetic induction.8888Energy is a fundamental principle that cannot be created or destroyed; it can only be converted from one form to another. However, we are currently squandering resources capable of generating energy as if they were infinite. By renewing and reusing the energy we waste, we could alleviate the pressing issue of energy scarcity, which poses a significant threat in today's world. The implementation of wind turbines allows for the generation of electricity that can be utilized for battery charging and integrated into the power grid. Additionally, each fan is equipped with a mechanism, such as a tube light connected to the fan's motor or a belt, which can illuminate a bulb or store energy in a battery for use in powering other devices.



The energy consumption of each building or household is influenced by the use of electrical appliances, including lighting systems, electronic devices, and cooling systems, which tend to consume substantial amounts of electricity. The rate of electricity consumption is also contingent upon various factors, such as the occupants, management practices, environmental standards, building design and construction, mechanical and electrical equipment, and climate conditions.

Fans are commonly employed for cooling purposes and are a staple in nearly every household in India, as they are needed throughout the year. While fans serve the essential function of providing airflow for cooling, they rely on electrical power. During power outages, the inability to use fans becomes a significant issue, particularly in India, where load shedding is prevalent. Unfortunately, the only solutions available for operating fans during such outages involve purchasing generators or inverters.



The primary purpose of the Power Fan is to provide a means of utilizing a fan during periods of load shedding. To achieve this, the fan is converted into a generator. The principal objective of this device is to generate electricity while it operates, which is then stored in a battery. This stored energy is utilized during load shedding events. The Power Fan operates based on the principles of a generator, specifically adhering to Faraday's law of electromagnetic induction.

II. PRINICLE

The assembly was utilized as a generator, affixed to the fan's rod. Copper was selected due to its weak magnetic properties, rendering it unaffected by magnetic fields. The copper winding was positioned on the rod of the fan, which serves as the connection between the fan and the ceiling. This rod is constructed from a non-magnetic and non-conductive material. Strong magnets are arranged in a circular formation around the copper winding, ensuring that all magnets encircle it. The air gap between the magnets and the winding is minimal, measuring only a few millimeters. This arrangement of strong magnets is secured to a rotating disc using thin rods, nuts, and bolts. The rotating disc is then connected to the motor shaft of the fan, which also links to the fan blades.

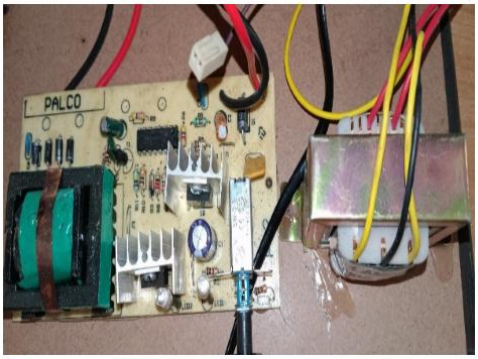
In the construction of the fan, copper winding is positioned on the fan rod, which connects the fan to the ceiling. Surrounding the copper winding are robust magnets, which are affixed to a rotating disc. When electrical power is supplied to the fan motor, the motor's shaft begins to rotate. This shaft is linked to the rotating disc, which is equipped with fan blades and slender rods secured to the disc using nuts and bolts. These rods connect the circular set of magnets to the disc, which is attached to the shaft. As the disc rotates, the set of

magnets also turns around the copper winding. This motion generates a rotating magnetic field (RMF) that intersects with the stationary copper winding. The interaction between the copper winding and the RMF results in mutual induction, producing an electromotive force (EMF) in the copper winding. Consequently, electrical power can be generated by the fan. The generated EMF is transmitted through wires and stored in a battery. It is essential to store the EMF produced by the assembly mounted on the fan rod. For this purpose, a rechargeable battery is utilized, specifically a lead-acid battery due to its longevity. The current generated by the motor is alternating current (AC), while only direct current (DC) can be stored. To convert AC to DC, a rectifier is employed, which transforms alternating current into direct current. Additionally, an inverter is required to convert the stored DC back into AC, as all household appliances operate solely on AC.

III. DETAILED DESCRIPTION

A ceiling fan motor equipped with a generator winding primarily comprises a motor axle, a stator, and a rotor. The stator is affixed to the motor axle and is constructed by stacking a specified number of metal plates. Surrounding the stator are multiple first magnetizing coils, each of which is wound with a second magnetizing coil that includes a generator winding. The second magnetizing coil is responsible for detecting the electromagnetic field (EMF) in its vicinity. The stator features a designated number of coil arms, evenly spaced and oriented perpendicularly to the motor axle. Each coil arm contains a concave section designed for the corresponding first magnetizing coil to wind around, with the second magnetizing coil also wound around the respective first magnetizing coil. Notably, each first magnetizing coil is electrically linked to an energy-saving driver control circuit. This circuit receives an input voltage and regulates the electrical current phases of the first magnetizing coils, enabling the illuminating unit to generate light without requiring additional electrical power. It is important to note that the energy-saving driver control circuit can convert external alternating current (AC) power into direct current (DC) power, thereby eliminating power supply noise interference. While the circuit operates, it can detect the rotor's position during rotation, allowing it to ascertain the electrical current phases for each first magnetizing coil. In this configuration, the energy-saving driver control circuit incorporates a predetermined number of Hall elements, each capable of sensing the polarity of the rotating rotor. Consequently, the energy-saving driver control circuit can effectively determine and manage the electrical current phases of the first magnetizing coils to facilitate inertia buildup, enabling the rotor to maintain its rotation relative to the stator. Additionally, the energy-saving driver control circuit implements energy-saving control measures.

IV ADVANTAGES OF THIS PROJECT



1. Electricity was generated using a fan.
2. The design is straightforward.
3. The manufacturing expenses are low.
4. The fan's speed is minimally impacted, as the copper winding exhibits reduced magnetization.
5. It does not interfere with the primary function of the fan, which is to provide airflow for cooling purposes.

V. APPLICATIONS:

1) Educational institutions, medical facilities, and accommodations are outfitted with a minimum of 50 fans, which can utilize this energy-generating system to illuminate tube lights or recharge batteries, thereby powering various devices such as computers and laptops.
2) To facilitate the charging of mobile phones, a mobile charging circuit is necessary, providing the suitable voltage and current essential for effective charging. This solution will assist middle-class individuals in conserving energy and reducing expenses.

VI. CONCLUSION

The challenge of minimizing energy consumption is significant in today's context. Additionally, the recycling of energy plays a crucial role, enabling us to generate electricity for lighting purposes. By utilizing this ceiling fan, we can regenerate electricity, which will assist in powering our household appliances.

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