IlluminationOf Lamp with Waste Rotational Energy-A Data Analysis onThe Ceiling Fan

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Abstract. The mutual induction concept serves as the foundation for this method. To generate energy, we employed a D C motor that is mounted on the rotor Shaft. 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 D C motor. We can generate electricity more effectively and efficiently by employing this assembly.

Keywords: Back EMF, ceiling fan, permanent-magnet

1 Introduction

The world is a vast source of untapped energy found in nature. It is a well-established theory that energy can't be formed or demolished; it can only be converted from one form to another. Nevertheless, we are squandering resources that have the capacity to generate energy, treating them as if they were limitless. By renewing and reusing the energy we waste, we could play a significant role in addressing the critical issue of energy scarcity, which is a major concern in contemporary society. Through the use of wind turbines, we can capture electricity generated by wind for applications such as charging devices and connecting to the power grid. Furthermore, components like fans are designed with mechanisms, either integrated into their motors or via belts, that can power a tube light or store energy in a battery for later use in operating other devices[3]. The energy consumption of each building or household is affected by the use of various electrical appliances, including lighting systems, electronic gadgets, and cooling units, which typically require considerable amounts of electricity. However, the rate of electricity consumption is contingent upon various things like, such as the occupants, managementpractices, Environmental regulations, architectural design and construction practices, mechanical and electrical systems, as well as climatic factors [2].
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

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operate on electricity to provide cooling, power outages hinder their use, and India experiences a significant percentage of load shedding. Conséquent, 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[4].Energy 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[5,6]. The rate of electricity consumption is also contingent upon A range of elements, including the residents, management strategies, environmental regulations, architectural design and construction methods, mechanical and electrical systems, as well as climatic 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 [7,8].

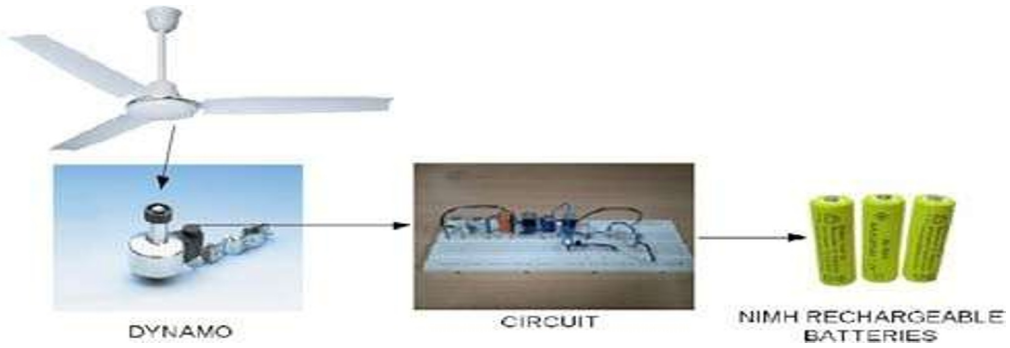


Fig. 1 –components of fabrication work

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 [9,10].

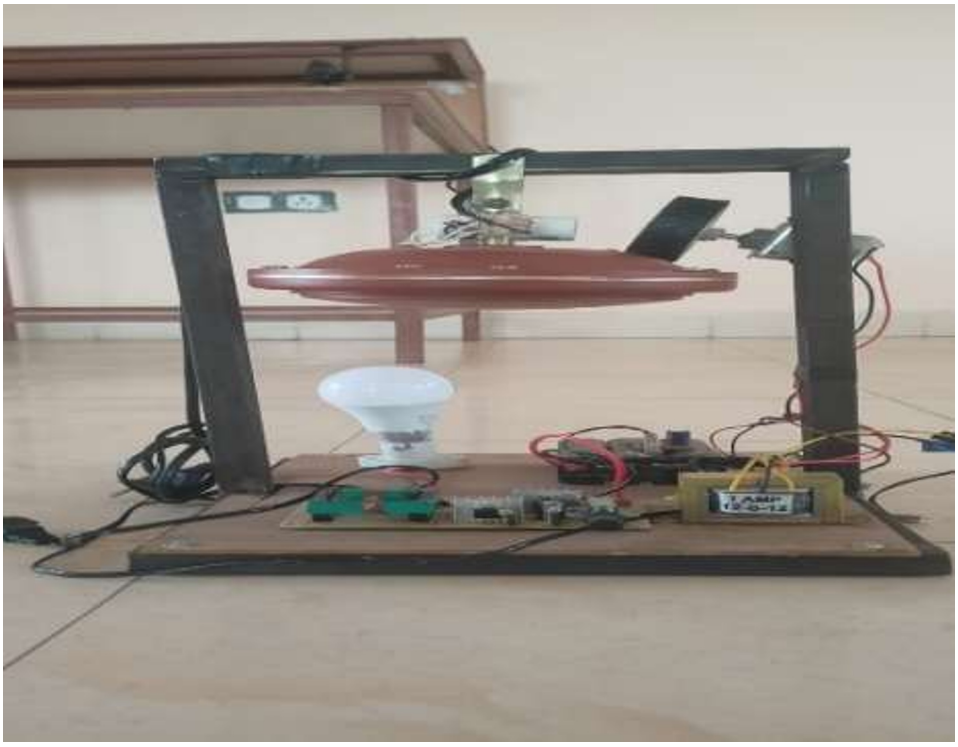


Fig. 2 –fabrication work model

2. Working Principle

The assembly operates as a generator, connected to the fan's rod. Copper was selected due to its low magnetic properties, rendering it unaffected by magnetic fields. The copper winding is positioned on the rotor Shaft, which serves as the connection between the fan and the ceiling. This rod is constructed from a material that is both non-magnetic and non-conductive. Strong magnets are arranged in a circular formation around the copper winding, ensuring it is fully encircled. The air gap between the magnets and the winding is minimal, measuring only a few millimetres. This configuration of powerful magnets is secured to a rotating disc using thin rods, nuts, and bolts. The rotating disc is then linked to the motor shaft of the fan, which is also connected to the fan blades.

In the construction of the fan, the Cu-winding is located on the fan shaft, which acts as the link to the Ceiling. Surrounding this Cu-winding are durable magnets that are affixed to a rotating disc. When electrical power is supplied to the fan motor, the motor's shaft begins to rotate. This Fan shaft is linked to the rotating disc, which is equipped with fan blades and slender rods that are secured to the disc with nuts and bolts. These shafts connect the rounded arrangement of magnets to the disc, which is attached to the fan shaft. As the disc rotates, the magnets also move around the copper winding. This motion generates a rotating magnetic field (RMF) that intersects with the inactive copper winding. The collaboration between the Cu winding and the Rotating magnetic field results in mutual induction, producing an electromotive force (EMF) within the copper winding. Consequently, the fan

is capable of generating electrical power. The produced EMF is transmitted through wires and stored in a battery. It is essential to store the EMF produced by the gathering mounted on the rotor Shaft, for which a rechargeable lead-acid battery is utilized due to its reliability. The current is produced by the motor is alternating current (AC), but individual direct current (DC) can be stored. To convert AC to DC, a rectifier is employed[11].

3 Comprehensive Portrayal:

A fan with a motor that features a generator of the copper winding is primarily composed of ashaft, stator, and rotor. The component as stator is securely mounted on the shaft and is designed by stacking a specific number of metallic plates. Surrounding the stator are several primary magnetizing coils, each enveloped by a secondary magnetizing coil that contains the generator winding. The secondary magnetizing coil plays a crucial role in sensing the electromagnetic field (EMF) in its vicinity. It is designed with a prearranged number of coil arms, which are evenly spaced and positioned perpendicular to the motor shaft.

Fig. 3 ─PCB Circuit board

Each coil arm includes a concave section intended to accommodate the winding of the associated primary magnetizing coil, with the secondary magnetizing coil also wrapped around it. Importantly, each primary magnetizing coil is connected to an energy-efficient driver control circuit. This circuit obtains an input voltage and manages the electrical current segments of the primary coils, allowing the lighting unit to produce illumination without the need for additional electrical power. Furthermore, the energy-efficient driver control circuit can convert external alternating current (AC) into direct current (DC), effectively reducing power supply interference. This circuit is a designed to monitor the rotor's position during its rotation, which aids in identifying the electrical current phases for each primary magnetized coil. Here setup, the energy-efficient driver control circuit includes a specific amount of hall elements, each responsible for detecting the polarity of the rotating rotor. As a result, the driver control circuit can accurately identify and regulate the electrical current segments of the primary coils, enhancing inertia accumulation and enabling the rotor to sustain its rotation in relation to the stator. Additionally, the energy-efficient driver control circuit incorporates methods aimed at conserving energy.

4 Result Analysis:

4.1 Analysis Of Power:

Consideration of work :

Battery's (3U) = 12V (Series)

D C Motor = 12V

Fan Condition:

Initial of 230V to 240V

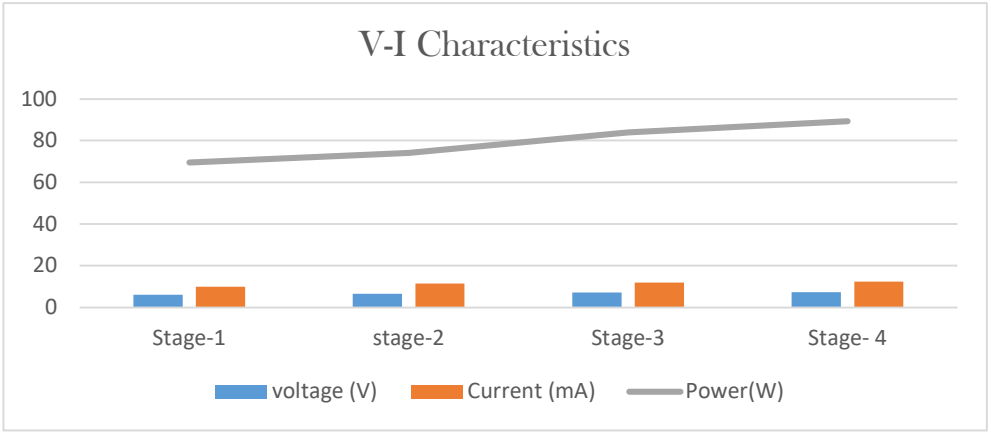
Step-up Transformer (12V to 230V)

The author have made a trial test on fabrication model. The below data shows the performance of model for different stages

Table1 : data set for trial run

Speed of the Fan with standard stages	**Voltage generated by the DC motor (V)**	**Current generated in DC Motor (mA)**	**Power-send to Battery's (V x I)**
1st stage with low speed	6.01	9.9	0.059499
2nd stage with medium speed	6.5	11.4	0.07410
3rd stage with high speed	7.05	11.9	0.083895
4th stage with Max. Speed	7.2	12.4	0.08928

The total power that can be generated by this DC motor is of 0.083-0.089 W.



The above Graph States that the power is Generated as the Voltage and Current is increased gradually. The fan generates electricity through a DC motor, producing a voltage of 6 to 7.2 volts and a current ranging from 9 to 12 milliamperes (mA). Consequently, the power output is calculated to be 0.089 watts.

5 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.

6 Conclusion

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, there by powering various devices such as computers and laptops.
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.

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