Basic Principle of Electric Motor Of 12 Volts DC Supply To 220V AC Output

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Abstract: The magnetic attraction and repulsion is the fundamental principle underlying all motor operation. A motor requires a method of manipulating magnetic fields so that the magnets continue to attract and repel one another. This is due to the fact that once a magnet has attracted another magnet, it becomes motionless. A device known as an electric motor is used to convert electrical energy into mechanical energy, as opposed to an electric generator. The application of the rules of electromagnetism, which indicate that a force is exerted anytime an electric current is present in a magnetic field, assures their proper operation. Motors comprise a huge number of distinct functioning parts in order to continue to rotate and provide power when it is necessary. Motors can be powered by direct current (DC) and alternating current (AC). The stator and the rotor are, respectively, the components of an electric motor. In a motor, the component that does not rotate is referred to as the stator, whilst the component that does revolve is referred to as the rotor. This study will focus particularly on the battery capacity of 12 Volts that can be delivered to DC motor that are coupled to Electric Motor that generate 220 Volts AC output.

Key Words: ***—Electromagnetism, DC, AC, Electric Motor, Magnetic Fields.***

I. INTRODUCTION

Faraday, an experimentalist in electricity and magnetism from the nineteenth century and one of the finest experimental physicists of all time, spent 10 years intermittently seeking to prove that a magnet could produce electricity. In 1831, he attained success by winding two coils of wire around opposing sides of a soft iron ring. The first coil was linked to a battery, and when a current went through it, the iron ring became magnetic. A metre-long wire from the second coil was stretched to a compass needle that was so far from the first circuit that it was not immediately influenced by any current in it. A motor-generator combo is an economical and reliable means of operating a power unit for industrial and commercial applications.

Manuscript revised July 14, 2022; accepted July 15, 2022. Date of publication July 16, 2022.

This paper available online at www.ijprse.com

ISSN (Online): 2582-7898; SJIF: 5.59

The two sets are mechanically linked. The following are the fundamental principles of this sort of system: The electric input power drives the ac motor, which helps to rotate the generator and produce extra energy. It is the current-carrying conductor of an electric motor that creates the surrounding magnetic field, making it the primary component of the machine. When an electric current-carrying wire is positioned perpendicular to a magnetic field, it will experience a force. Electric motors, as opposed to electric generators, are used to convert electrical energy into mechanical energy. The theories of electromagnetism, which indicate that a force is exerted anytime an electric current is present in a magnetic field, are the basis of their operation. A magnetic field-present wire loop will experience a torque as a result of this force. This torque causes the motor to rotate, which enables the motor to do useful work? Motors are used in several applications, including but not limited to fans, power tools, household appliances, electric cars, and hybrid vehicles.

Motors feature a high number of unique moving components so that they can continue to rotate and produce electricity as needed. Direct current (DC) and alternating current (AC) are the two forms of energy that may be used to power motors; each has a variety of benefits and drawbacks. A type of electrical equipment, an electric motor converts the electrical energy it receives into mechanical energy. The majority of

electric motors create force in the form of torque that is applied to the shaft of the motor through interaction between the magnetic field of the motor and electric current in a wire winding. This is the fundamental concept behind the operation of electric motors.

II. METHODS

2.1 Research Design

The study is to propose an electric motor that can produce electricity that can be an alternative energy in some various and important aspects. In this study, the researchers used the experimental research design to conduct experiments in a way that is informative and efficient with both time and money. These strategies, when implemented during product development, have the potential to contribute to building quality into products while also contributing to a reduction in the amount of time required for the development cycle of basic principle of electric motor and the findings of this study, including its conclusion and recommendations, will be based, in part, on the analyzed data that the researchers collected.

2.2 Research Instrument

In order to gather the data, that can used in the study, unstructured observation of the study is used where it is not always possible to make a detailed plan for the 'observation' process in advance when one is dealing with a real-world scenario. Especially in the case of exploratory investigations, the researcher does not have sufficient clues to structure his observations, which may call for changes in what he observes. This may call for changes in what the researcher observes. Unstructured observation often results in such shifts in the status quo. Due to the flexible nature of unstructured observation, it is conceivable to change the investigation's emphasis on time, given that there is sufficient evidence to provide it.

2.3 Research Prototype Outside

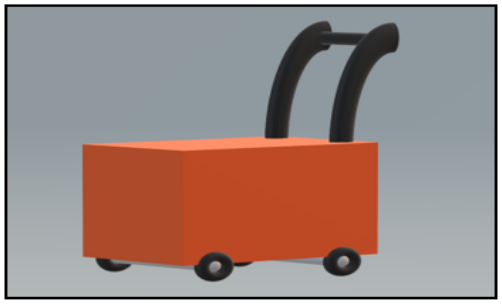


Fig.1. Prototype Model-I

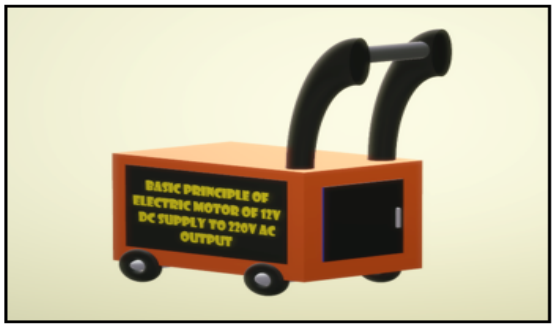


Fig.2. Prototype Model-II

Fig.3. Prototype Model-III

2.4 Research Prototype Inside

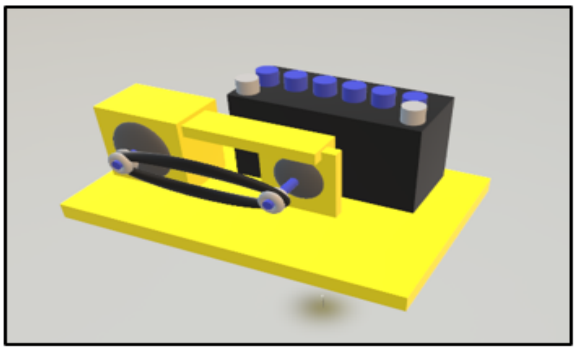


Fig.4. Prototype Model-IV

Fig.5. Prototype Model-V

2.5 Schedule of Loads

Table.1. Wire Sizing and Circuit Breaker Protection

SCHEDULE OF LOADS					
CKT. #	**Quantity**	**Load Description**	**V**	**VA**	**A**
1	4	CONVENIENCE OUTLET (360W)	230	1440	6.26
2	5	LIGHTING OUTLET (5W)	230	25	0.11
		TOTAL:		**1465**	**6.37**

$$Ampere = \frac{Total\ number\ of\ Watts}{Constant\ Voltage}$$

$$Ampere = \frac{1465\ VA}{230\ V}$$

***Ampere* = 6.37 Amperes**

Use 2P, 15AT/50AF C.B. Protection

12 AWG WIRE

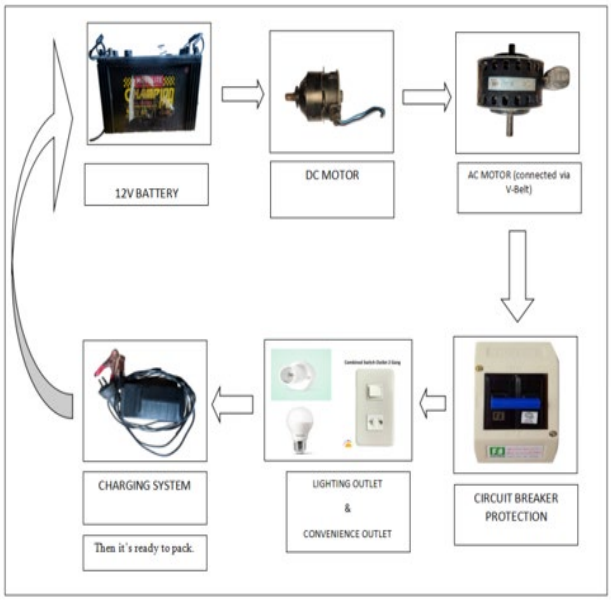
The Computed Amperes will used for selecting the sizing of Electrical wire and Circuit Breaker Protection.

2.6 Tools and Equipment's

NAME	PICTURE
DC MOTOR	
AC MOTOR	
PULLEY	
FAN BELT	
DC BATTERY	
LED BULB(5Watts) (5 pieces)	
SCREWS	
RECEPTACLE/ LAMP HOLDER	
SWITCH WITH OUTLET	
CLIP FAN	
CELLPHONE CHARGER	
MODEM	
POWER DRILL	
ELECTRIC POWER GRINDER	
WELDING MACHINE	
CIRCUIT BREAKER	

These are all the Tools an equipment used in this study.

2.7 Prototype Procedure



III. RESULTS AND DISCUSSION

Table.2. Morning Indoor Testing

DAY 1 (INDOOR)									
TIME	LIGHTING		CLIP FAN		CHARGER		MODEM		LOAD
	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	WATT-hrs.
7:00AM - 8:00AM	3	15	3	45	1	10	1	15	85
8:00AM - 9:00AM	3	15	3	45	1	10	1	15	85
9:00AM - 10:00AM	3	15	3	45	1	10	1	15	85
10:00AM - 11:00AM	3	15	3	45	1	10	1	15	85
11:00AM - 12:00PM	3	15	3	45	1	10	1	15	85
TOTAL									425

Table.2. presents the findings of the initial day of testing an application in an indoor situation. The testing comprises the employment of low powered home goods such as light bulbs, clip fans, mobile chargers, and modems. It is possible to observe that the load stays at 85 watts per hour in the morning, and they are able to power themselves up with the total energy consumption of 425 watts throughout the course of 5 hours.

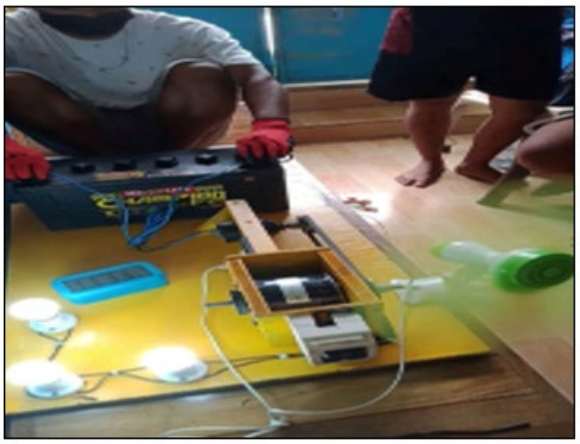


Fig.6. Working Model-I

Table.3. Morning Outdoor Testing

DAY 2 (OUTDOOR)									
TIME	LIGHTING		CLIP FAN		CHARGER		MODEM		LOAD
	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	WATT-hrs.
7:00AM - 8:00AM	1	5	3	45	1	10	1	15	75
8:00AM - 9:00AM	1	5	3	45	1	10	1	15	75
9:00AM - 10:00AM	1	5	3	45	1	10	1	15	75
10:00AM - 11:00AM	1	5	3	45	1	10	1	15	75
11:00AM - 12:00PM	1	5	3	45	1	10	1	15	75
TOTAL									375

The Table.3. enlists the data noted on the second day of testing. This test was conduct Outdoor same time as Day 1. In this test, light bulbs were reduced while the Clip fan, Charger, and Modem remained the same. The 375-watt Power bank could power the load for 5 hours.

Fig.7. Working Model-II

Table .4. Afternoon Indoor Testing

DAY 3 (INDOOR)									
TIME	LIGHTING		CLIP FAN		CHARGER		MODEM		LOAD
	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	WATT-hrs.
1:00PM - 2:00PM	3	15	3	45	1	10	1	15	85
2:00PM - 3:00PM	3	15	3	45	2	20	1	15	95
3:00PM - 4:00PM	3	15	3	45	2	20	1	15	95
4:00PM - 5:00PM	5	25	3	45	1	10	1	15	95
5:00PM - 6:00PM	5	25	3	45	1	10	1	15	95
TOTAL									465

Table.4. enlists third-day or second-day indoor testing results. Light bulbs and cell phone chargers were increased while Clip Fans and Modem remained the same. 5 Light bulbs and 2 Cellphone chargers were tested running at the same time for two hours. The total energy consumption was recorded to be 465 Watt Hour and the testing lasted for 5 Hours.

Fig.8. Working Model-III

Table.5. Afternoon Outdoor Testing

DAY 4 (OUTDOOR)									
TIME	LIGHTING		CLIP FAN		CHARGER		MODEM		LOAD
	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	WATT-hrs.
1:00PM - 2:00PM	1	5	3	45	2	20	1	15	85
2:00PM - 3:00PM	1	5	3	45	2	20	1	15	85
3:00PM - 4:00PM	1	5	3	45	1	10	1	15	75
4:00PM - 5:00PM	3	15	3	45	1	10	1	15	85
5:00PM - 6:00PM	5	25	3	45	1	10	1	15	95
TOTAL									425

Table.5. lists fourth-day or second-day outdoor testing results. Outdoor exam on Day 3. Testing reduced the quantity of lightbulbs. Clip fans and Modem are unchanged. 425 Watt Hours were used throughout 5 hours.

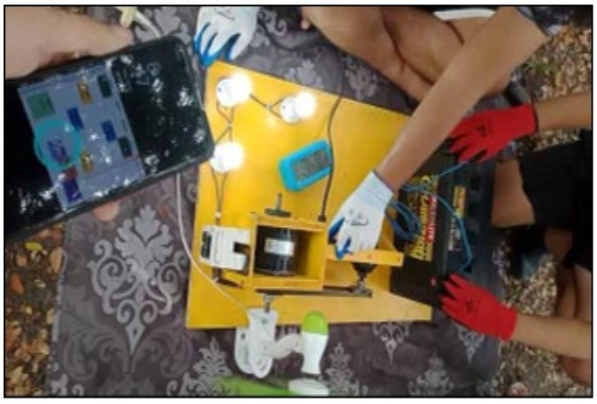


Fig.9. Working Model-IV

Table.6. Evening Indoor Testing

DAY 5 (INDOOR)									
TIME	LIGHTING		CLIP FAN		CHARGER		MODEM		LOAD
	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	WATT-hrs.
7:00PM - 8:00PM	5	25	3	45	1	10	1	15	95
8:00PM - 9:00PM	5	25	3	45	1	10	1	15	95
9:00PM - 10:00PM	5	25	3	45	1	10	1	15	95
10:00PM - 11:00PM	5	25	3	45	3	30	1	15	115
11:00PM - 12:00AM	5	25	3	45	3	30	1	15	115
TOTAL									515

Table.6. enlists the data noted on the fifth day of testing or third day of testing Indoor. In this test, the quantity of Light Bulbs and Cell phone chargers were increase and the Clip Fans and Modem remains the same. During this period the Power Bank was able to power the load up to 5 hours with total energy consumption of 515 Watts.

Fig.10. Working Model-V

Table.7. Evening Outdoor Testing

DAY 6 (OUTDOOR)									
TIME	LIGHTING		CLIP FAN		CHARGER		MODEM		LOAD
	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	QTY.	WATT/FIXT	WATT-hrs.
7:00PM - 8:00PM	5	25	3	45	1	10	1	15	95
8:00PM - 9:00PM	5	25	3	45	2	20	1	15	105
9:00PM - 10:00PM	5	25	3	45	2	20	1	15	105
10:00PM - 11:00PM	5	25	3	45	1	10	1	15	95
11:00PM - 12:00AM	5	25	3	45	1	10	1	15	95
TOTAL									495

Table.7. lists sixth-day or third-day outdoor testing results. Outdoor exam on Day 5. In the evening, a power bank charges 5 light bulbs, 3 clip fans, a modem, and a charger for 5 hours using 495 watts.

Fig.11. Final Working Model

IV. CONCLUSION

The researchers concluded that Basic principle of electric motor of 12 volts dc supply to 220 volts ac output creates new variety of a renewable energy Source that Sustaining a source of power for indoor and outdoor use, this electric motor may also power electric lighting, electric powered fans, and chargers such as power banks for recharging essential devices during a power outage. The study was completely investigated, Based on the 6 trials investigation. It was sustainable for an average of 5 hours before the battery becomes empty. Researchers found out that temperature didn't actually a large effect on the prototype after 6 times of testing in different time, situation, and location. In terms of Acceptability, it was able to power up lights, clip fans, chargers and modem. When it comes to safety it was protected using a Circuit breaker it can automatically detect if there is a short circuit or overload. Researchers recommend to invest a lot to the battery because that's the most important part of the prototype. The higher the battery capacity the longer it can sustain.

Recommendation:

In this study, the use of Electric motor can beneficial in various areas of indoor and outdoor areas. Somehow, the results discussed that it is more sustainable in indoor aspects, with the results of 1st day in the morning the load is 85 watts per hour, consuming 425 watts in 5 hours. 2nd, is the 5-hour test consumed 465 Watt Hours of energy, 3rd day, Power Bank lasted 5 hours. This data results, tells that electric motor is more advantage and useful in indoor activities, as it is computed and tabulated in the results and discussion. Electric motor will be highly recommended to use indoor.

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