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In this research study, the performance in battery running and charging of an original circuit design is compared with the performance between the developed DC–DC boost converter running and charging replication circuit design. Bedini generators are a kind of magnetic generator designed by John Bedini on the basis of zero point technology. The generator serves as a self-battery charger. In this study, the two types of circuit design, namely, the original and the replication, are examined in terms of performance in battery running and charging. The DC–DC boost converter offers greater voltage boost capabilities and hence has the potential to enhance step-up power conversions. The novel design was a prototype of the six-pole eight-neodymium magnet generator, which potentially offers free energy and could therefore serve as an alternative means of addressing energy needs when the current nonrenewable fuel sources have been wholly depleted in the future. The coefficient of performance (COP) for the battery performance of both designs is calculated in this study in order to allow comparisons to be drawn. Upon analysis, it is discovered that the DC–DC boost converter circuit is both practical and efficient, offering a high level of step-up power conversion capacity for battery running and charging. The COP of the new system provides a significant increase in COP when compared to the original design. [DOI: 10.1115/1.4039504]

Keywords: magnet generator Bedini, Bedini circuit, DC–DC boost converter, coefficient of performance (COP)

1 Introduction

Nikola Tesla once said that all people should have energy sources for free to fulfill their daily needs. Unlimited quantities of electricity are available and would be capable of powering the world with no need to rely upon nonrenewable fossil fuels such as oil, coal, or natural gas. The most significant idea is that free energy would have no cost. Mechanical energy, which drives windmills by using the blowing force of the wind, or solar energy in solar cells, which is converted into DC current and stored in batteries, could be very valuable [1], while other energy sources include wind power, water power, and telluric power. This kind of power is produced by free energy generators. Acting against this idea is the notion that free energy can be suppressed by corporations involved in the energy sector who rely upon fossil fuels for their profits and do not wish to see alternative energy sources thrive. All other remaining untouched forces of nature are familiar in the scientific literature, and include earth batteries, atmospheric electricity, telluric currents, and pressure system changes.

The Bedini generator is a kind of electrical generator that utilizes the moving parts of working machines to regenerate electricity for other electric devices or to save as back-up power sources. John Bedini is the first person who proposed this kind of generator, called the Bedini Simplified School Girl (SSG) in 2001 [1–4], which was then further developed by Peter Lindemann [5,6] and others [7]. The study presents the original basic concept of a Bedini generator for battery running and charging and also explains the replication design. The charging and running require performance inputs and outputs, which exceed normal requirements, thereby implying that radiant energy infusion is involved in the process [7]. This study is carried out using investigation and analysis for the two design types of Bedini generators. This will allow the performance to be evaluated and comparisons made between the original circuit running and charging Bedini design and the prototype DC–DC boost converter replication by six-pole neodymium magnet Bedini. The study emphasizes the project to develop the Bedini monopole mechanical energizer six-pole and eight-pole neodymium magnet generators. The test procedure was established to determine the coefficient of performance (COP) for the original circuit running and charging battery design to compare this with the DC–DC boost converter design [8].

The coefficient of performance provides a measure of energy transfer, which is defined by the output as a proportion of the operator's input. Coefficient of performance can be applied in the description of any machine, which derives additional inputs of energy from the surrounding environment. One example would be the use of COP to explain the details of the energy exchange which takes place in solar collectors or in heat pumps [9]. Coefficient of performance differs from mere efficiency in that it can be assigned a value greater than one, as indicated in Fig. 1, which depicts energy flow. Indeed, COP typically exceeds efficiency,

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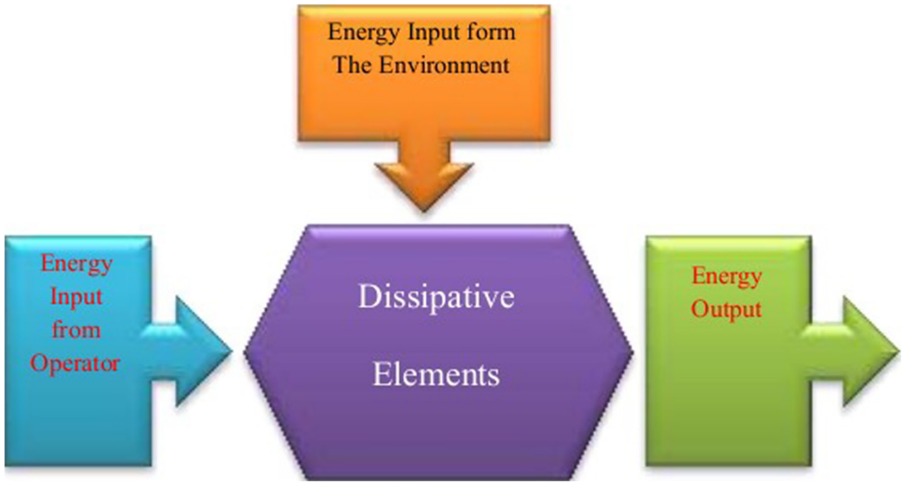

Fig. 1 Block diagram COP used to describe the energy flow of a machine

though would equal efficiency in cases where the input from environmental energy is reduced to zero

$$\mathrm{COP} = \frac{P_{\mathrm{Out}}}{P_{\mathrm{In(Operator)}}} \tag{1}$$

2 Overview and Design Formulation

2.1 Bedini Motor-Generator. From particle physics [8,10,11], it follows that any bipolarity, including any scalar potential, is a broken symmetry in virtual vacuum flow, despite the fact that interaction with a vacuum is not considered in classical electrodynamics at the stage of electrical system design. Dipoles asymmetry means that it is collecting disordered energy from the vacuum, ordering part of it, and sending it in observable forms in all directions. It follows that any dipole and potential in essence is a negative resistor, which may be used in real circuits. Earlier [12] it was shown that scalar potential is a composition, consisting of pairs of longitudinal electromagnetic waves propagating in opposite directions. The potential is an ordered reorganization of vacuum energy to the determinate system of bidirectional energy flows. To attach increased potential to negative resistance in a battery, for example Ref. [13], by using the bidirectional property of potential, it is possible to overexcite heavy ions charging the battery and also overexcite electrons, which may feed the load at the external circuit. The system becomes open, and the thermodynamic principle of equilibrium between the electrical system and the surrounding vacuum is violated and the possibility to work with $\mathrm{COP} > 1$ becomes available. A simple DC Bedini motor-generator, which uses only a small amount of energy for controlling purposes, stores energy from the vacuum in a rotor/flywheel and charges batteries or sets of batteries in a nontraditional way. Such devices work with $\mathrm{COP} > 1$.

2.2 Bedini Generator Original Circuit Design. Whenever a magnet comes close to a coil, it triggers a current within that coil, which can then pass through the diode bridge rectifier circuit, and also through the resistor and potentiometer. The current can be stopped if the magnet is placed vertically above the core. If the magnet is then moved past the core, the current is reversed, and flows back through the transistor base and exits via the emitter. This activity causes the transistor to be switched on, which duly allows the current to flow back from the positive point of the main battery to the negative point of the battery via the primary coil. The transistor will switch off after the magnet passes the coil and ceases to induce the current in the trigger coil. This causes the magnetic field around the coils to collapse, marked by a significant potential spike in the primary coil which passes through the charging battery. The basic structures of the original design Bedini generators based on SSG are shown in Fig. 2.

2.3 Design Methodology and Development of Battery Running and Charging. The principal aim is to develop a circuit for battery running and charging using the DC–DC boost converter design in the case of a monopole motor. It is also important, however, to improve the performance in battery running as a means of upgrading the overall circuit efficiency. A monopole machine has two main components, which include the electronic circuit and also a running coil which serves as a trigger for introducing the charge to an electromagnetic circuit, which then converts this electrical energy into mechanical energy; the process also works in reverse whereby mechanical energy can be switched to an electrical form (Figs. 3, 4(*a*), and 4(*b*)). The proposed system thus comprises a monopole machine, which is able to perform battery charging along with battery running and charging to develop a circuit design. The next component is the stator, which is a coil that has four windings: here is a power coil winding, a trigger coil, and then a double coil, which serves as the charging coil and running coil and which was originally developed to support the DC–DC boost converter circuit voltage booster and current booster. This allows the output voltage to be increased to a level where it can be usefully applied in battery running and charging coil winding, which in turn works with the DC–DC boost converter circuit voltage booster and current booster to increase the input voltage. Eight permanent magnets make up the rotor and are arranged so that the ends with the same polarity are fixed in the central spinning plastic disk. Variable flux is created in the coil by the rotor, but this does not influence the overall performance. A plastic rotor is employed in order to eliminate the possibility of electromagnetic interference upon the steel bearings and shaft, which would be used in a metal rotor. One further advantage is that the rotor weight is reduced, thereby allowing the rotor to revolve more smoothly.

2.4 DC–DC Boost Converter. DC–DC converters have today become commonplace in the field of switched mode power supplies. They are typically employed for stepping up or down any kind of nonregulated DC input voltage. A number of different DC–DC converter types are currently in existence, including buck, boost, buck–boost, Cuk, and the full bridge converter. However, for basic converter topologies, only buck and boost can be included in this category, with other listed types being derivatives of these two basic converters. For each of the differing converter topologies, the principles of operation will be unique, as will the specific benefits and drawbacks each can bring [14].

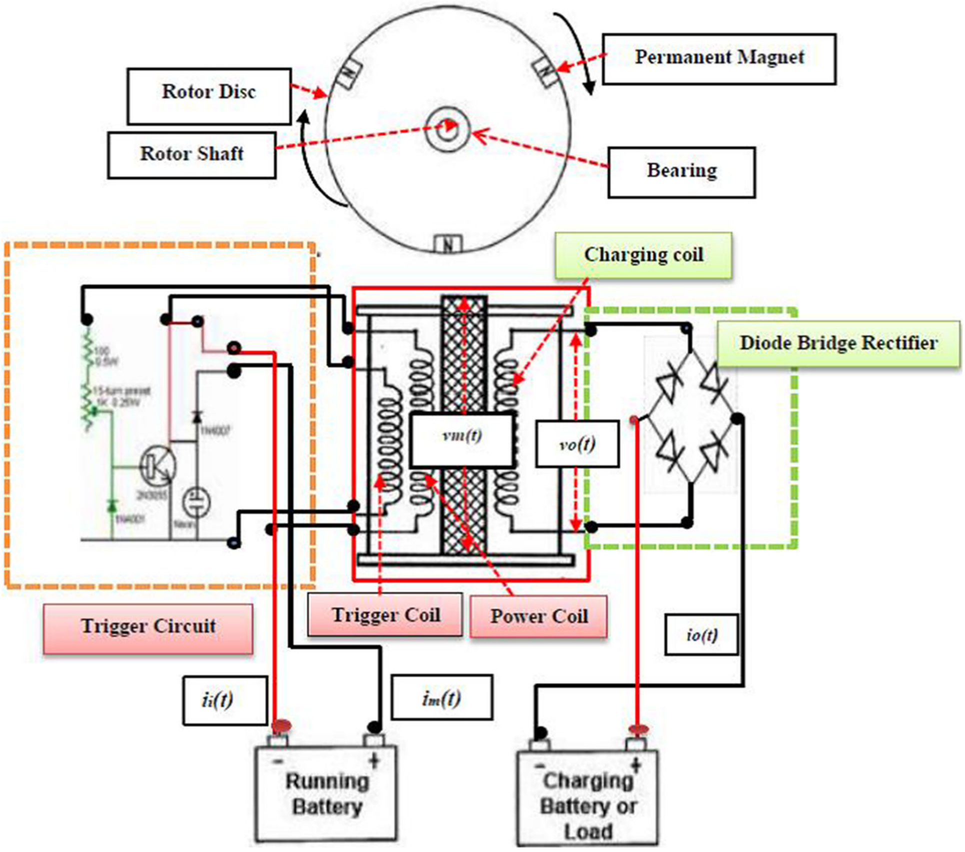

Fig. 2 Schematic circuit original of the Bedini magnet generator monopole machine

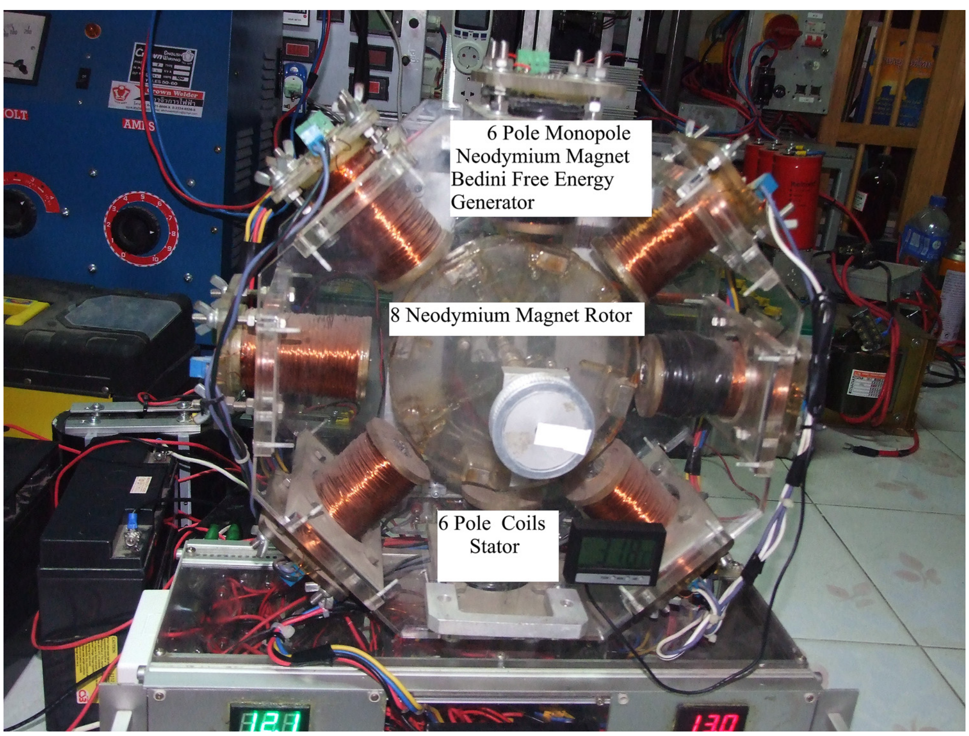

Fig. 3 Prototype of Bedini six-pole and eight-pole neodymium magnet generators

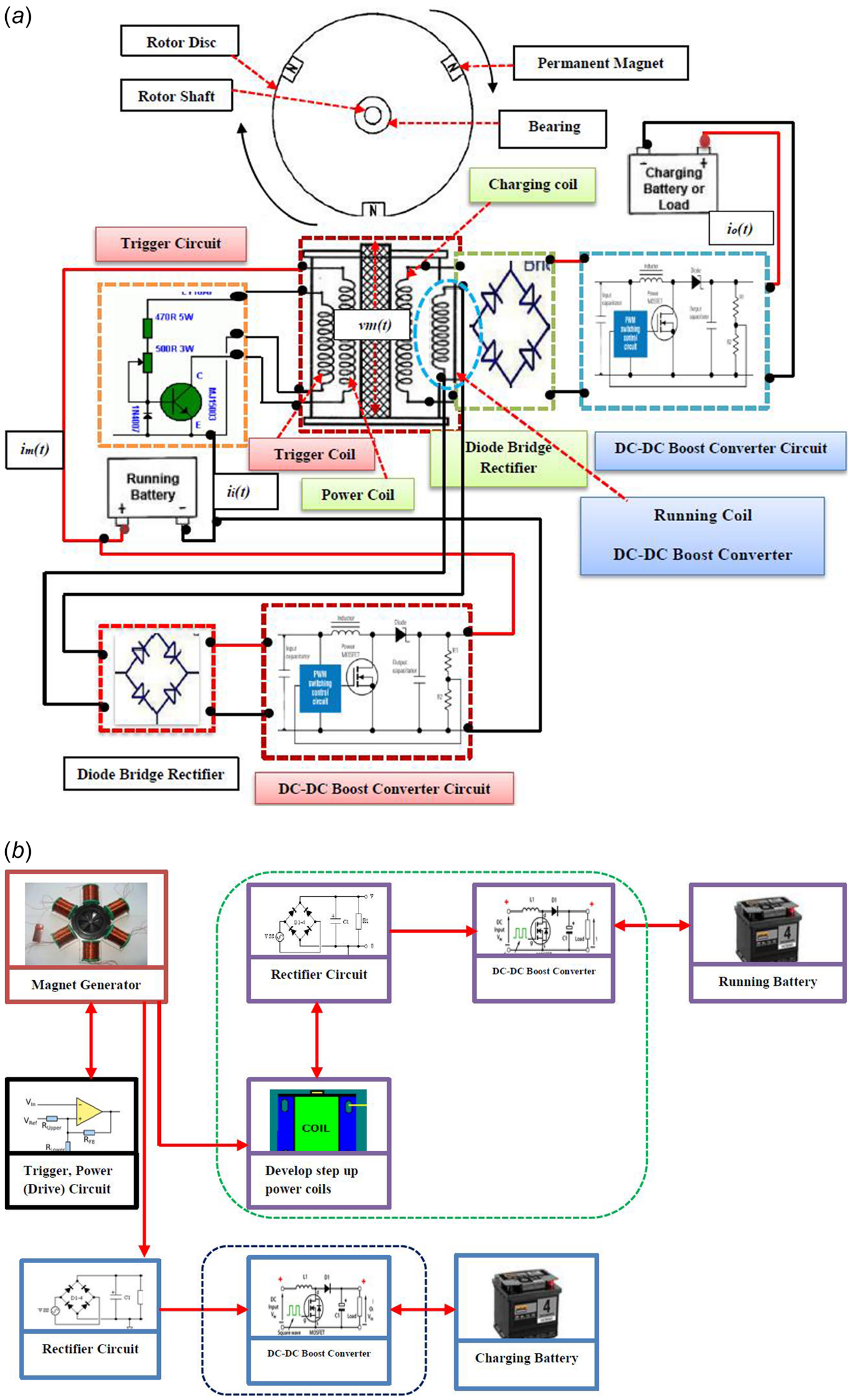

Fig. 4 (*a*) **The circuit for the development of a DC–DC boost converter capable of battery running and charging and** (*b*) **the block diagram presenting the development of the DC–DC boost converter for battery running and charging**

2.5 Design of the DC–DC Boost Converter. The role of a boost converter is to step up the unregulated DC input voltage in systems designed to use renewable energy so that a greater output voltage can be maintained, since this is a requirement when batteries are involved. Boost converters are therefore designed with the principal focus upon output power achieved, overall efficiency, and practical ease of implementation.

Boost converters are used in systems, which involve power transmission from wind and solar power generators. They absorb energy and then inject this energy into batteries or other loads.

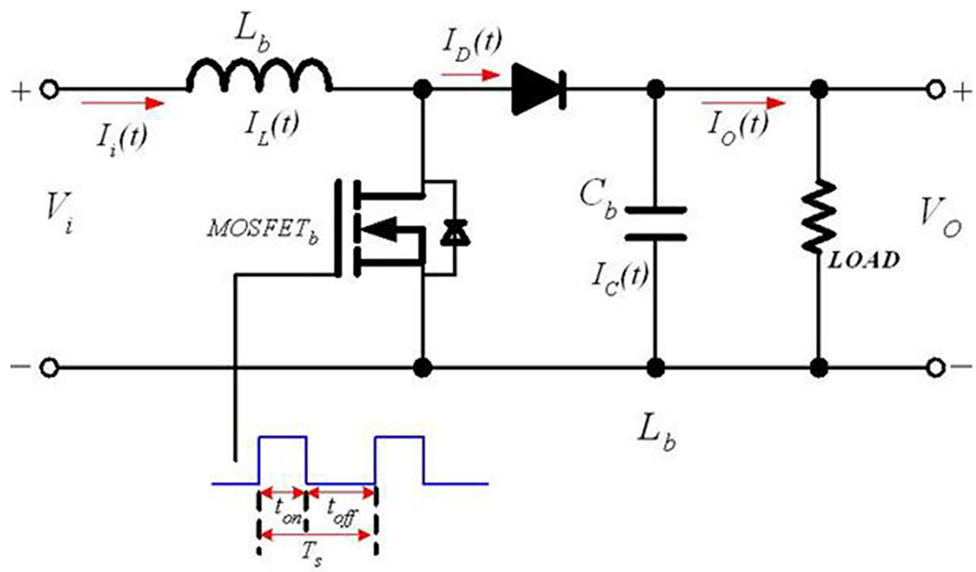

Fig. 5 **Representation of the electrical equivalent circuit of the DC–DC boost converter**

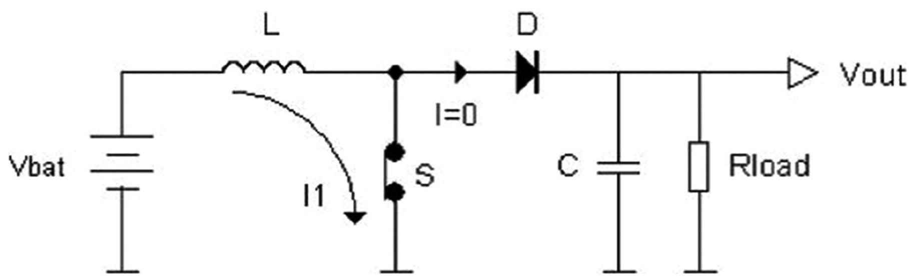

Fig. 6 **The equivalent circuit of the boost converter during t_{on} in mode 1**

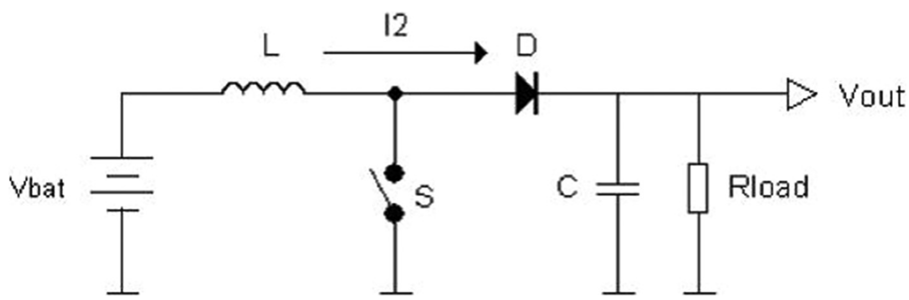

Fig. 7 **The equivalent circuit of the boost converter during t_{off} in mode 2**

Four components within the converter are necessary in order to accomplish this transmission: the inductor, the diode, the output capacitor, and the electronic switch. An illustration of the boost converter connection appears in Fig. 5 [15]. A switching cycle is necessary to achieve the activity of energy absorption followed by energy injection. The mean voltage of the output therefore depends upon the on/off duration of the switch. When the frequency of switching is constant, any alteration of the on/off duration is known as pulse width modulation switching. The term k denotes the switching duty cycle, which can be defined as a ratio whereby the "on" duration is divided by the total switching time period. The two steps of absorption and injection, governed by the relative switching period length, can control the converter, which accordingly operates in two separate modes: continuous conduction mode, and discontinuous conduction mode.

2.6 Continuous Operation Mode. The continuous conduction mode can be subdivided into two further modes [16]. The first mode, known as mode 1, commences at the print when the switch SW is switched on at $t = t_{on}$ as Fig. 6 indicates. The current input will then rise and flow through switch SW and inductor L. The energy during the mode 1 phase will be stored in the inductor.

The second mode is mode 2, which commences as the switch is switched off at $t = t_{off}$. Any current which had been passing through the switch will thus be diverted through L, D, C, and load R as can be observed in Figs. 6 and 7. This causes the inductor current to drop until the next cycle takes place and the switch is once again switched on. Energy, which was stored in the inductor, will be transferred to the load, and therefore the output voltage is greater than the input voltage, as indicated by the equation shown below

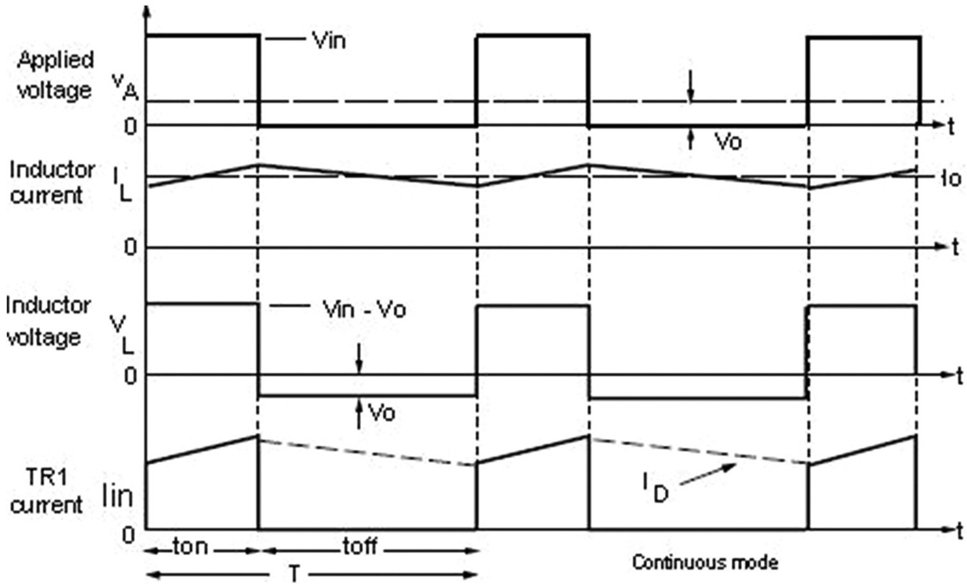

Fig. 8 The waveforms of the boost converter in continuous conduction mode

$$V_{out} = \frac{1}{1-k} V_{in} \tag{2}$$

where the output voltage is shown by V_{out}, the duty cycle is k, and the input voltage is represented by V_{in} [12,13].

The inductance value must be carefully calculated if the converter is to be operated in continuous conduction mode, since it is necessary for the inductor current I_L to flow constantly; it must never be allowed to drop to zero. This can be seen in Fig. 8. L is therefore given by the equation

$$L_{min} = \frac{(1-k)^2 kR}{2f} \tag{3}$$

where L_{min} represents the minimum inductance value, k denotes the duty cycle, output resistance is given by R, and f denotes the switching frequency for the switch SW [14].

The required output capacitance for any selected output voltage ripple can be calculated using the equation

$$C_{min} = \frac{k}{RfV_r} \tag{4}$$

in which C_{min} is used to indicate the minimum capacitance, the duty cycle is shown by k, R denotes the output resistance, f is the switching frequency for switch SW, and the output voltage ripple factor is represented by V_r [12]. V_r is thus given by the equation shown below

$$V_r = \frac{\Delta V_{out}}{V_{out}} \tag{5}$$

Table 1 Summarized results for the replication design

No.	Item	Material	Dimension
1	Rotor disk	Clear acrylic	Radius 15.24 cm × 10 cm
2	Bifilar coil	6 × clear acrylic	8.89 cm
3	Permanent magnet	8 × NdFeB	2 cm × 4 cm × 1 cm
4	Trigger coil	Copper wire #26AWG	1000 turns
5	Power coil	Copper wire #23AWG	1000 turns
6	Charging coil	Copper wire #23AWG	1000 turns
7	Running coil (developed coil)	Copper wire #23AWG	1000 turns
8	DC–DC boost converter	Step-up 12–24VDC	10 A240W
9	Battery charging/running	Sealed lead-acid	12VDC 17 amp hour (Ah)
10	Average rated speed	1300 rpm	

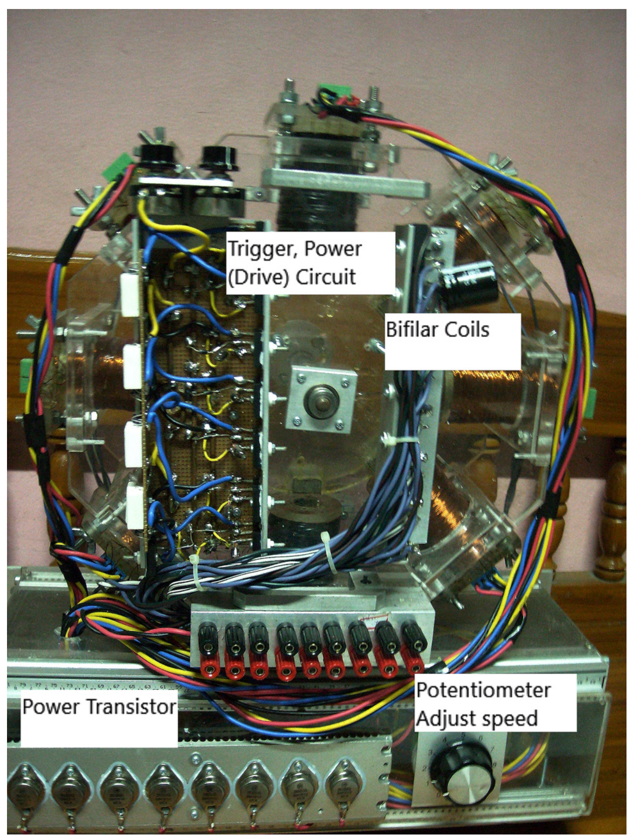

Fig. 9 Prototype of the Bedini six-pole and eight-neodymium magnet generator design

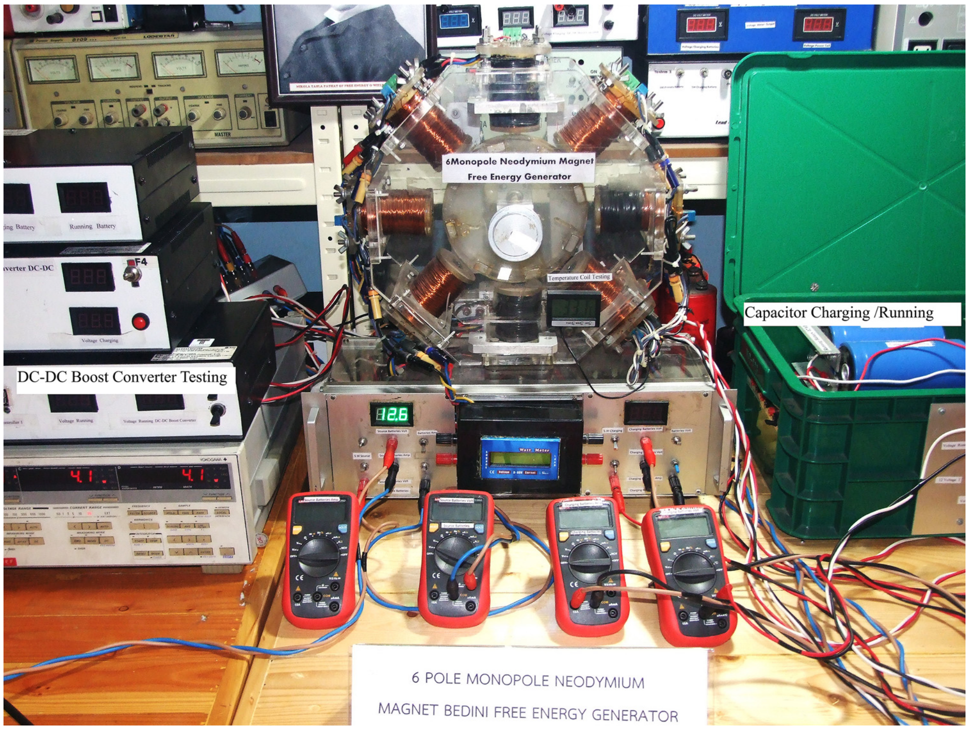

Fig. 10 Prototype of the Bedini six-pole and eight-neodymium magnet generator testing design

3 Experimental Implementation and Setup

3.1 The Proposed Specifications for the Tested Design. The construction of the Bedini generator is investigated in order to study the performance comparison for original to battery running and the charging circuit with a testing prototype of the Bedini six-pole and eight-neodymium magnet generator. The test based on the replication design configuration proposed was reconstructed as appears in the photograph, which is presented in Table 1 and in Fig. 9.

The operation of the testing for the circuit original of the Bedini magnet generator monopole machine and the development of the DC–DC boost converter for running and charging the battery is shown in Fig. 10.

4 Performance Comparison of Battery Charging and Running Original Between DC–DC Boost Converter Replication Designs

4.1 Performance Evaluation and Testing Procedure. In comparing the battery charging and running original with the battery charging and running DC–DC boost converter replication in terms of the output voltage, the value for the battery running original was gradually reduced as the operating time increased, while the charging voltage of the battery load increased during the start of the time interval and then stayed constant. The battery charging and running DC–DC boost converter replication curve indicated an initial voltage increase but then stayed constant, as can be observed in Fig. 11.

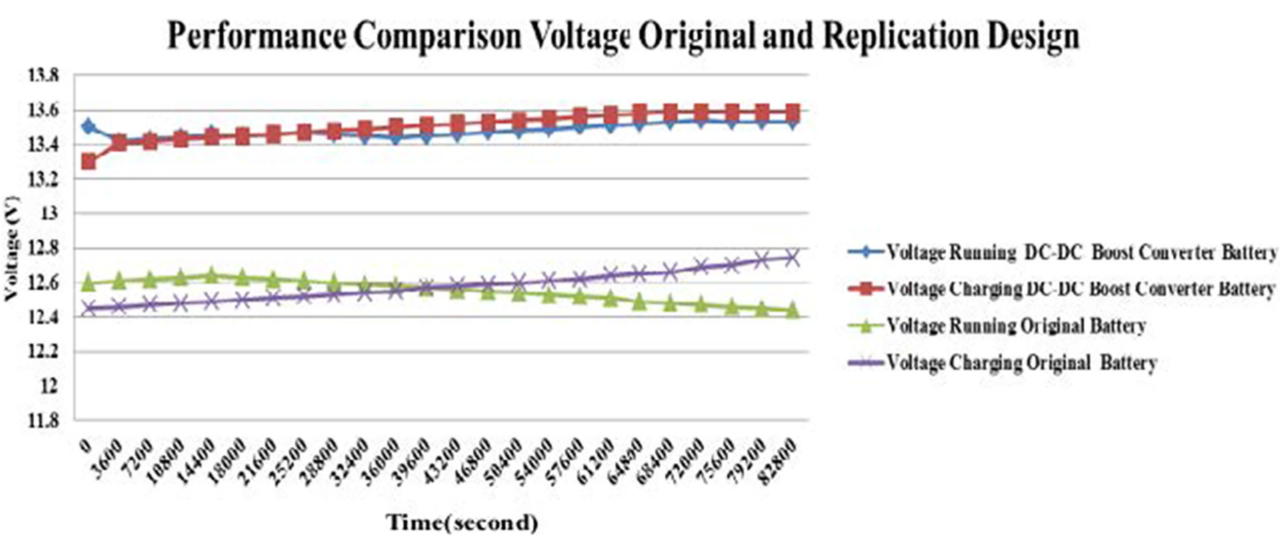

Fig. 11 Performance comparison for voltage battery running and charging original and the DC–DC boost converter replication designs

Table 2 Summarized results for both the original and replication designs

Original design	Replication design
Average time total: 19,350 s	Average time total: 19,350 s
Average speed: 1300 rpm	Average speed: 1300 rpm
Running battery	*Running battery*
Average power consume: 12.71 W	Average power consume: 23.68 W
Charging battery	*Charging battery*
Average power consume: 4.94 W	Average power consume: 8.02 W

Table 2 and Fig. 12 present the results for comparison in tabular and graphical form for both the original design and for the replication. On the basis of the results obtained, the time required for the replication design to run exceeds the power consumption since running increased by 23.68 W while the increase in charging was 8.02 W. The original design for running recorded 12.71 W while charging was 4.94 W. This can be explained by the performance of the step-up input and output voltage through the DC–DC boost converter circuit. Furthermore, the rpm averaged around 1300 rpm.

Table 3 and Fig. 13 reveal that the prototype Bedini six-pole neodymium magnet generator was able to achieve the objective of reaching COP > 1. However, the COP values obtained in the replication far exceeded the original design. Upon completion of four cycles, the COP increase obtained using the replication design averaged 1.87, while the original design COP reached only 1.63. On the basis of the COP data, it can be inferred that the battery running and charging DC–DC boost converter allows the Bedini six-pole neodymium magnet generator to achieve greater power transfer absorbance within a given time interval in comparison to the original design, and it is also therefore more efficient than the original.

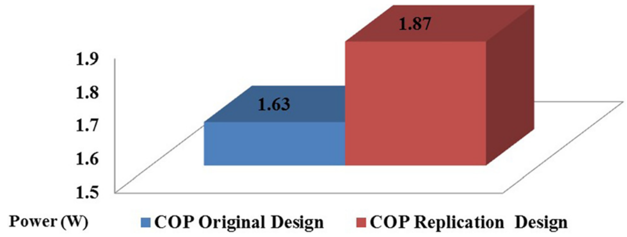

Fig. 13 Performance comparison COP for the original and replication designs

5 Conclusion

To conclude, the research study achieved its original objectives successfully, in improving the circuit battery charging and running via the DC–DC boost converter and the six-pole and eight-neodymium magnet, achieving an increase in COP is 12.83%. In addition, the replication circuit design is able to accomplish the running and charging more rapidly than the original design and thus offered better performance in comparison. The replication circuit design is therefore superior to the original circuit design. The invention of the Bedini magnet generator represents a

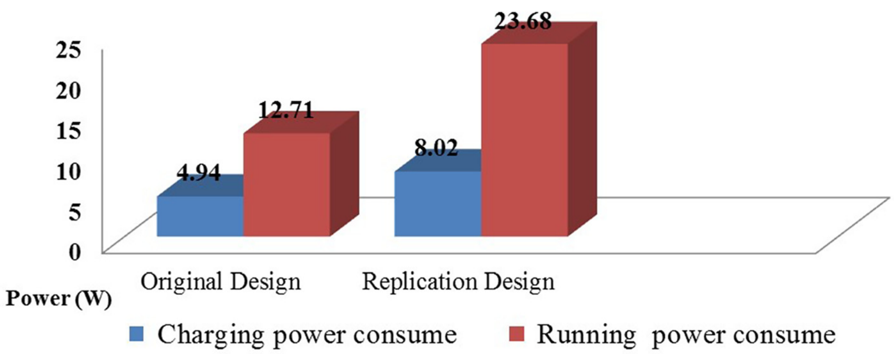

Fig. 12 Performance comparison power consumption (W) for the original and replication design

Table 3 Comparison of COP calculations for the running original and replication designs

	Input joules calculation original (charging)				Output joules calculation original (running)			
COP	Input (A)	Avg. (V)	Charging, T (s)	Input (J)	Load (A)	Avg. (V)	Running, T (s)	Output (J)
1.33	0.485	12.58	39,600	241,560	1.01	12.62	25,200	321,300
1.95	0.381	12.61	28,800	138,240	0.99	12.63	21,600	270,000
1.88	0.321	12.64	18,000	73,080	1.01	12.62	10,800	137,700
1.34	0.381	12.61	7200	34,560	1.02	12.60	3600	46,260
Average COP 1.63								
	Input joules calculation DC–DC boost converter replication (charging)				Output joules calculation DC–DC boost converter replication (running)			
COP	Input (A)	Avg. (V)	Charging, T (s)	Input (J)	Load (A)	Avg. (V)	Running, T (s)	Output (J)
2.13	0.086	13.30	39,600	45,144	0.40	13.05	25,200	131,544
2.19	0.082	13.24	28,800	31,104	0.42	13.15	21,600	119,448
1.73	0.081	13.20	18,000	19,080	0.45	13.25	10,800	64,395
1.44	0.078	13.05	7200	7344	0.51	13.33	3600	24,480
Average COP 1.87								

significant advance, which could have useful practical applications. The basic underlying concept of the Bedini magnet generator is the creation of free energy, but in addition, the generator also appears to offer the potential to improve approaches to back-up storage power management in vehicles or other machinery based upon rotation. This would potentially offer considerable benefits to future generations.

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