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Development of Magnetic Field Energy Generator: A Short Review

Azfarridzwan Muszaffarsham[1], Shahrul Azmir Osman[1,*]

[1]Faculty of Mechanical and Manufacturing Engineering
Universiti Tun Hussein Onn Malaysia (UTHM), Parit Raja, 86400, MALAYSIA

*Corresponding Author Designation

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Abstract: The primary issue with the conventional generator is it requires diesel or petrol to produce electricity. A standard 5-kilowatt generator will typically consume about 3 liters per hour. The price of fuel does fluctuate, which can make running this type of portable generators expensive over a prolonged period of time. Plus, it can be such a waste just to light up a stall. Thus, a view to overcoming both and noise pollution at the night market, a perpetual magnetic energy generator which is smaller in size, portable, light-weighted as well as easy to handle is proposed later in this research paper. In short, the research is focused on designing and developing an affordable Neodymium-based free energy generator that operates continuously without depending on any external source. The repulsive force between the Neodymium magnets produces a torque that serves as a prime mover for the rotor arm. So, the magnetic generator converts the mechanical energy gotten from the motion of magnets moving under repulsive force, into electrical energy using a DC motor. The DC motor will generate voltage to light up the lamp.

Keywords: Generator, Magnetic Field, Design

1. Introduction

Conventional power sources such as generators rely on fossil fuels or secondary power sources such as nuclear power or electricity derived by whatever means for its source of driving power. Thus, there is a need for a power source that is substantially pollution-free to operate, requiring substantially no external power, and is simple to maintain. The primary issue with the conventional generator is it requires diesel or petrol to produce electricity. Henceforth, in with a view to overcoming both and noise pollution at the night market, a perpetual magnetic energy generator that is smaller in size, portable, light-weighted as well as easy to handle is proposed later in this research paper. Moreover, a few designs and parameters based on previous studies of magnetic energy generators need to be taken into consideration in the development of the magnetic energy generator.

The objectives of this study are to identify the influence parameter that able to provide the energy from the magnetic field. Next, to design the prototype of the Magnetic Field Energy Generator and to evaluate the geometrical factor of Magnetic Field Energy Generator. The scope of study a design of a

*Corresponding shahrula@uthm.edu.my

magnetic energy generator is consists the type of magnet used, the concept of cylindrical form in designing a magnetic energy generator, the focus to energize up to 12-volt LED lamp.

2. Materials and Design

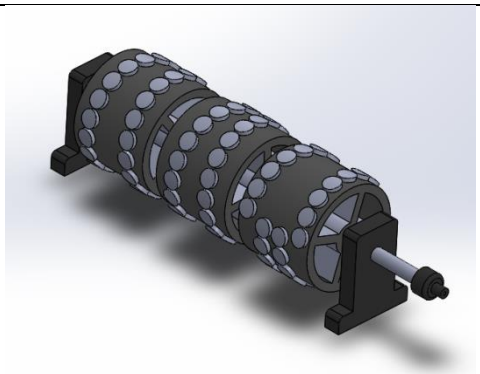
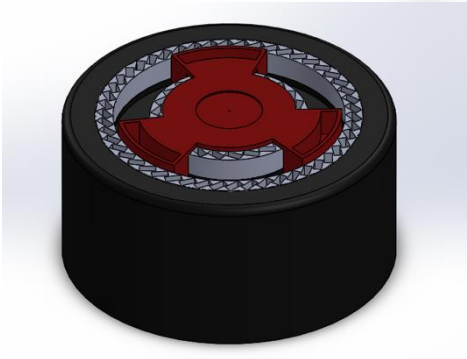
2.1 Materials

It is undoubtedly fair to use neodymium as a magnet for the development of a magnetic energy generator, as the neodymium magnet appears to have the strongest magnetic field, higher thermal stress, and better longevity. In this project, brushless DC motor tends to be a safer option in the application of the magnetic energy generator, as the BLDC motor has less overall maintenance due to lack of brushes, higher speed range and lower electrical noise generation, and a high efficiency and high output power to size ratio.

PLA contrary is a biodegradable thermoplastic that is derived from renewable resources, which makes it more environmentally friendly among other plastic materials like ABS and PVA. The other great feature of PLA is its biocompatibility with the human body. It does not leave any adverse effects when put in close contact with the human body. This allows using this filament for wide use in the medical industry. It is also significantly more shatterproof and flexible than the others. Furthermore, the preparation of PLA filaments for 3D printing was systematically investigated with a desktop extruder specially designed for household users.

2.2 Design

Table 1: The Designs

Name	Design of Magnetic Field Energy Generator	Design Information
V-Gate Design		• Push in vertically, upward or downward depending on how the pole of the magnet is arranged. • Has a metal rod and three rotors. • Require extra precision on the magnet holder.
Mihai Design		• Rotor part to be pushed sideways or horizontally by magnetic field. • Has one rotor to drive • Easier to determine the angle arrangement of the magnets.

3. Method

A simulation of the magnet array arrangement from the chosen design requires a specific test to measure and identify the forces acting on each other in order to certify that the design can be employed to keep the rotor rotating continuously. To verify that the essential processes work well, the test will be conducted using SolidWorks software with an EMS plug-in.

Fabrication process is a process where after the design process has passed the engineering concept assessment. This fabrication process involves several engineering processes, among them, 3D printing, drilling, and fitting process.

The purpose of this study is to introduce a more compact and practical perpetual magnets generator using Neodymium magnets which is able to generate adequate power to run tasks. In order to guarantee its practicality and functionality, several stages of experiments will be conducted which are the first stage of the evaluation is to study how the angle of each magnet affects the Magnetic Field Energy Generator's performance. The second stage of the test is to investigate the expected outcome affected form the geometrical factor of the Magnetic Field Energy Generator. For the third and final stage of the testing, a study does the selected design fulfil all the requirements for the Magnetic Field Energy Generator.

4. Result and Analysis

The first result that shown in Figure 1 is the force value acting on the single moving magnet at the initial starting position.

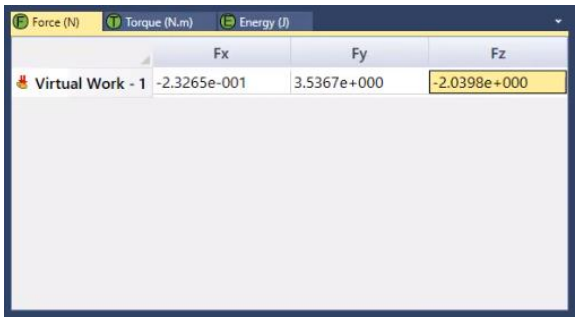


Figure 1: Amount of Force Exerted on Each Axis

Most of the force is going to be along the z-axis, the SolidWorks global coordinate system and the value is given about -2.0398 N. So, the starting force along the z-axis is going to be -2 Newtons. There is also a large y-axis force that makes the magnet can be moved out of the plane in which can take note of as the challenges in designing the magnetic energy generator.

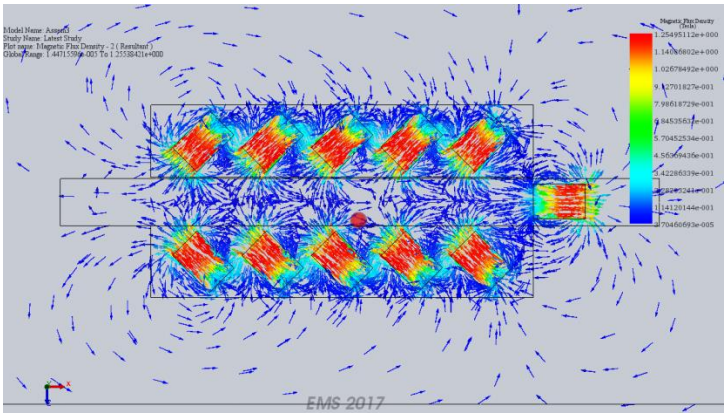


Figure 2: Magnetic Field Lines on Each Magnet

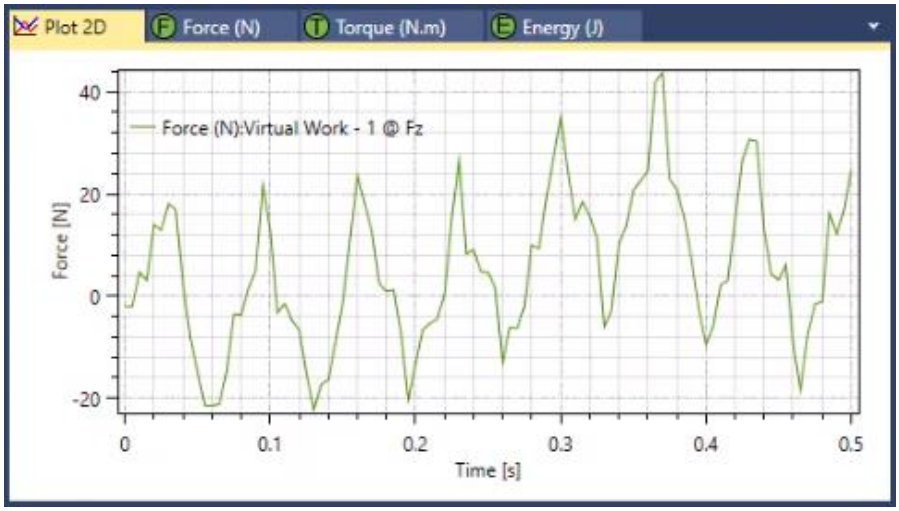


Figure 3: Amount of Force Acting on Moving Magnet

This particular result graph, it shows the force acting on the moving magnet. The force acting on the moving magnet shows almost periodic and tends to be mostly positive along the z-axis which tells that the moving magnet tends to accelerate forward when it goes through this arrangement.

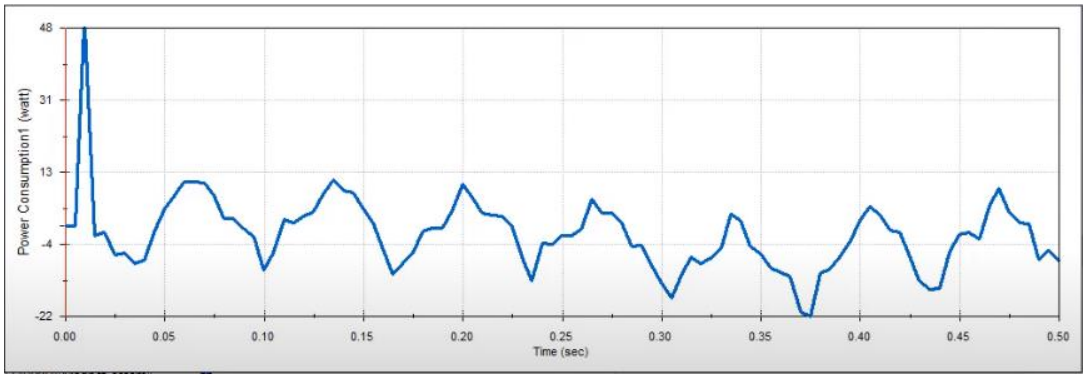


Figure 4: Power Consumption

Then, Figure 4 shows a graph for the power consumption of the motor that is used to push the magnet at a constant velocity. Noticed that the initial value on the graph is high. This is because it will need to supply some power to accelerate the magnet through the arrangement of other magnets. As the magnet get moving even the reading becomes negative, what it means is that the moving magnet system is actually producing power or in other ways, this also tells that the system is accelerating. Thus, this is how the EMS program can actually study magnetic systems and the motion of magnets and other components through an arrangement of permanent magnets.

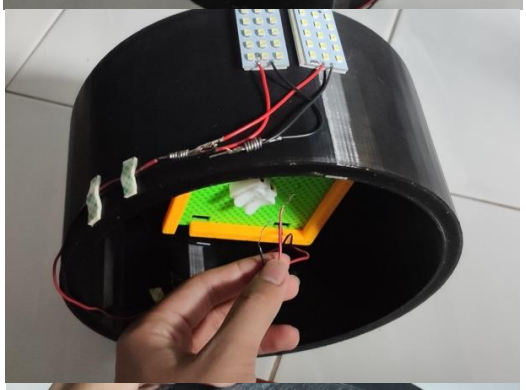
Magnetic Field Energy Generator was designed is due to the huge amount of electricity in term of lighting in night market stall. Although, this product was designed with light weight properties, because the product will be able to take anywhere. The final product design of Magnetic Field Energy Generator is as follows:

Table 2: Final Product Specification

NO.	CRITERIA	PRODUCT SPECIFICATION
1.	Performance	Magnetic Field Energy Generator is used to reduce the electrical consumption, especially in term of lighting. Also, this product is uses magnetic field principle to produce kinetic energy that will convert into electrical energy through two main components which are the stator and rotor.
2.	Operating Temperature	0ºC to 50ºC
3.	Price	RM 380
4.	Weight	700 g (0.7 kg)
5.	Packing Dimension	2 m (length) x 2 m (width) x 1.5 m (height)
6.	Material	PLA
7.	Estimate Lifetime	3 Years
8.	Number of Part	21 Parts
9.	Maintenance	Minimal (Bearing, Rotor part and LED)
10.	Reliability	Maximum 5% failure rate over their lifetime
11.	Finishing	Corrosion resistant to enable continued usage with minimal maintenance.
12.	Safety	This product is not requiring a large voltage. Maximum voltage is 12V only and it does not harm the user. The movement of blade are not producing any sound (dB).
13.	Ergonomics	This product can be set up by one person only.
14.	Testing	Build a prototype in order to proven to meet design specification and its function.

In this product there are 21 components excluded the 150 of Neodymium magnets. Each part is installed with manually and not using an automatic machine. Based on Table 3 shows the overall process of product development.

Table 3: Process Prototype

JOB DESCRIPTION	FIGURE
1. The initial step of developing a prototype is to insert the Neodymium magnets into the 3D printed magnet holder following the correct magnet pole.	
2. After the Neodymium magnets have been inserted into the magnet holder, the magnet holder will be assembled on the main body (stator).	
3. Next, connect the wiring from the DC motor to the two sets of the LED lamp by soldering. The battery also will be connected to the DC motor for the start-up.	
4. Assemble a bearing on the main body where the shaft will be connected.	

5. Assemble the 3D printed connector and shaft connector onto the DC motor. Then, attach the complete assemble motor to the main body. A few strong types of glue or double-sided tape will be needed in this process.

6. Last but not least, insert Neodymium magnets into the rotor. Then, assemble the rotor on the shaft which already connected to the bearing and the DC motor on the main body to complete the assembly.

As a result, the prototype of the Magnetic Field Energy Generator has been completely developed. The prototype starts to operate when the starting force was imposed by the battery to achieve high revolutions per minute on the rotor during the start-up. Then, the magnets on the rotor and the magnets on the main body (stator) produce repulsion forces which result in the rotor rotating directly as the theory of perpetual motion. Next, the rotating rotor is connected to the direct current motor by using the connector and the shaft to convert the torque to electrical energy.

Theoretically, the perpetual motion can occur when the starting force exerts on the shaft for the rotor to start rotates at a constant speed with the help of a magnetic field. However, for this prototype test, after the starting force from the battery has been removed, the rotating rotor becomes slow and stops after a certain time. The possible reason is because of the friction from the DC motor slowing down the rotational of the rotor even with the presence of bearing.

5. Conclusion and Recommendation

Newton First Law states that an object either remains at rest or continues to move at a constant velocity unless a force acting upon it. To maintain a constant speed on the rotor, the magnetic force from the Neodymium magnets must act continuously on the rotor. To keep the rotor spinning at a steady speed, the magnets had to be arranged at a specific angle. The angle of the magnets must first be analysed for the rotor to move perpetually at a constant angular speed.

The law of conservation of energy asserts that the total energy of an isolated system remains constant over time and is therefore considered to be conserved. Energy cannot be generated or destroyed, simply converted from one form to another, according to this law. Because this prototype generates power using free energy from magnetic energy, it violates the rule of conservation of energy because energy cannot be created. However, it has been demonstrated in this prototype development that the Magnetic Field Energy Generator can still produce energy, but only for a limited amount of time. The Magnetic Field Energy Generator, however, can be upgraded to generate energy for a longer

amount of time with the help of force during start-up and the addition of a control system to manage the start-up forces. This can be added to the generator's recommendation later on in the project.

Based on final product outcome, it can be concluded that the objectives of this research have been achieved which are to provide energy from magnetic field. In addition, it has been demonstrated that the perpetual motion may still be used to generate energy while using a magnetic field.

The use of Neodymium magnets in this project to generate energy from the magnetic field has been demonstrated through the creation of the Magnetic Field Energy Generator. As can be shown, energy generators can be utilised for a long time and have no negative impact on the environment.

There are various parameters to examine to make the best use of this product application. To begin, the target area should be considered while employing this product, such as the night market. Then there was the question of how much voltage should be generated to accommodate the use of lighting. The energy generator then performs without making any loud noises, which is an improvement over a conventional energy generator. Finally, the product designs are a significant role in this research. This study only looks at two sets of LED bulbs. As a result, the design product is not too big and can be easily carried.

Furthermore, the rise in air pollution in Malaysia is becoming hazardous. As a result, our air is less healthy as a result of the use of vehicles, and the use of fossil fuel electricity generators also contributes to the problem. Coal-burning, for example, produces a lot of smoke and dust, which can be harmful to the health of the people in the area. As a result of this research, it can be determined that the process of creating an energy generator using the perpetual motion from magnetic field energy is possible.

Several adjustments are needed, according to product testing. This is done to maximise the impact of the product's consumption. Several parts below that can be improved, such as

I. Improvement Rotor Design

Based on the previous design of the rotor part, it can be improved by adding a bone structure on each arm of the rotor in order to improve the durability of the rotor part. The small improvement on the design of the rotor part also can avoid the rotor part from bending due to rotation and the reaction between the magnets on the rotor and the main body.

II. Adding Gear System

In this development of Magnetic Field Energy Generator, there is no gear system used between the connection of the rotor, shaft and DC motor. By adding a gear system, it can transmit a high torque value to the DC motor. With a gear system also, the generator can be used even at low speed. Therefore, the efficiency of the Magnetic Field Energy Generator can be increased.

III. Adding Control System

A control system can be added to the Magnetic Energy Generator, as indicated in the conclusion. The rotating speed of the rotor will be detected by a control system. When the control system detects that the rotor's rotational speed has slowed, the battery will automatically be switched on to apply force on the shaft, causing the rotor to speed up again.

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