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High Electricity Generation using Oscillations of Pendulum

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Abstract

Power generation is one of the major factors in the recent years. To reduce this problem resources like solar energy, wind energy, thermal energy, hydel energy, nuclear energy, etc. have been used. Since with all these above energy resources, we are facing power crisis due to many factors. Future energy sustainability depends heavily on how the renewable energy problem is addressed in the next few decades. The main problems with these energy sources are cost and availability. Wind and solar power are not always available where and when needed. So to avoid these problems renewable energy sources can be used. In this project, the simple pendulum concept is used. The simple pendulum setup with gear mechanism and wiper motor through a PIC microcontroller and relay is employed as it does not require large external energy. The gear mechanism and wiper motor is used along the simple pendulum in order to obtain continuous oscillations where the mechanical energy is converted into electrical energy.

Keywords: *Simple pendulum, gear mechanism, relay, PIC microcontroller*

INTRODUCTION

Power generation is one of the major factors in the recent years. To reduce this problem resources like solar energy, wind energy, thermal energy, hydel energy, nuclear energy, etc. have been used. Since with all these above energy resources, we are facing power crisis due to many factors. The factors includes that, the wind turbines require heavy towers, and huge blades, which impact the environment and these types also faces problems in terms of cost and availability [1, 2]. Industry must overcome a number of technical issues to deliver renewable energy in significant quantities. Control is one of the key

enabling technologies for the deployment of renewable energy systems. Solar and wind power require effective use of advanced control techniques. In addition, smart grids cannot be achieved without extensive use of control technologies at all levels. These problems can be overcome by alternative sources that are renewable, cheap, easily available, and sustainable [3–6].

However, current renewable technologies have limitations. Indeed, even the most optimistic forecast on the diffusion of wind, photovoltaic, and biomass sources estimates no more than a 20% contribution to total energy production within the next 15–20 years.

To avoid these problems renewable energy sources can be used. In this method we use simple pendulum concept which is a form of renewable energy source. By using this method, the cost for the energy production will be very less and it does not require any external energy unlike other power plants. Power produced using pendulum concept is a renewable and virtually inexhaustible power source, is a promising means of green energy production [7–10].

BLOCK DIAGRAM

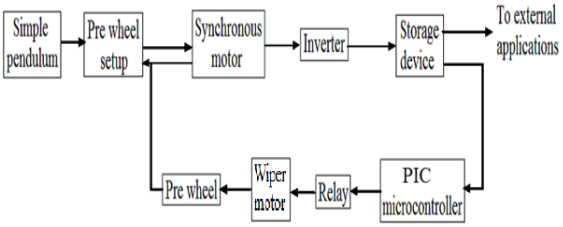

Fig. 1: *Block Diagram of Proposed System.*

DESCRIPTION

A simple pendulum setup is made with a curved rod attached at the top of the arm (string). The pendulum is connected to a pre wheel arrangement as shown in the Figure 2. The shaft attached with the pre wheel is connected to a synchronous motor which produces a.c power. The a.c power produced from the synchronous motor cannot be directly stored on the battery. So, an inverter circuit is connected to the synchronous motor for converting the a.c power into d.c power. The d.c power obtained from the inverter is then stored in the storage device like battery. 70% of power stored in the battery can be used for external applications and the remaining 30% of power will be reused for obtaining continuous oscillation in the pendulum. The remaining 30% of power is given to the PIC microcontroller. The microcontroller is

programmed to turn ON the relay in a periodic basis. The time period for the relay to be turned ON will be 3 seconds at a time interval of 7 seconds. The power from the relay is given to the wiper motor. Wiper motor will be attached with the pre wheel arrangement which is connected to the pendulum. The pre wheel will rotate for a time period of 6 seconds which oscillates the pendulum [11–14].

EXPERIMENTAL SETUP

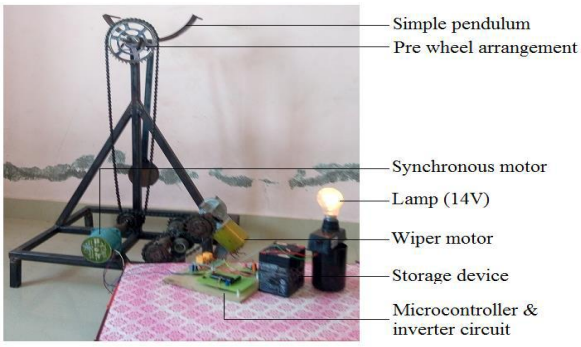

Fig. 2: *Hardware Setup.*

The hardware setup for efficient power generation through simple pendulum is shown in Figure 2.

RESULTS

Table 1: *Output of the Propose System.*

S. No.	Time (secs)	Voltage Rating (volts)	Current Rating (amps)
1.	3	39	1.9
2.	6	28	1.1
3.	9	10	0.5
4.	12	40	1.9
5.	15	27	0.9
6.	18	7	0.4
7.	21	40	2.0
8.	24	25	1.0
9.	27	9	0.3
10.	30	39	1.8

The output generated by the proposed system and its voltage and current rating is shown in the above Table.

CONCLUSION

Thus, the power generated through the simple pendulum concept is a promising means of green energy production which is more economical and efficient when compared with other power production resources. The main advantage of simple pendulum power production over wind, solar, hydel energy power production is, it does not require large space and the production and maintenance cost will be very less. In the present scenario the power obtained from the power plants like

solar, wind, hydel, etc. are not cost effective. So, the power produced from the simple pendulum concept will reduce the environmental impact of the whole electricity supply system.

FUTURE SCOPE

1. The standalone energy systems depend upon climatic variations so by using simple pendulum power generation concept we overcome this disadvantage and in addition to this more power can be generated.
2. By the power generation through the simple pendulum concept along with wiper motor mechanism for obtaining continuous oscillation in the pendulum, maximum power can be generated which can be used in rural electrification.

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