Electricity Generation using Gravity Light and voltage Controller

Aditi Ingale[1], Bhagyashree Pachore[2], Prajakta Patil[3], S.S. Sankpal[4]

[1,2,3]*B.E. Student, Department of Electronics & Telecommunication Engineering, P.V.P.I.T., Budhgaon, Maharashtra, India*
[4]*Assistant Professor at P.V.P.I.T., Budhgaon, Maharashtra, India*

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Abstract - *Now a days population is increased by day by day so it is very necessary to generate electrical energy. For that purpose the power generation from Gravity light is a revolutionary new approach to storing energy and creating illumination. Here we generate power from gravity and simultaneously store the energy in the battery. In this we use Arduino based voltage controller circuit. When the voltage level is less than threshold level then battery will charge and when voltage level is equal to threshold level then battery stop charging. This stored energy we use multiple lamps or other applications.*

*Key Words***: Innovative, Gravitational Energy, DC Gear Motor, Electrical Energy**

1. INTRODUCTION

With a growing world population 20% of the world's population do not have access to electricity. That's 1 in 5 people. This number is projected to remain the same.

Without electricity, most of these people have no other option but to use kerosene lamps to light their homes. A typical lamp is made by taking an empty bottle or tin can, putting a wick in the middle, filling it with fuel and lighting. According to a survey, the use of kerosene results in vastly higher cancer rates due to smoke Inhalation, and 2.5 million burn victims due to dropped or jostled lamps every year in India Alone. The problem of bringing light to remote parts of the developing world has been tackled in the past with everything from solar-powered lamps to wind-up devices and rechargeable Batteries – all of which require relatively expensive kit or physical effort by the user.

The other renewable sources such as solar, wind, biomass etc are available only for a particular duration of time during the day and night. Therefore, the gravity power generation is one of the methods to generate power which fulfill energy demands and requirements of present time. It is possible to deflect gravitational action away from an object so that the object is partially deviated. That effect makes it possible to extract energy from the gravitational field, which makes the generation of gravitational electric power technologically feasible. Such plants would be near about similar to hydro-electric plants.

Gravitational electric power plant has advantages over the hydro-electric plant, such as not needing of fuel and not polluting the environment. However, the gravitational electric plant would be much smaller than hydro-electric plants. The location of that plant would not be restricted to suitable water elevations and gravitational electric power plants and their produced energy would be much expensive.

2. OBJECTIVE

1. An eco-friendly solution for domestic & street light.

2. Usage of stored muscular energy.

3. Generating significant amount of power for domestic application.

4. Practically tested results and mathematically evaluated results are to be compared.

5. Concept of electricity generation using gravitational potential energy.

3. LITERATURE SURVEY

As per R.S.Ambade et al[1] Conserving energy has become the biggest issue in present scenario. Due to the development and modernization the electricity demand is increasing at high extent. To fulfill this demand globally which is without any harmful effect on environment is possible by using gravity power generation. The reason behind generating power by using gravity is that it is available all over the earth. As per Abhirama Rai K et al [2] Gravity Light is a gravity-powered lamp designed for harnessing gravitational energy into useful electrical energy. It uses a bag filled with rocks or any heavy objects, attached to a cord, which slowly descends similar to the weight drive in cuckoo clock. This action powers a generator which lights up an LED bulb. Its basic principle is conversion of potential Energy into kinetic energy in a smart way. As per Keerthan gowda R J et al[3] From Recent circumstances man has been in quest for energy to take care of his consistently expanding demand. These days the general public has woken up to the immense dangers of contamination and a dangerous atmospheric devation caused by fuel based energy sources.
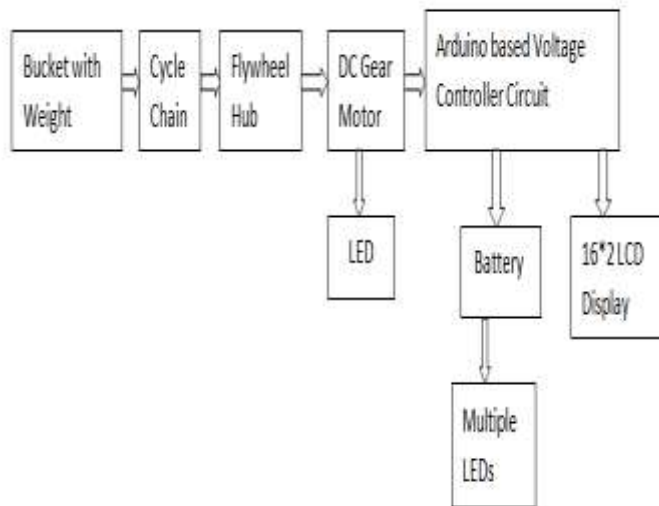
4. METHODOLOGY

4.1 Block Diagram

Fig (1). Block diagram of Gravity Light

4.2 Working

The working of gravity light is based on the three basic physics fundamentals i.e. Potential energy, Kinetic Energy, Gravity Force. The Bucket with the load is connected to both the ends of the cycle chain resulting in potential energy. The weight attached on both the ends are variable. 2.5 Kg weight is placed on one end and 0.5 Kg weight is placed on other end in order to balance the model. The Cycle chain is placed on the saw tooth pics of the Flywheel Hub.

The Flywheel Hub is used to support and hold the Cycle chain with the weight. The DC Gear Motor of 60 r.p.m is connected to the Flywheel Hub. When the Weight is attached on both the ends the Flywheel starts rotating in the direction of maximum weight and the buckets tends to roll down resulting in rotational motion of the hub. As the bucket rolls down the motor runs and the LED connected to the DC Gear motor Glows.

The time period of glowing the LED is around 10 min. When the bucket with 2.5 Kg weight reaches the bottom, it should be replaced at the initial position manually in order to repeat the same, thus making the use of muscular energy and not using additional circuitry.

The time that the device can be continuously operated varies depending on the weight of the ballast. However, from our testing and analysis, it was concluded that the average time is between 10-12 minutes for 2.5 Kg and 0.5 Kg weights. After this, the bucket has to be recalibrated. The intensity of this light produced can also vary. It depends on a number of factors such as the type and rating of LED bulb connected and the quality of the DC motor that is used. However, the light produced from this device is a type of long lasting continues light without any fluctuations or dim light.

When the bucket is suspended, the potential energy is converted by gravity to the kinetic energy with a slow descent of the bucket. The converted energy then generates light. The gravity light can be operated for 30 mins continuously before the bucket needs to be refilled. The strength of the light can be adjusted from strong lighting to long-lasting low-level lighting.

An Additionally Arduino based voltage controller is attached to the DC gear motor in order to display the voltage generated using gravity light. 16*2 LCD Display is used to display the amount of voltage produced at the output of the mechanism. Also, a 12V battery is used to store the voltage produced by the gravity light when the weight is suspending to the bottom i.e., we are simultaneously glowing the LED as well as storing the energy in the battery in order to use for other applications like Mobile Charging or for additional connections for Lamps.

5. COMPONENTS USED

5.1 Flywheel

In this project the free wheel and the free wheel hub is used to carry the rotation in one direction with the help of chain with respect to the load applied on both the ends of the chain. It is also used to sustain the load attached to it as it is robust. Free wheel is used to mount the chain mechanism and it performs the rotation motion as the weight starts to come down. The freewheel is continuously kept tight, as chain torque is in the right-hand direction.

Fig (2). Flywheel

5.2 Arduino

Arduino is low cost. Arduino quad with 1GB RAM. Arduino can be used to develop stand-alone interactive objects or can

be connected to software on your computer. Arduino is an open-source physical computing platform based on a simple i/o board and a development environment that implements the Processing/Wiring language. The Arduino Uno Rev3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.
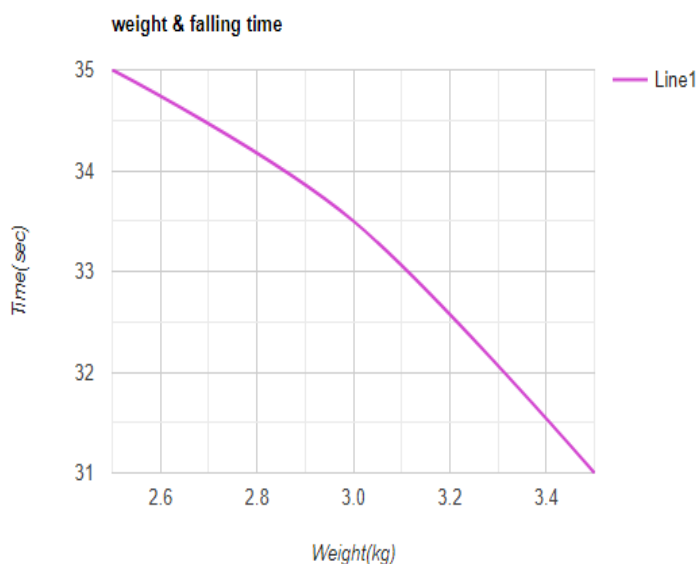

Fig (3).Arduino

6. RESULTS

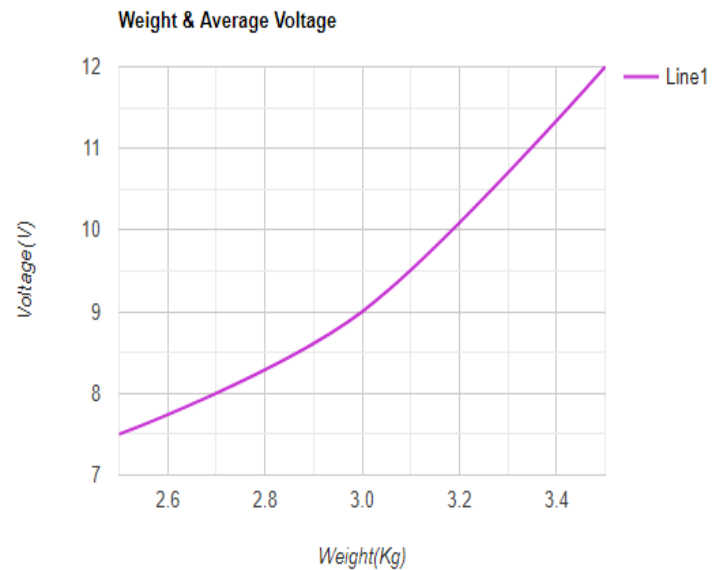**Fig (4). Weight vs Falling Time**

Fig (5). Weight vs Average Voltage

6. CONCLUSION

Electric lighting can be easily taken for granted. Millions of people in the developing countries do not have the luxury of electricity and depend on kerosene lamps. Kerosene is expensive and inhaling the fumes of kerosene is dangerous. An inexpensive renewable and sustainable gravity-powered light could indeed be an appropriate solution for lighting demands across the world. Generation of gravity power can be increased by applying much higher load at the end of the sprocket. Though heavy load increases the voltage and current of DC motor but decreases the lighting time of the LED. Applying heavy load, it may cause bending to the shaft and stand. So a suitable mass must be used to fall it as much long time as possible. Due to low gear ratio there is a power loss in a great extent. Gravity light needs no operating cost, so it can be operated as the demand of the light. In the remote areas, it may play a very important role for studies and educating children as well as fulfilling the power demand. Moreover, the power can be stored in the battery so that it may be very helpful during emergency situations.

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