

# SMART LAMP USING GRAVITY

Yathish kumar<sup>1</sup> A, Vasu M K<sup>2</sup>, Udayshankar T M<sup>3</sup>, Reshma<sup>4</sup>

Department of Electrical and Electronics Engineering,  
Vidya Vikas Institute of Engineering and Technology, Mysuru , Karnataka,India-570028

**Abstract:** This smart lamp using gravity power and pulley mechanism is harnessed by using few electrical components and naturally occurring gravitational force of the earth. It uses a bag filled with rocks or any heavy objects, attached to a cord, which slowly descends similar to the weight drive in 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. The light can be turned on by filling the Bag with approximately 10kg of weight and lifting it up to the base of the device. the weight falls over an extended period of time, pulling a strap that spins gear and drives a generator, which illuminates low power LEDs. The installations is simple and costs less and durability is also high.

## 1. Introduction

The gravity light uses the simple force of gravity which is universally available in every location. In some parts of the world lighting is provided through expensive and polluting kerosene, kerosene lamps are hazardous to health and environment and constantly require replenishment. Fumes which are raised from burning of biomass can cause eye infection and various health issues. It was estimated that nearly 2.5 million people in India alone severe burns from over turned kerosene lamps every year as well as the vast amount of carbon dioxide produced.

The invention has made noticing the crisis and the cost involved in alternate forms of energy such as solar energy devices. This is a boon for developing nations and ruler people where a large number of people still use fossil fuel for the lighting purposes. The fossil fuel cost less than then other renewable devices such as solar panels, wind mills and hydel. But this smart lamp using gravity power costs less than those renewable devices and requires less maintenance.

### 1.2 OBJECTIVE

The goal of this project is to bring awareness in the people regarding the use of clean energy sources. Give alternatives to the existing clean energy techniques which are considered to be expensive. Help young enthusiasts develop their own clean energy devices. And also to develop a realistic alternative to Kerosene lamps by harnessing the power of gravity.

## 2. METHODOLOGY

Free fall of any weight would take seconds to reach ground for a height of fall, say 1.5 -2 meters. With our device we are creating a high resisting torque using Ac synchronous motor which makes the suspended weight, difficult to descend down rapidly. We apply the weight at the sprocket end which is attached to a shaft on which a larger diameter wheel is fixed. And the wheel is connected to a smaller pulley using a Belt which in turn is connected to the motor. Because of the gear ratio small rotation in sprocket end makes the pulley turn faster which in turn runs a synchronous motor to produce uninterrupted electricity .Input energy is muscle power. An average person can lift weights up to 10 kg with ease. Hence, our product is designed keeping weight factor in mind. In scoping out likely performance, some further numbers were needed next to important parameters. For these, a lift height of 8 feet was set (2.5m), as this is achievable by an adult with arms raised above their head, the drop time is around 10-15 minutes and it depends on the height of the stand and mass that we used

Once it is done the output of the ac synchronous motor is connected to a Rectifier which converts AC-Dc , with this enhancement we obtain 12v DC power that can be stored using a battery.

### 3. Design and components



SL NO	COMPONENT	QUANTITY	PRICE IN INR
1	Synchronous Motor	1	100
2	Bicycle Wheel	1	300
3	Sprocket	2	200
4	Chain	1	50
5	Pulley	1	100
6	V Belt A95	1	300
7	Mild Steel shaft	1	50
8	U Clamp	1	20
9	M12 Bolt	2	8
10	M6 Screw	2	4
11	Washer	8	16
12	Wood piece	2	30
13	0.5W LED Bulb	1	80
14	Ac To Dc Circuit	1	50
15	Labor Cost		50
TOTAL COST			1358.00

Fabrication of lamp

#### 4. LDR Sensor

We can control the lights manually, but it is time taking and also time lagging chances are there so, the electronic light control has provision to control the light. LDR is a light dependent sensor whose resistance varies with light. Its resistance decreases with increase in light. Thus it senses the light and it switches on the lighting system when there is no light.

#### 5. Results and Discussions

The Following assumptions were made for calculations:

- \* No Slip in Belt drive
- \*Frictional Losses Are Negligible

Plotting for lighting time:

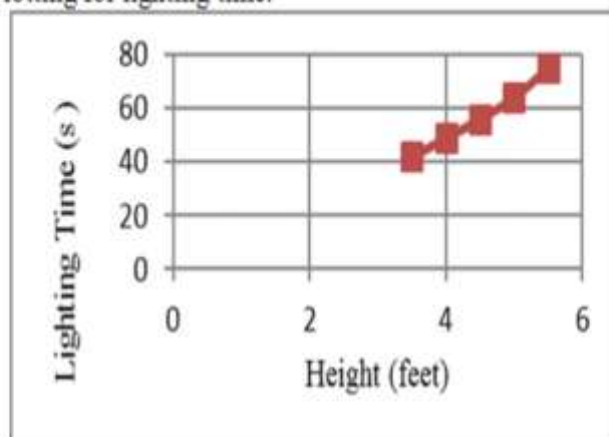


Fig.5.1: Graph of lighting time(s) vs. height(feet) .

Observations	Weight (kg)	Voltage (V)	Current (mA)	Lighting Time (seconds)
1	1.0 kg	3.2	12	42
2	1.5 kg	3.6	15	38
3	2.0 kg	3.9	17	34
4	2.5 kg	4.3	19	29
5	3.0 kg	4.7	22	26

Table 5.2: Observation of voltage and currents for different masses from a fixed height (3.5feet)

Plotting for voltage and weight from 3.5 feet:

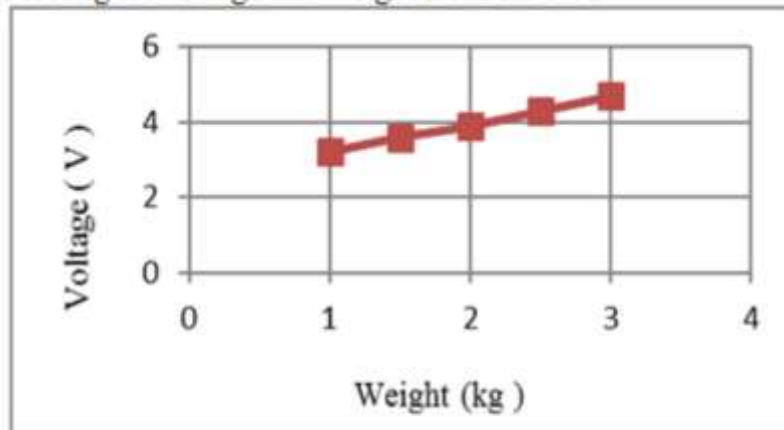


Fig5.2: Graph for voltage (v) vs. weight (kg).

Plotting for current and weight from 3.5 feet:

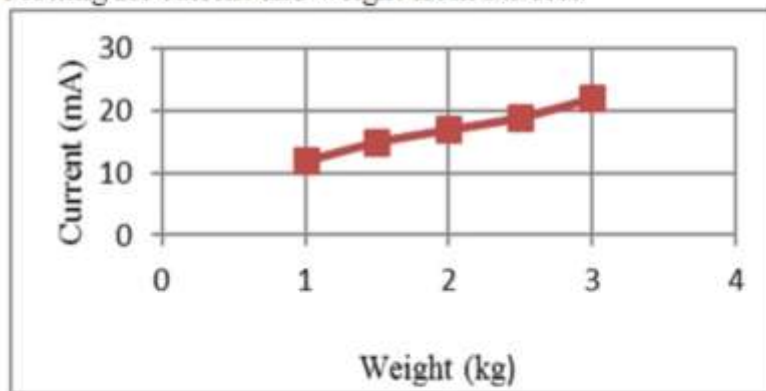


Fig 5.3: Graph for current (mA) vs. weight (kg)

## 6. CONCLUSION

Hence, we conclude that, gravity light meets all these drawbacks and its advantages over others are,

- \*Lower expenditure on lighting and increased income
- \* Safe, cheap and clean light
- \* Access to better energy solutions
- \* Increase time for productivity and lower fuel overheads
- \* Ability to study after dark
- \* Ability to work after dark
- \* Eliminates health hazards of kerosene lamps: Burns, fumes and eye infections

## 7. SCOPE FOR FUTURE WORK

Fall time achieved is around 12 min. It can be made up to 25min to 30 min thus reducing the manual effort.

Use a taped wire instead of Industrial V Belt. Slip will occur but one can find other easy measures to avoid it.

Overall size can be reduced i.e. making it compact using very high torque motor or by increasing resisting torque Improvement in LED technology will boost Gravity light's performance further.

With watts of power it generates, Gravity Light provides a light superior to kerosene lamps and can also power other devices, such as a radio.

One can make provision for DC jack at the back of it for connecting rechargeable LED bulbs and/or other devices.

**References**

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