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Production of Electricity Using Solar Cells

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Abstract: ***We efficiently produced electricity from the natural available source the Sun. The electrons can be stored in NI-MH 1.2 V ultra-fast charge VIPOW battery. We used two such batteries each having 1.2 V. The required time to convert photon energy into electrical energy (electrons) stored in batteries tabulated in table 1. Our results signifies that there is certain time required to convert photon energy into electrical energy. We achieved electrical energy upto 2.4 Volts as per our objective defined in student research project. Authors one to three B.Sc. Second year (2020-2021) undergraduate students successfully assembled the solar kit.***

Keywords: Solar energy, Electrical energy, VIPOW 1.2 V Battery, the Sunlight, Solar kit, Photons.

I. INTRODUCTION

Growing global population, industrialization the demand of energy per capita increased continuously [1-2]. The suitable solution to overcome on the energy crisis is solar energy. A solar energy is available naturally and there is no environmental pollution as well [3-4]. Solar energy utilized to generate electricity using solar cells or panels. This acts as source of renewable energy on the Earth. The solar power play vital applications in various fields including solar electric power generation, industries, solar panel based running vehicles, space application and other numerous uses. The solar energy is considered as alternative energy source in the future [5].

We assembled solar cell or photovoltaic cell basic circuit enables to convert light energy (photons) directly into electricity by photovoltaic effect. The solar cell is a simple photoelectric cell which electrical characteristics gives response to voltage, current and resistance vary when exposed to light respectively. It is termed as photovoltaic modules or solar panels.

We selected B.Sc. Second year students to design and perform the solar project entitled “production of electricity using solar cell. The main objective of the student research project is to develop research skill among the undergraduate students.

II. METHODS

To assemble the proposed student research project, we purchased the following particulars to execute the said project.

Table 1: The required electrical and non- electrical component summary

Sr.No.	Name of particulars/items	Function	Quantity
1	Ultrafast charge battery VIPOW 1.2V	Storage of energy	20
2	The solar panel	Convert photo electrons into electrons	10
3	LED bulb	light energy	10
4	Speaker	sound energy	10
	Motor	Electrical mechanical energy	10
5	Voltmeter	Electrical energy	10
6	cables	To connect desired electrical point	10
7	Plastic grooves	to put VIPOW batteries	10
8	Springs	to fix VIPOW batteries	20
9	Wooden blocks	To assemble all components in wooden block	10

All the above electrical and non-electrical components were connected as discussed below: Firstly, we assembled all components shown in fig.1(a) which includes two batteries each having 1.2 V capacity to store the charge. The Fig.1(b) indicated silicon made solar panel and connecting cable.

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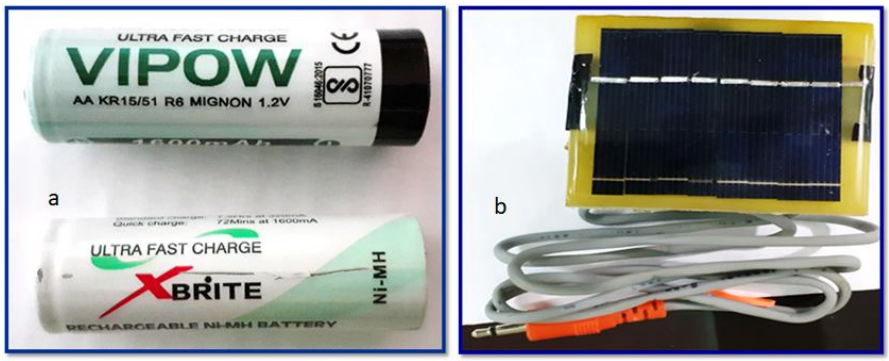


Fig. 1 (a) Battery 1.2 (b) solar panel or photovoltaic module or solar cell.

We installed the solar panel in front of department of Physics, in such a way that there is maximum sunlight falls on its surface so as to photoelectrons generates from the surface of solar panel and it stores in batteries.

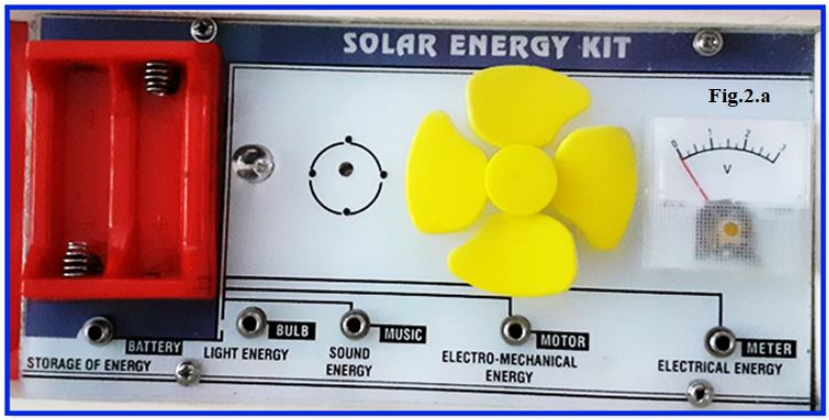


Fig.2 (a)The solar related components mounted in wooden block as shown in fig.2a.

Figure 2(a) represents the all required components can be assembled in wooden box or block. First there is two slots are fitted to put 1.2 V batteries to store generated electricity from sunlight. After that light energy-LED, sound energy-speaker, electromechanical energy-fan, electrical energy-volt meter were constructed in series as shown in above fig.2(a)

III.RESULTS AND DISCUSSION

The solar cells or photovoltaic (PV) cells implies photo means light and voltaic means electricity. It converts directly sunlight into electricity. A module is a group of cells and electrically connected and packaged into frame called as solar panel as well.

The main feature of the solar cell is the voltage of the cell does not depend on the size of cells its constantly changing due to variations in light intensity. The current in device is directly proportional to light intensity.



Fig.3 Experimental setup assembled and connected by B.Sc.S.Y.(optional Physics) students.

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We studied the production of electricity using solar cells by means of connecting solar panel to its allied electrical components as shown in below figure 3. The reading data for solar panel as tabulated in table 2.

Table 2: Reading data form solar panel

Time in Minutes	Steady solar panel exposed in sunlight		
	Voltage (Volts)	Current (Amperes)	Power (Watts)
05	0.1	0.1	0.01
10	0.2	0.2	0.04
15	0.3	0.3	0.09
20	0.4	0.4	0.16
25	0.5	0.5	0.25
30	0.6	0.6	0.36
35	0.7	0.7	0.49
40	0.8	0.8	0.64
45	0.9	0.9	0.81
50	1.0	1.0	1.0
55	1.1	1.1	1.21
60	1.2	1.2	1.44
65	0.3	0.3	1.69
70	0.4	0.4	1.96
75	0.5	0.5	2.25
80	0.6	0.6	2.56
85	0.7	0.7	2.89
90	1.8	1.8	3.24
95	1.9	1.9	3.61
100	2.0	2.0	4.00
105	2.1	2.1	4.41
110	2.2	2.2	4.84
115	2.3	2.3	5.29
120	2.4	2.4	5.76

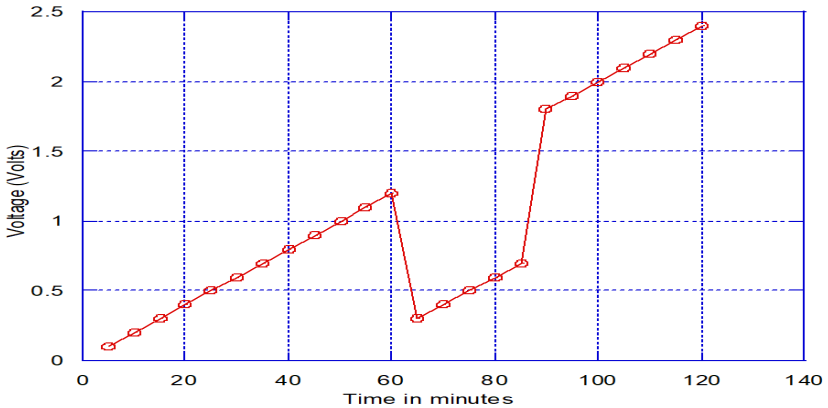


Fig.4 The variation of time in minutes versus voltage in Volts.

The figure 4 indicates the plot of variation of time in minutes versus voltage in Volts obtained from solar panel when it is exposed to sunlight. There is continuous increase in voltage 1.3 volts after that there is sudden decrease 0.3 volts as shown in fig.4.Again it gradually increases 0.6 and onwards it suddenly increases 1.7 volts. After that continuous increase in voltage was observed upto 2.4 volts as shown in above plot 4.

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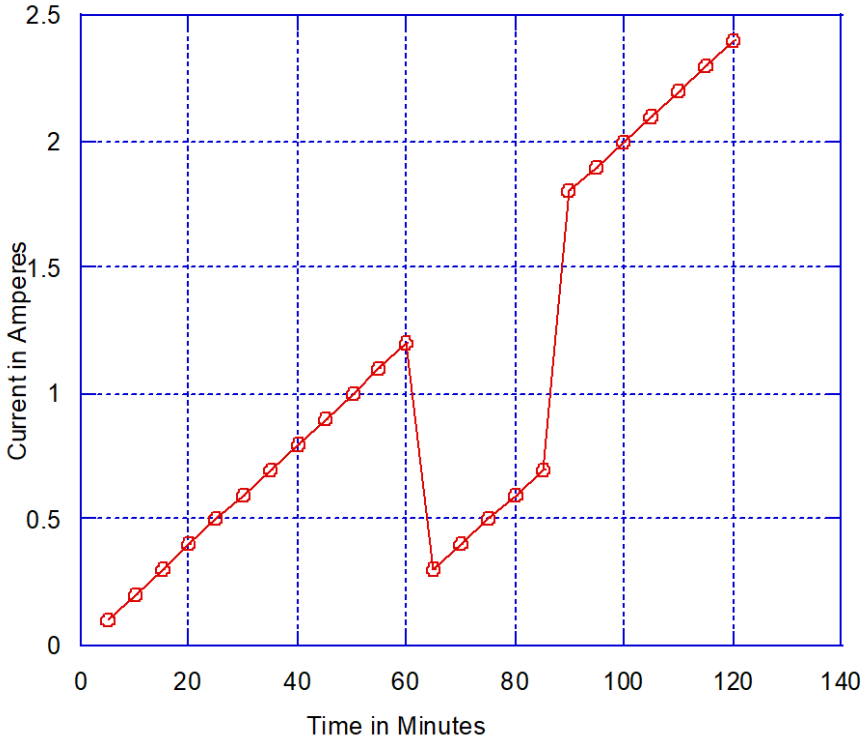


Fig.5 The variation of time in minutes versus current in Ampere.

The figure 5 indicates the plot of variation of time in minutes versus current in Amperes obtained from solar panel when it is exposed to sunlight. There is continuous increase in current 1.2 amperes after that there is sudden decrease 0.3 ampere as shown in fig.5.Again it gradually increases 0.5 ampere and onwards it suddenly increases 1.6 amperes. After that continuous increase in voltage was observed upto 2.4 amperes as shown in above fig. 5.

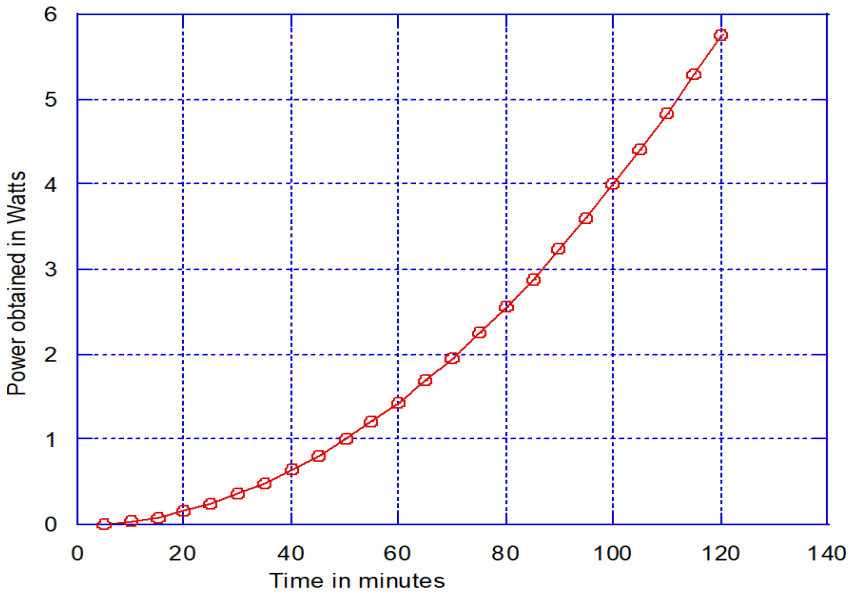


Fig.6 The variation of time in minutes versus power in Watts.

The figure 6 represents the plot of variation of time in minutes versus power in Watts, obtained from solar panel when it is exposed to sunlight. There is continuous increase in power from 0.01 Watts to 5.76 Watts as shown in above fig.6.

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IV. CONCLUSIONS

Our B.Sc. second year student's academic year 2020-21, successfully assembled, connected all the components of solar cell project and able to record the data from solar panel as shown in table 2. The objective of the student research project hence completed. Reading data from solar panel shows that there is voltage and current initially increases after some time it decreases again it continuously increases. However, the power in Watts remains continuously increases. However, the solar panel continuously absorb the photons from sunlight and generates the electricity. The 1.2 Volts two batteries having total 2.4 Volts voltage developed in the assembled circuit with 2.4 Ampere current. The total power generated from 2.4 V is 5.76 Watts as tabulated in table 2 and figures 4 and 6 respectively.

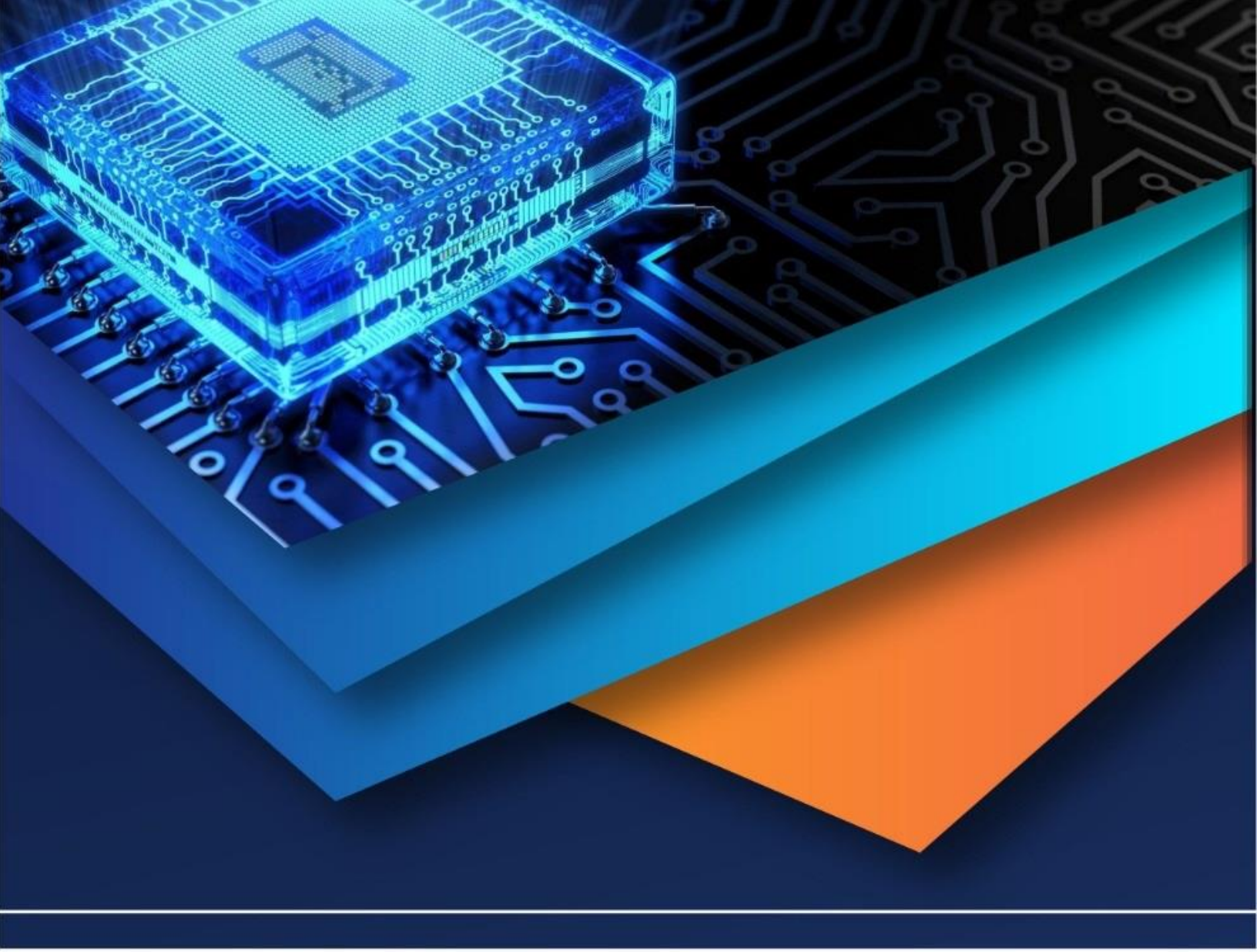
V. ACKNOWLEDGMENT

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