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## EXPERIMENTAL STUDY AND ANALYSIS OF POWER QUALITY MEASUREMENT OF PHOTOVOLTAIC CELLS WITH VARIOUS PARAMETERS

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### Abstract:

*The Solar panels are on a mount that follows the sun. These are optimizing output by following the sun across the sky for maximum sunlight. These typically give you about a 15% increase in winter and up to a 35% increase in summer. This is just the opposite of the seasonal variation for MPPT controllers. Since panel temperatures are much lower in winter, they put out more power. And winter is usually when you need the most power from your solar panels due to shorter days. Maximum Power Point Tracking is electronic tracking - usually digital. The charge controller looks at the output of the panels, and compares it to the battery voltage.*

### Keywords:

MPPT, Photovoltaic Cells, various parameters.

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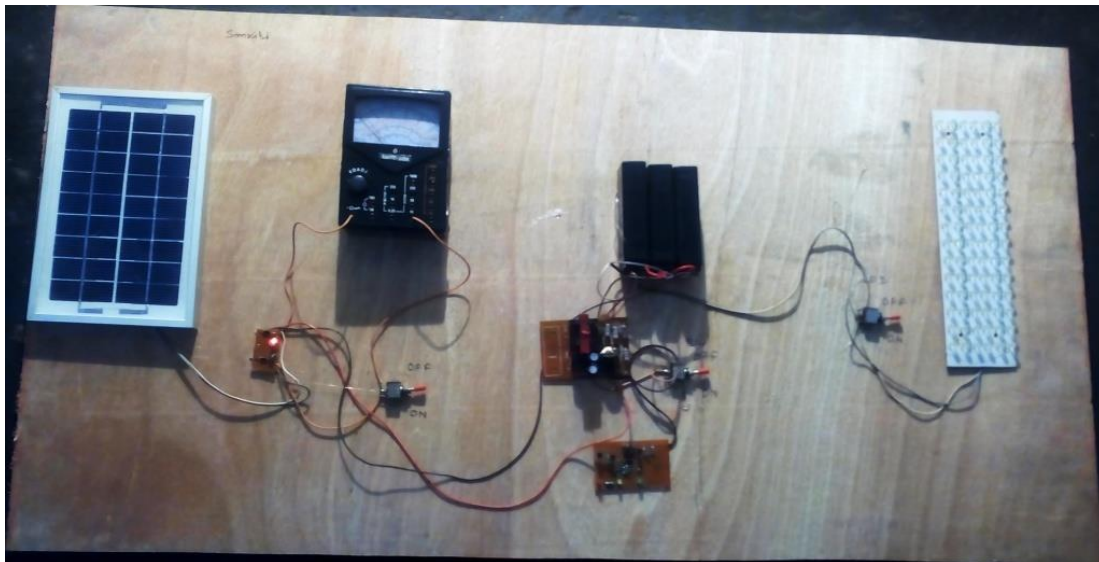
## 1. INTRODUCTION

Solar cells have a complex relationship between temperature and total resistance that produces a non-linear output efficiency which can be analyzed based on the I-V curve. It is the purpose of the MPPT system to sample the output of the PV cells and apply the proper resistance (load) to obtain maximum power for any given environmental conditions. MPPT devices are typically integrated into an electric power converter system that provides voltage or current conversion, filtering, and regulation for driving various loads, including power grids, batteries, or motors.

- Solar inverters convert the DC power to AC power and may incorporate MPPT: such inverters sample the output power (I-V curve) from the solar modules and apply the proper resistance (load) so as to obtain maximum power.
- MPP(Maximum power point) is the product of the MPP voltage( $V_{mpp}$ ) and MPP current( $I_{mpp}$ ).

## 2. EXPERIMENTAL SETUP

Solar power is a renewable source of energy, which has become increasingly popular in modern times. It has obvious advantages over non-renewable energy sources, such as coal, oil and nuclear energy. It is non-polluting, reliable and can produce energy anywhere that there is sun shining, so its resources are not going to run out anytime. It even has advantages over other renewable energy sources, including wind and water power. At the beginning of the charging process, a continuous MPPT-charging scheme is adopted to extract maximum power from the PV panel. Under a constant solar power condition, the battery current will decrease in accordance with the increase in battery voltage. When the SOC of battery reaches a given condition, a pulse-current- charging scheme with an adaptive rest period is applied to obtain an average charging current with an exponential profile. During the charging period, the MPPT function is retained to achieve high charging efficiency.



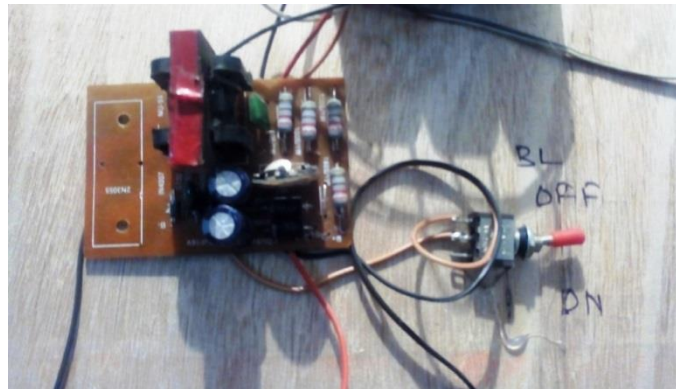
*Figure 1:* Experimental setup



*Figure 2:* Voltages Display



**Figure 3:** PV Cells with LED Display



**Figure 4:** charger



**Figure 5:** battery level indicator

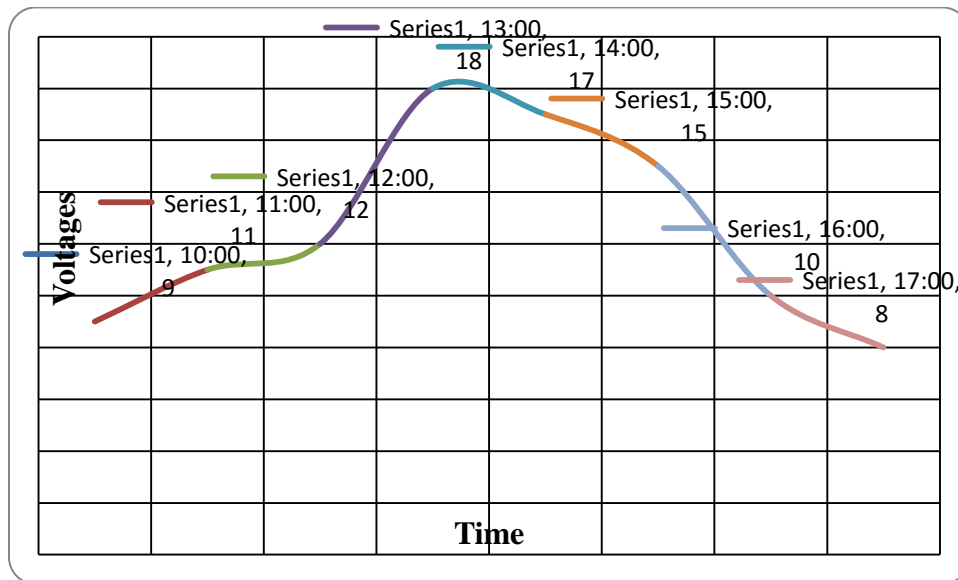


**Figure 6:** battery

### 3. PERFORMANCE TESTING

**Table 1:** Voltage with respect to time without using MPPT System

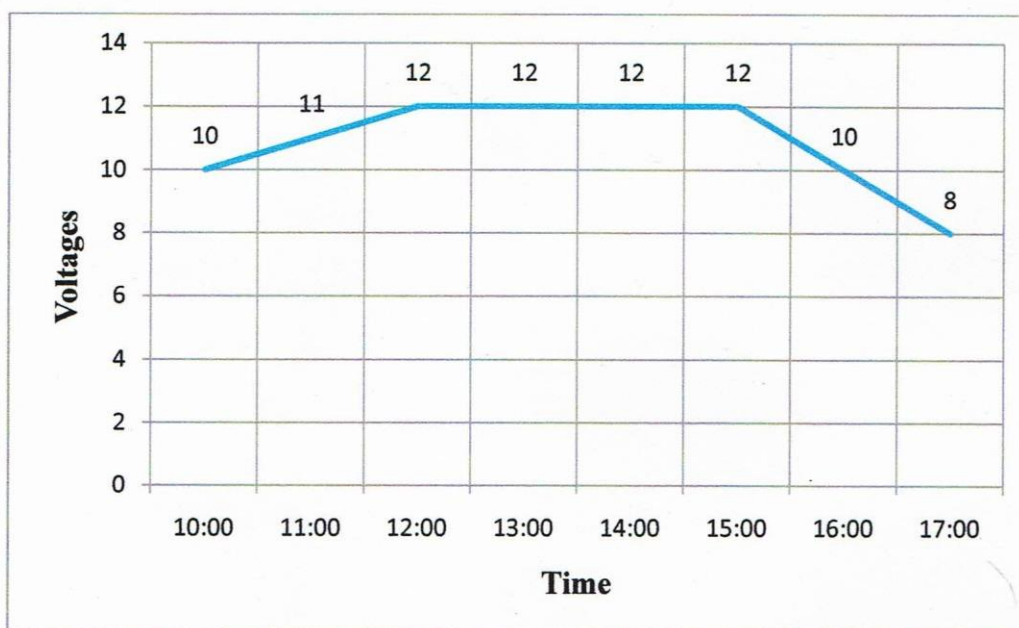
Sr. No.	Time	Voltages in D.C.
1	10:00	9
2	11:00	11
3	12:00	12
4	13:00	18
5	14:00	17
6	15:00	15
7	16:00	10
8	17:00	8



**Figure 7:** Voltage with respect to time without using MPPT System

**Table 2:** Voltage with respect to time with using MPPT System

Sr. No.	Time	Voltages in D.C.
1	10:00	10
2	11:00	11
3	12:00	12
4	13:00	12
5	14:00	12
6	15:00	12
7	16:00	10
8	17:00	8



**Figure 8:** Voltage with respect to time with using MPPT System

#### 4. CONCLUSION

In this paper, a MPPT system are designed and constructed by experimental process. By experimental setup, we are achieving the D.C. power from PV panels, and the output voltage are 12 V. D.C. at the time from 12:00 to 15:00 , which are shown in Table.2. , output voltages are used for appliances. Solar cells voltages are change during various time period due the change of insolation levels (irradiation) and temperature. We are obtained the stable output voltage by using of MPPT , Which are used for DC load.

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