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Design of a flexible photovoltaic MPPT data acquisition system for analysis of MPPT process and improved data storage.

Manuscript Presentation

By

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Layout

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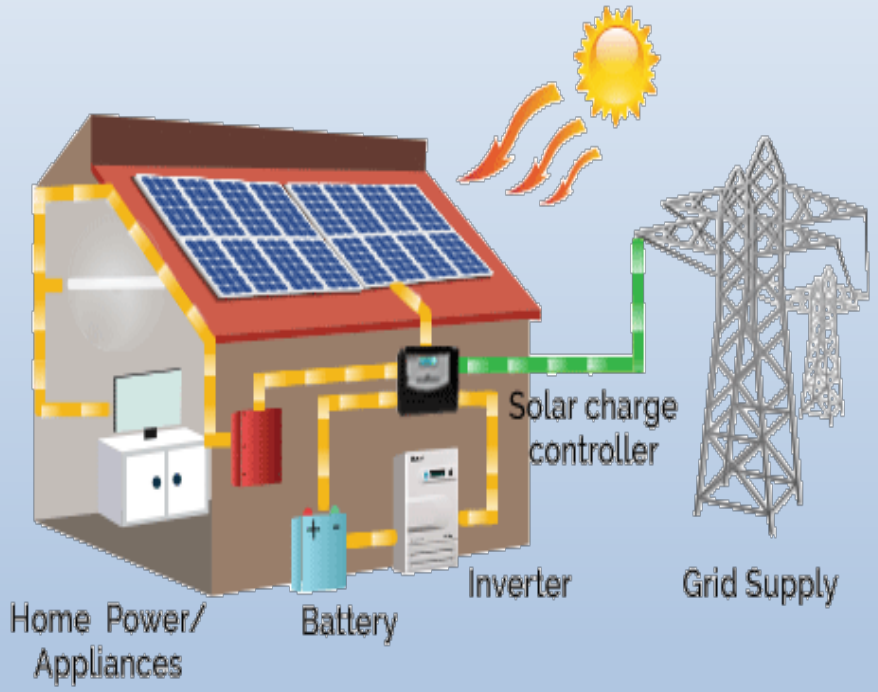
- Introduction
- Aim and Objectives
- Research Methodology
- Results
- Conclusion

Introduction



- No carbon print
- Omnipresent
- Easily accessible
- Inexhaustible
- Weather dependent
- Expensive

Background

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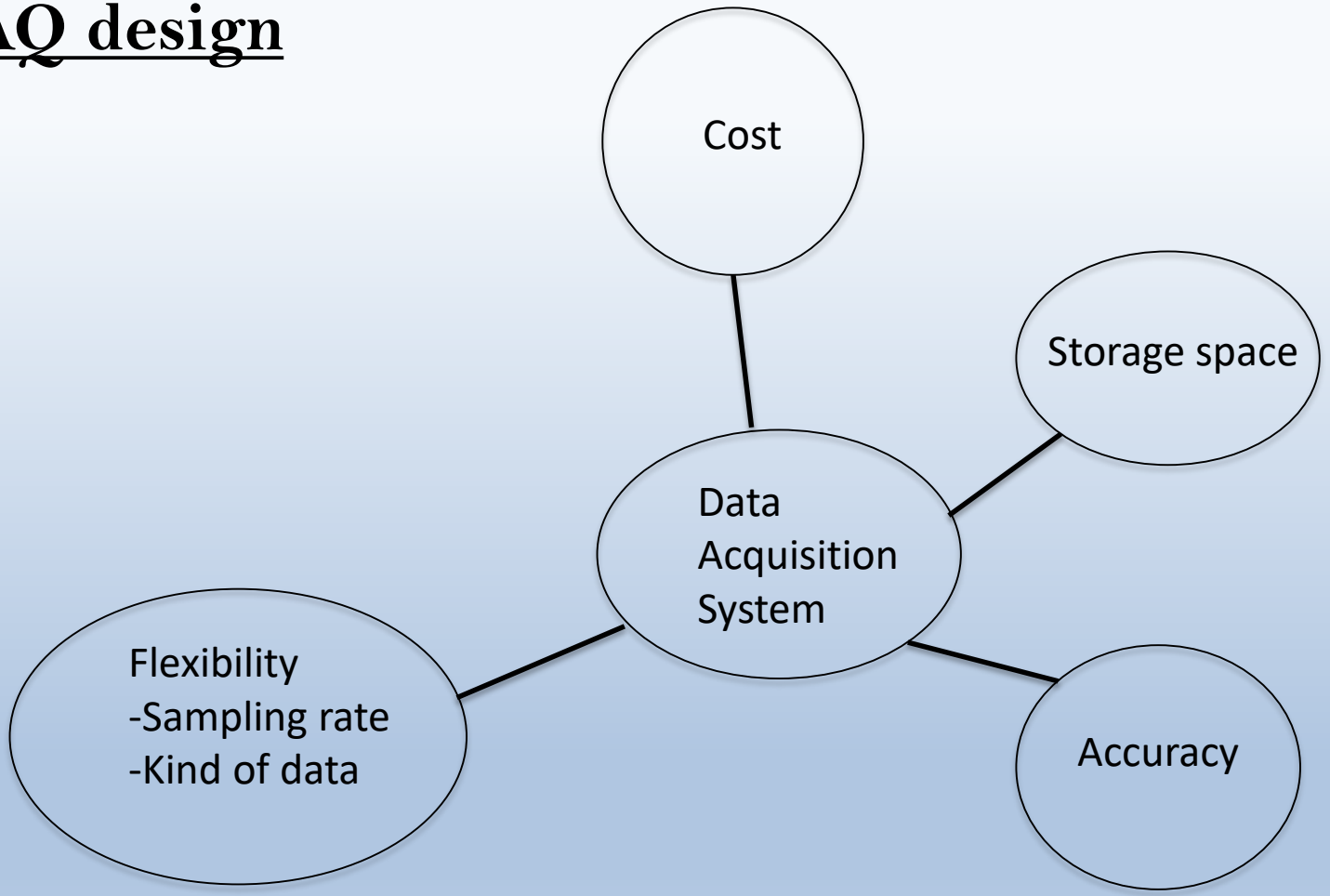
- **DAQ design**



Aim and Objectives

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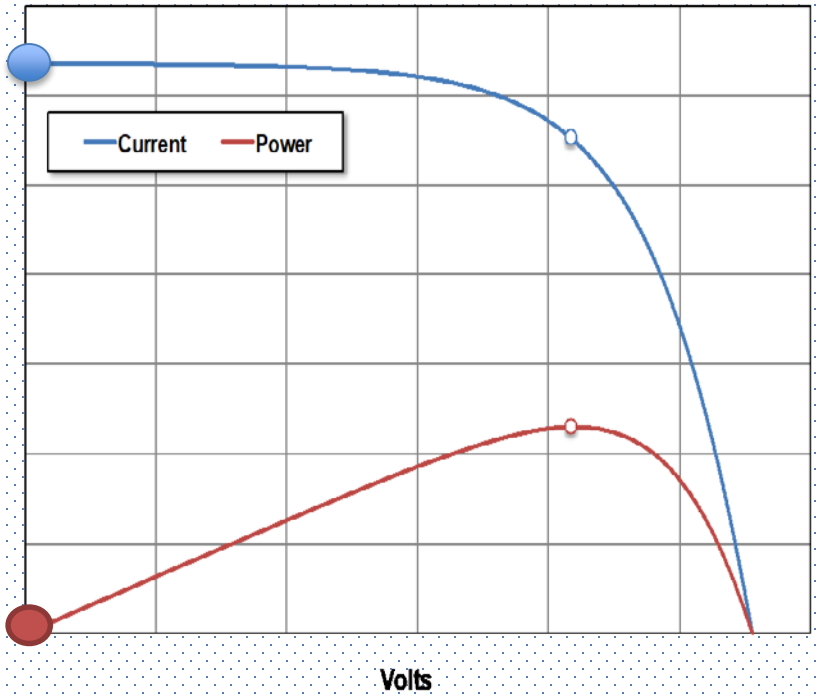
Aim

Design of a flexible photovoltaic MPPT data acquisition system for analysis of MPPT process and improved data storage.

The following objectives are to be fulfilled:

- To design the data acquisition circuitry and calibrate transducers.
- To construct and install the data acquisition system.
- To operate and analyze current voltage values from the logger.
- To determine the energy used in a 24hr period.

MPPT Tracking



MPPT algorithms

- Perturb and observe
- Incremental conductance
- Fractional open circuit voltage
- Fractional short circuit current

MPPT tracking algorithms

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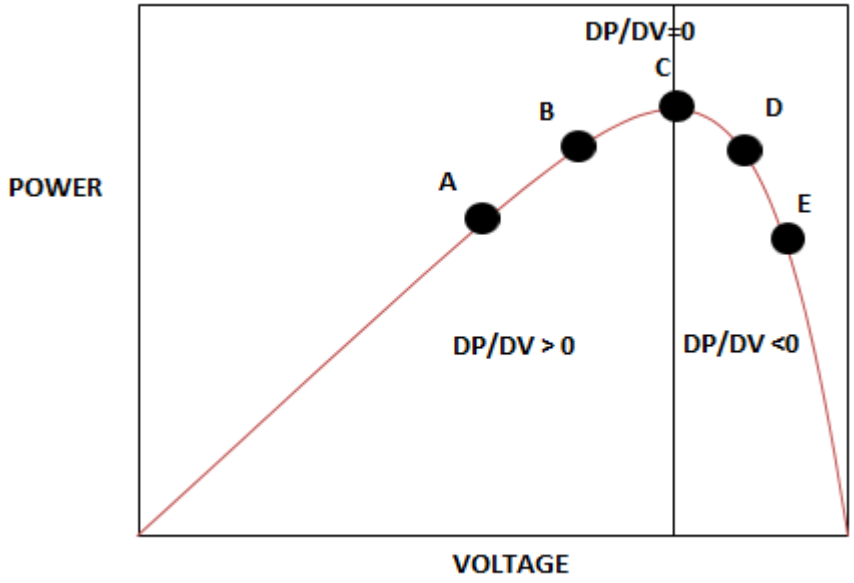
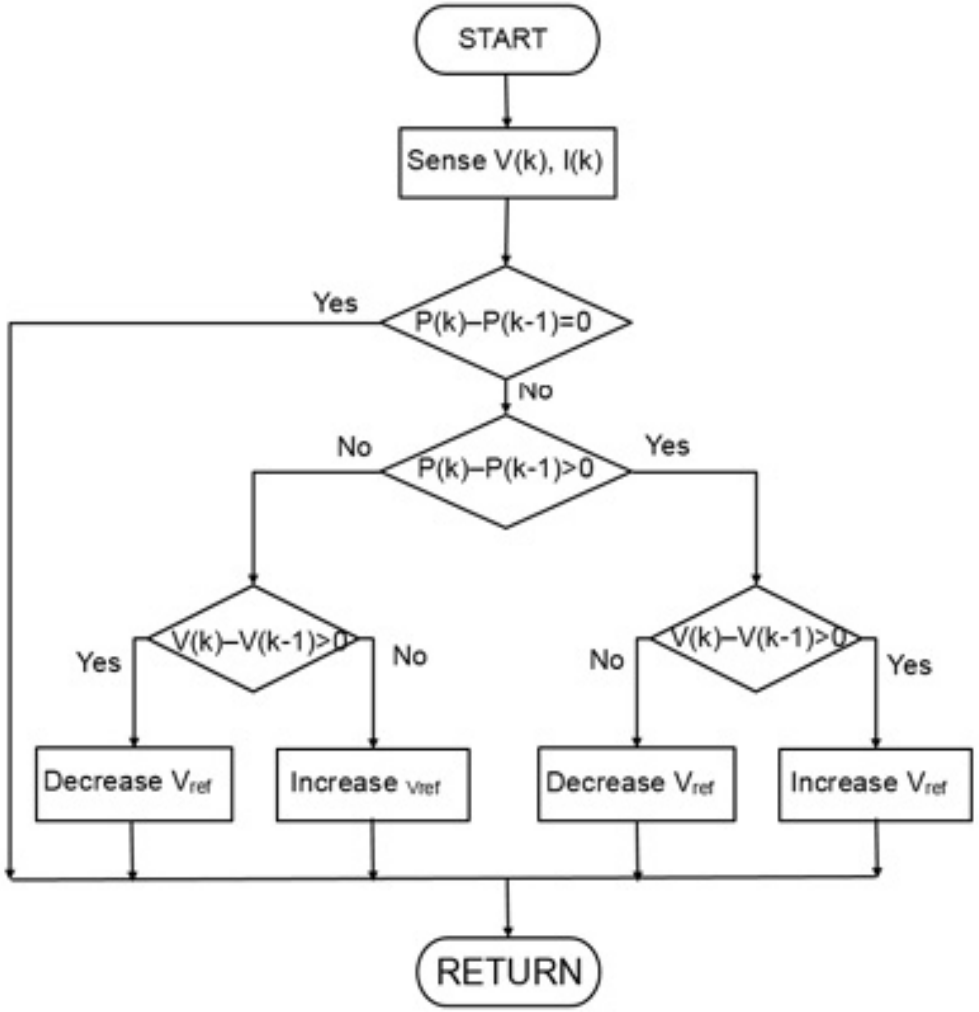
1. Perturb and observe

- $(P)power = (I)current \times (V)voltage$





MPPT tracking algorithms

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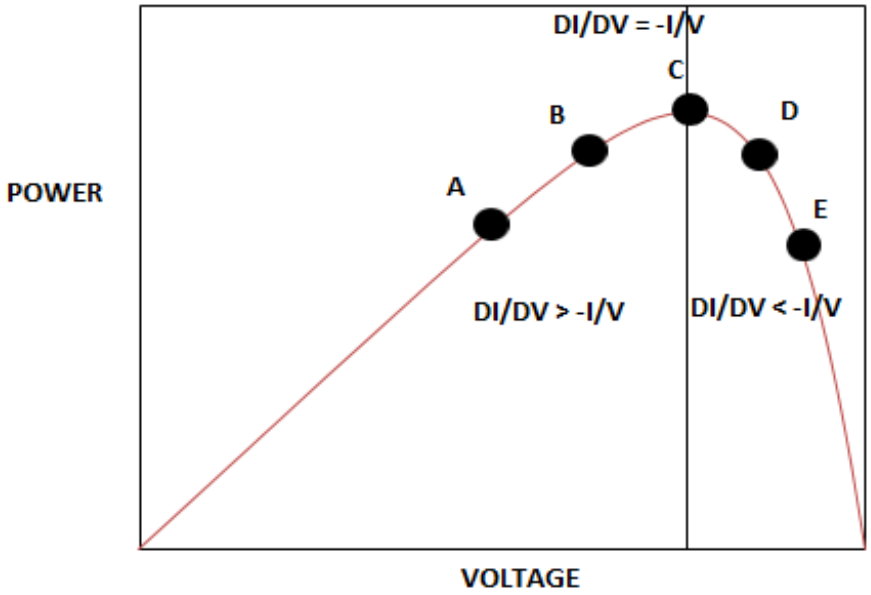
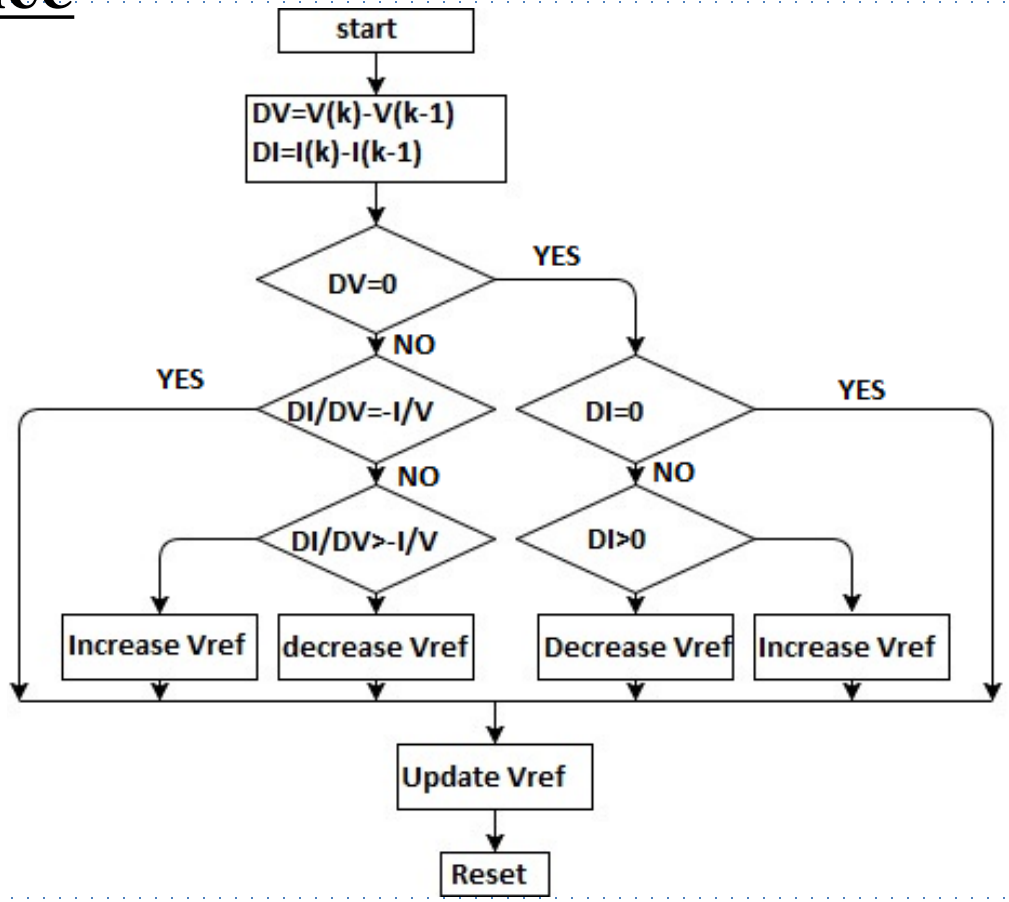
- **2.Incremental Conductance**

$$\frac{DP}{DV} = \frac{D(VI)}{DV} = I\frac{DV}{DV} + V\frac{DI}{DV} = I + V\frac{DI}{DV}$$





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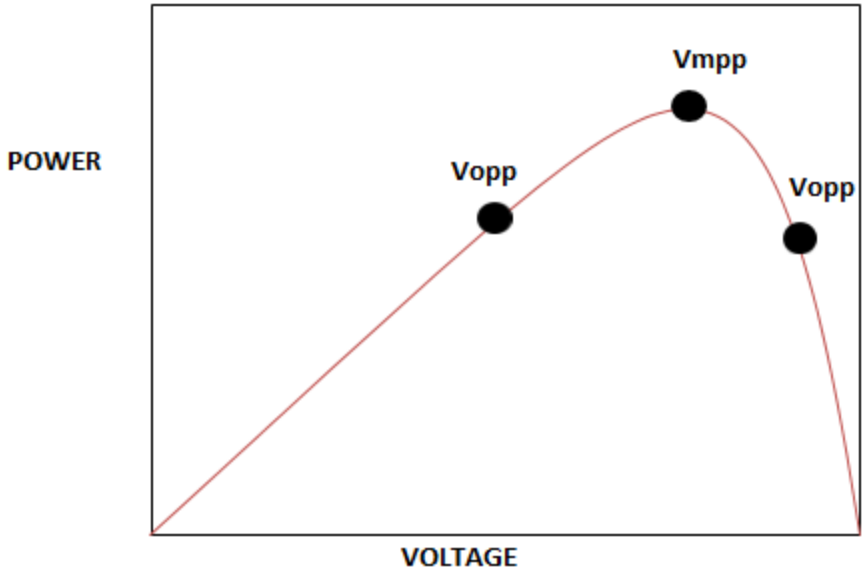
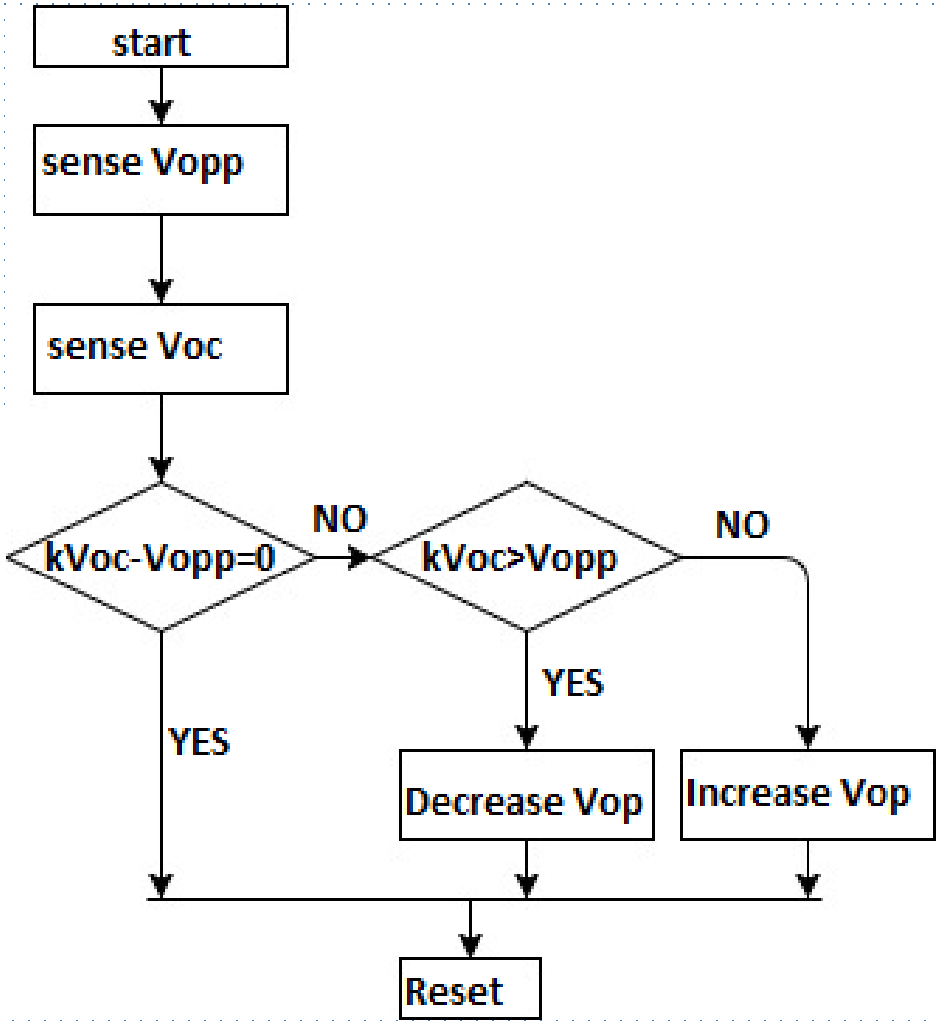
3. Fractional voltage

- $Pmpp \approx K \times Voc$





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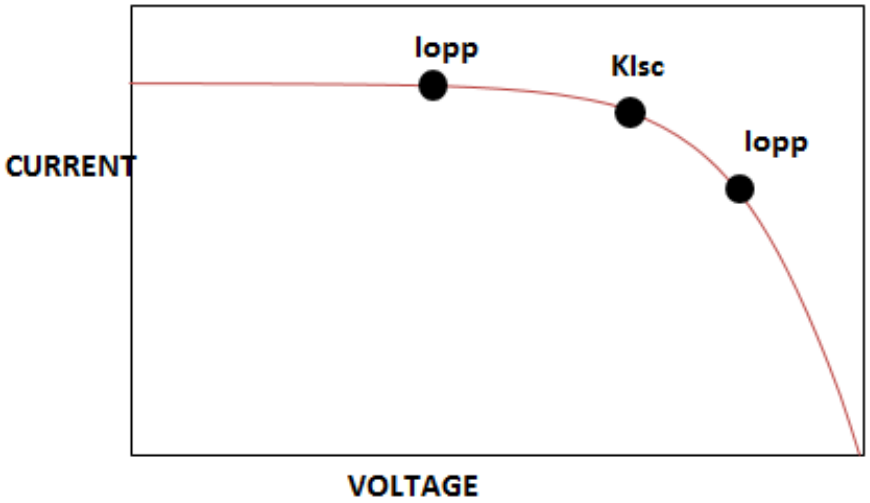
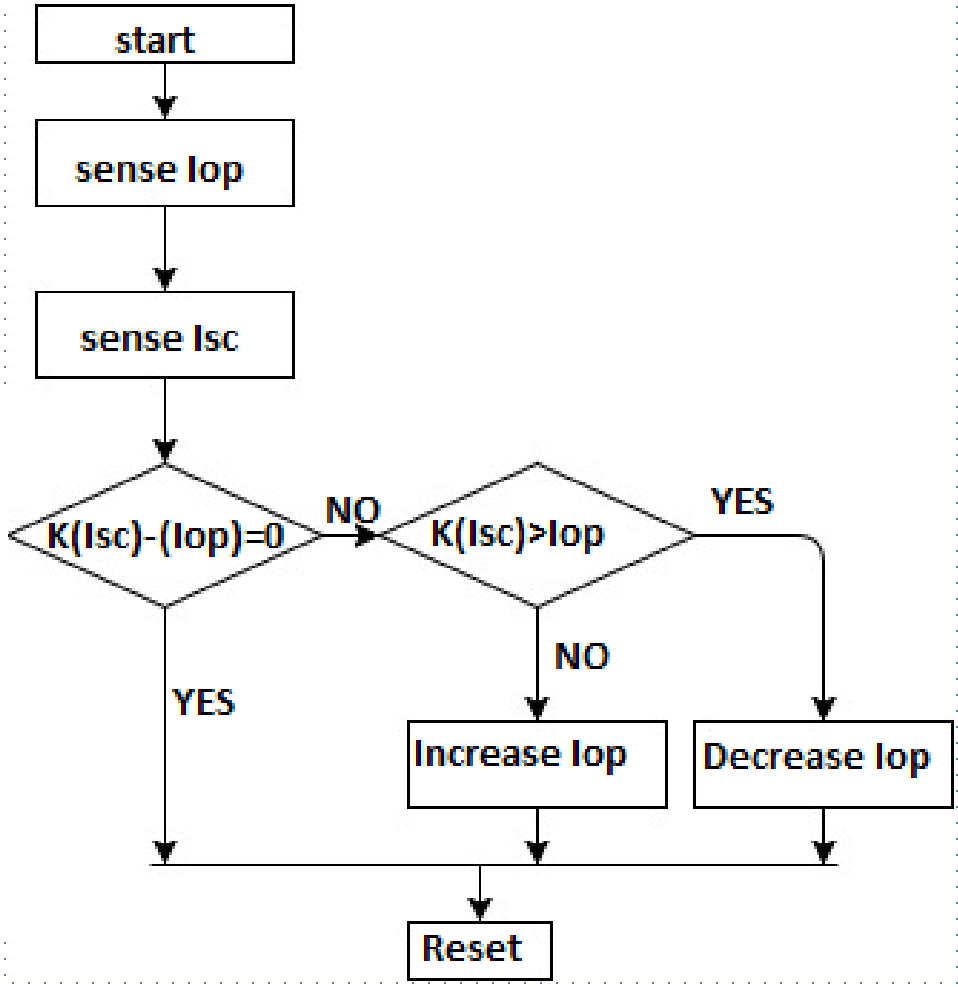
4.Fractional short circuit

$$I(mpp) \approx Isc \times K1$$





Methodology

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- **Materials**

K-type thermocouple

DT 80

Pyranometer

Shunt resistor

Methodology

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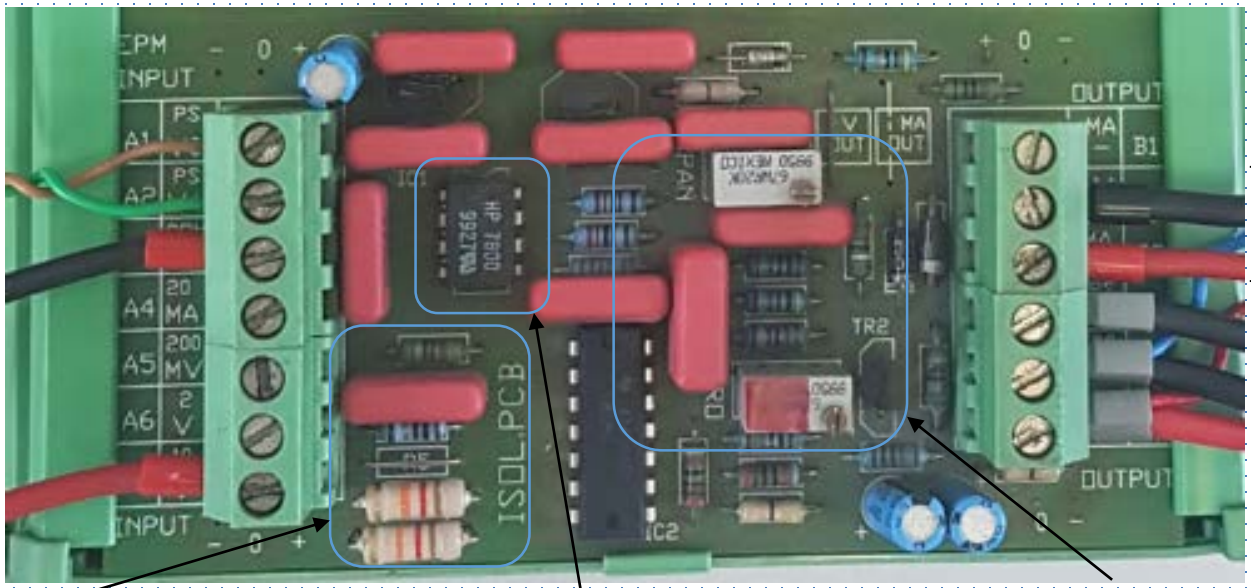
- **Voltage scaling board**



Methodology

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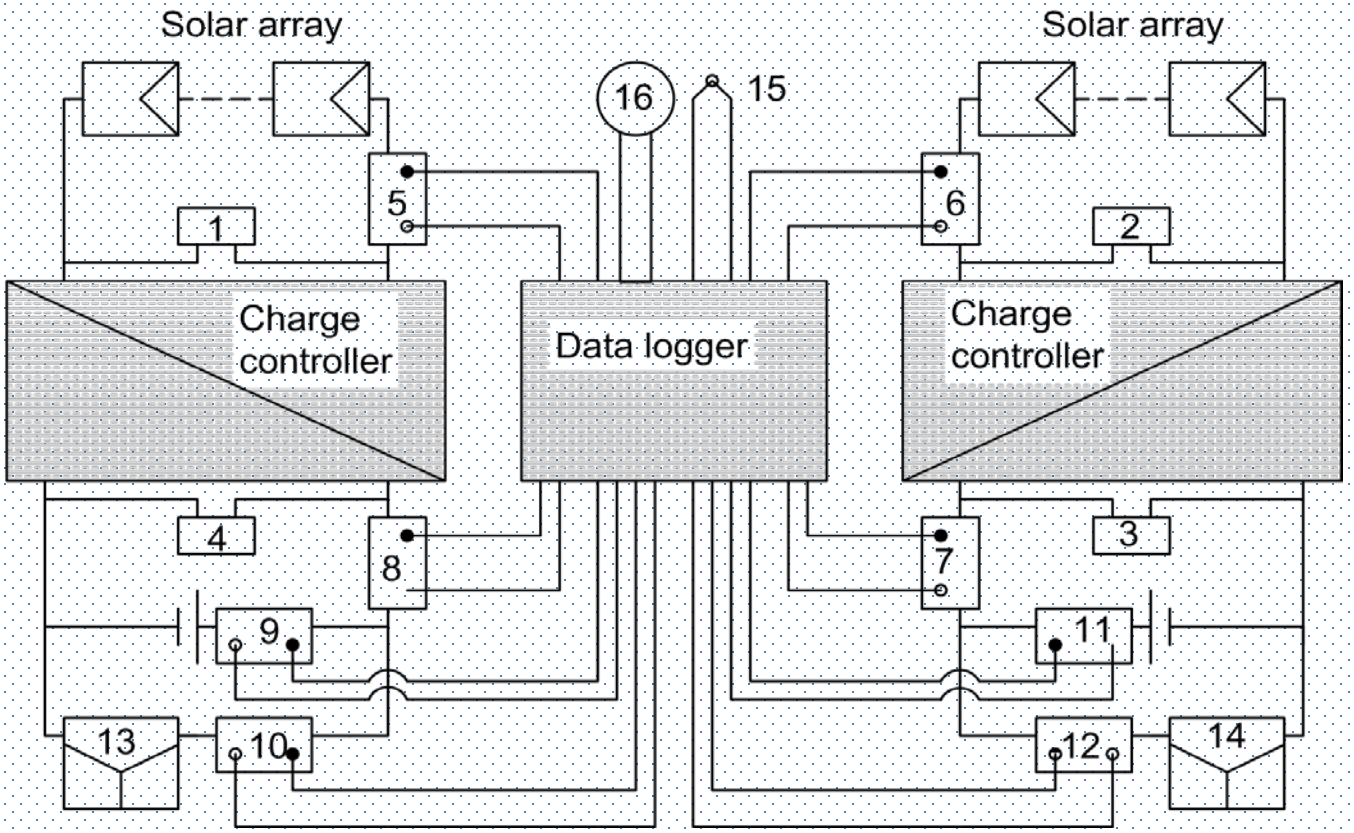
- **Design schematic**



Methodology

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- **Conversion equations**

$$\frac{input}{5} \times 120 = output$$

$$\frac{input}{60} \times 100 = output$$

Methodology

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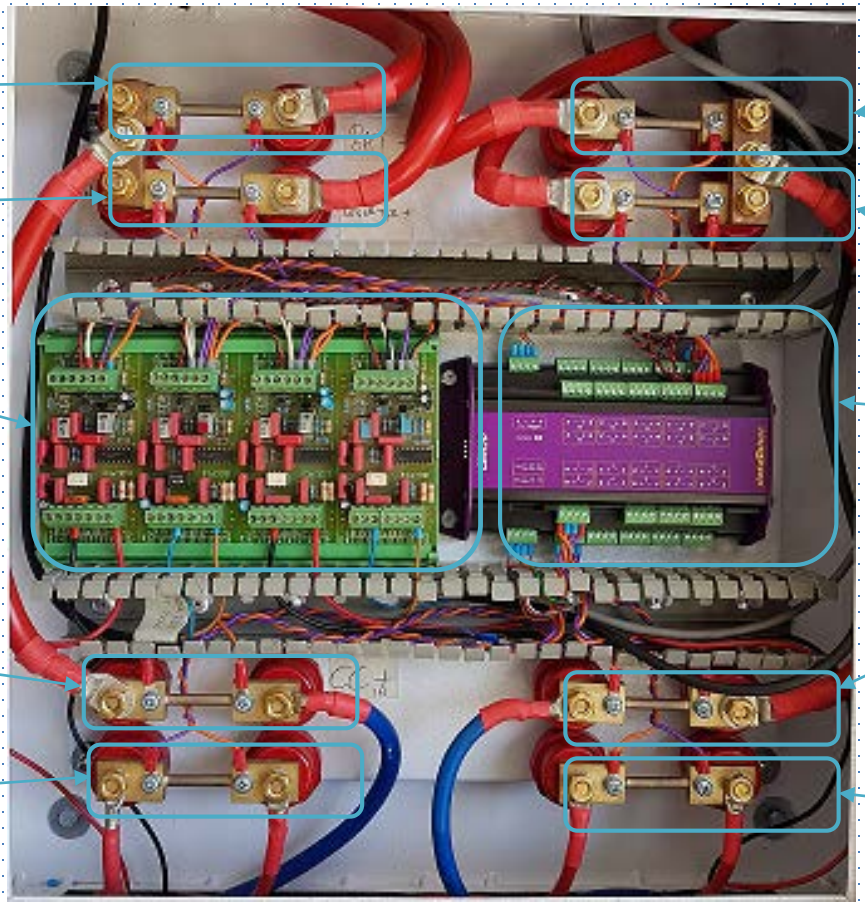
- **Design layout**



Results

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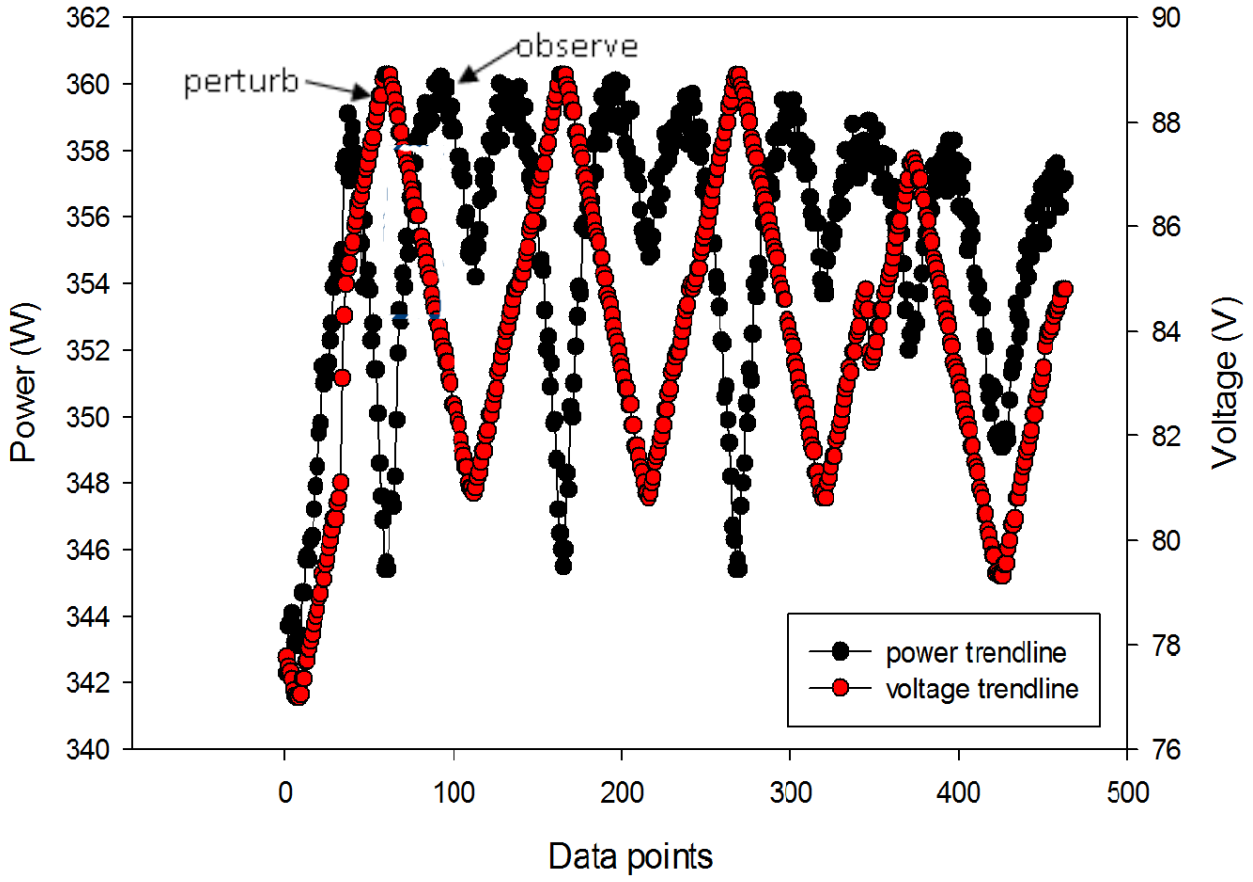
- **MPPT I-V data points**



Results

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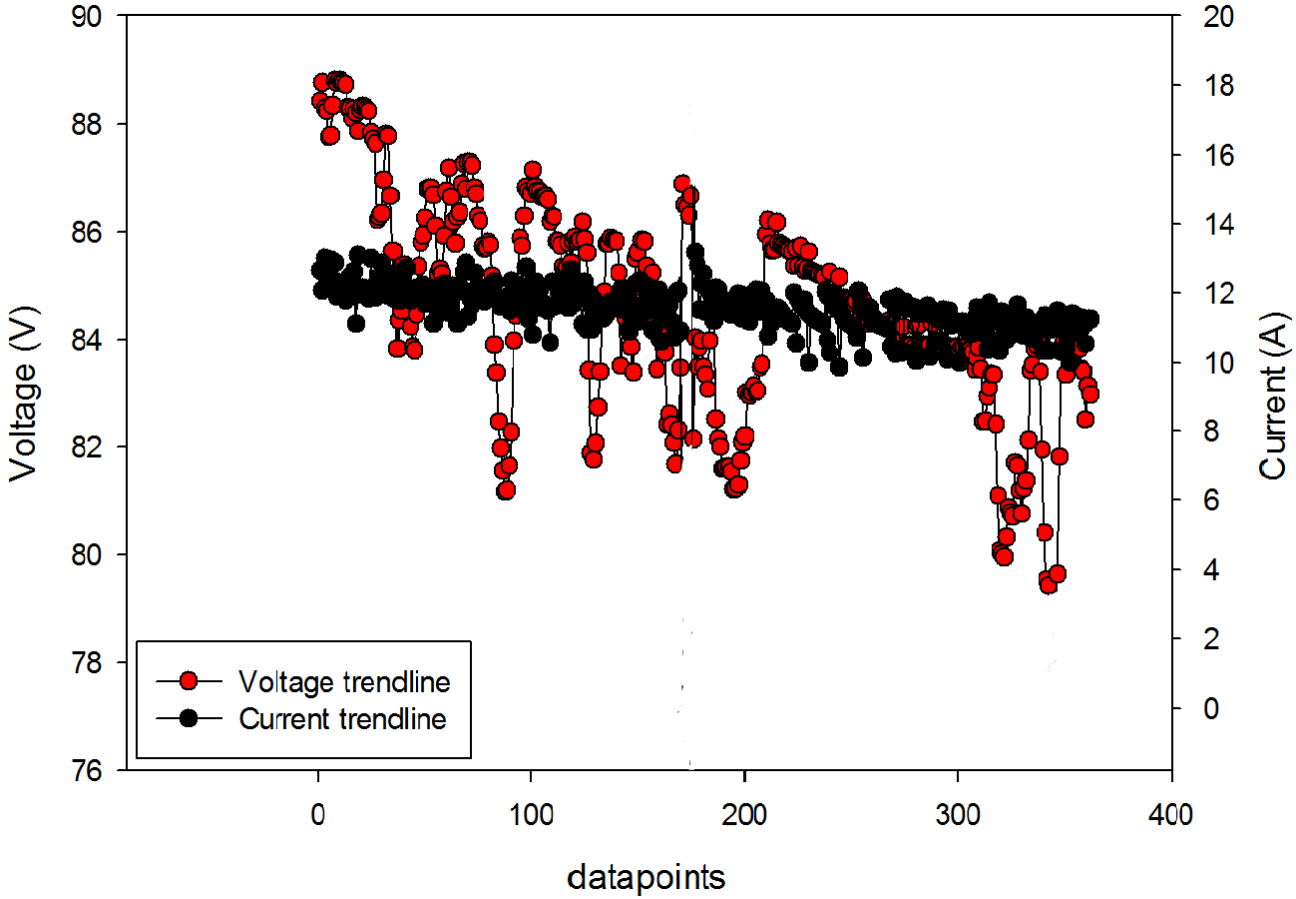
- **I-V logged data**



Results

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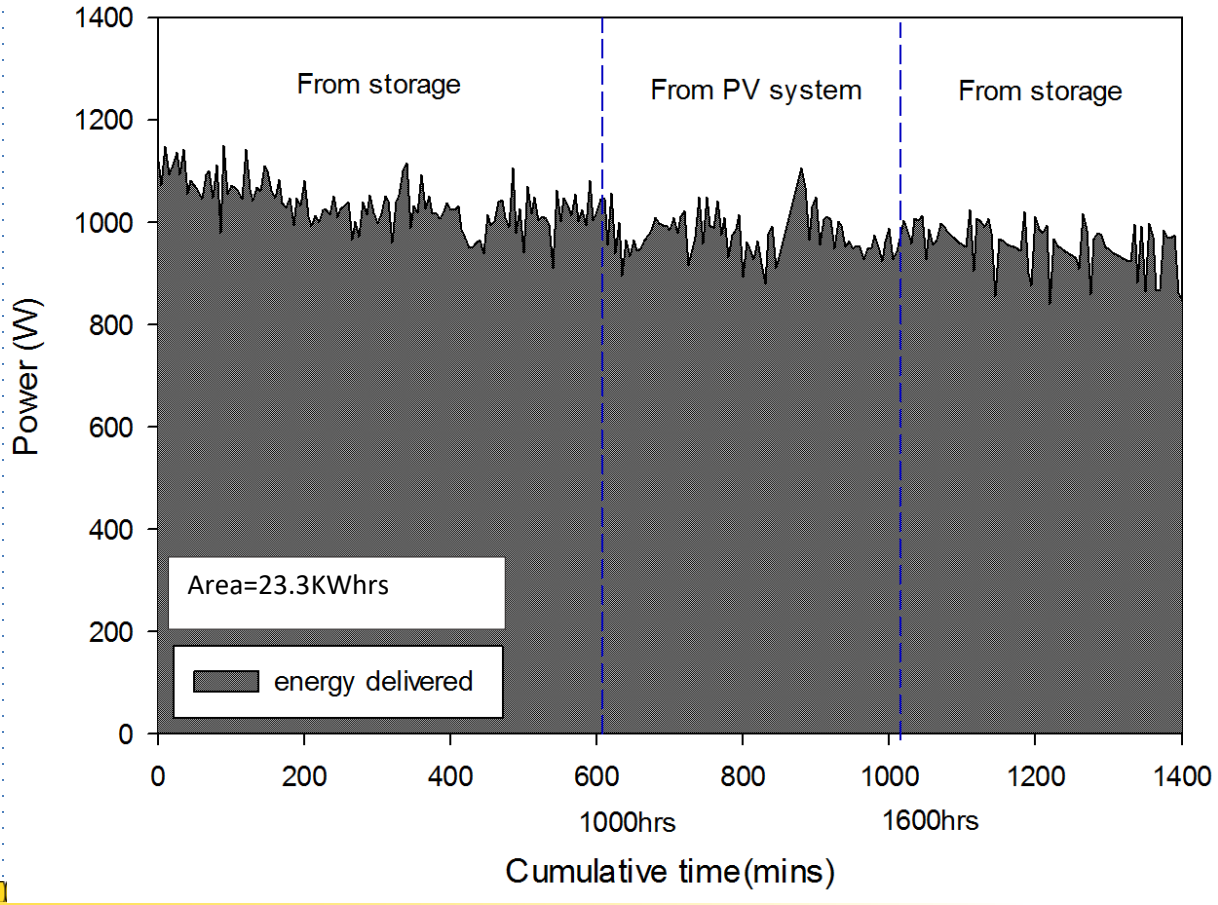
- **Energy delivered diagram**



Conclusion

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- The MPPT data acquisition system designed and constructed managed to provide a flexible platform to extract I-V data with known certainty.
- The acquisition system managed to articulate and show the P and O which is employed by the MPPT charge controller used.
- The amount of energy delivered by the PV system in a period of 24hrs was calculated from the I-V data collected from the data acquisition system.

Acknowledgements

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THANK YOU ALL