SOLAR PV BASED CHARGER

Project synopsis submitted in partial fulfilment

for the Award of

CERTIFICATION

in

Electric Vehicle Course

by

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INTRODUCTION

Project Overview:

The main aim of the project is to design a Solar PV based Charger which is used to the charge the battery of an Electric Vehicle.

Objectives:

The goal of this project is to design a Solar PV charger using MATLAB by understanding the integration of the Renewable energy sources in the charging infrastructure.

Significance:

This assignment helps to understand about the importance of the renewable energy sources in Electric Vehicle technology and especially in its charging infrastructure.

Tools and Materials

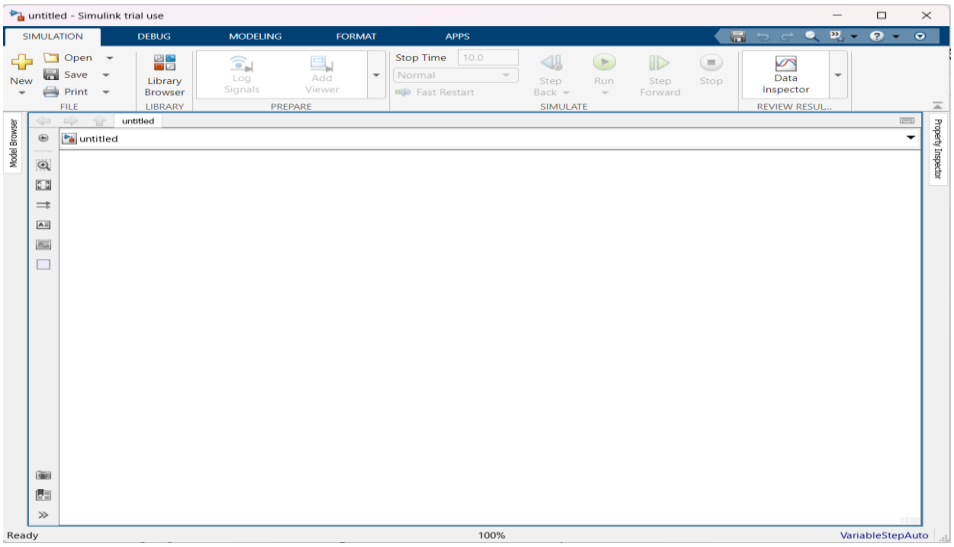
Software Tools:

The Charger is designed by using MATLAB software of version R2023B. The Simulink environment is more used for the design and analysis.

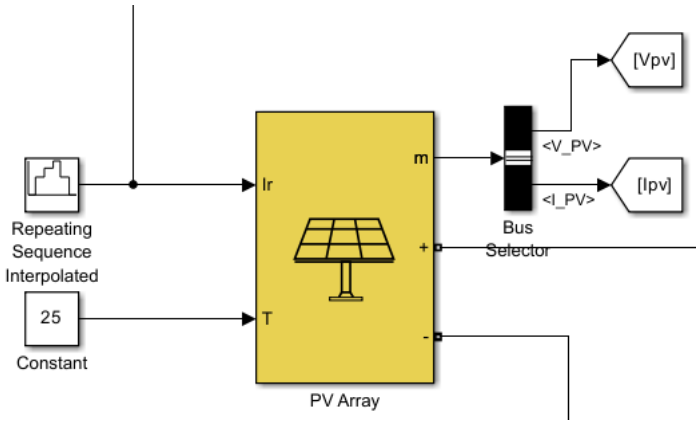
METHODOLOGY

Designing Procedure:

Step 1: Open the Simulink environment in the MATLAB Software.



Step 2: Select PV Array block from the Electrical and give Sun irradiance and Temperature as input as shown below. Then attach goto blocks to the bus selector which is attached to the measurement port of PV Array.



Note: For sun irradiance Repeating Sequence Interpolated block is selected and the following values are given.

For

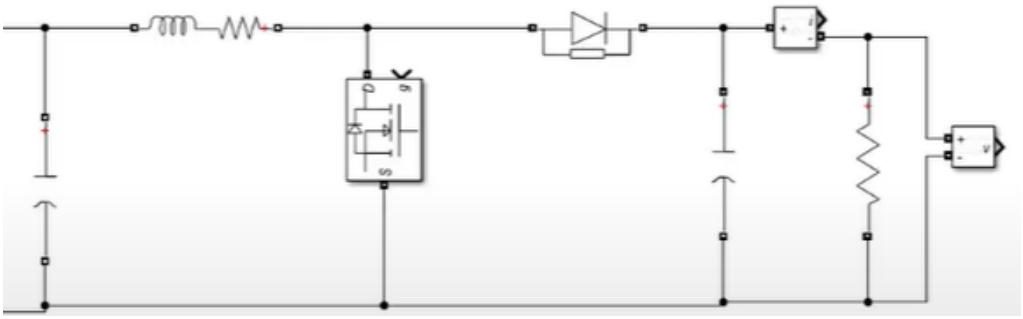
Vector of Output values:

[0 0 500 500 800 800 1000 1000 500 500 0 0].'

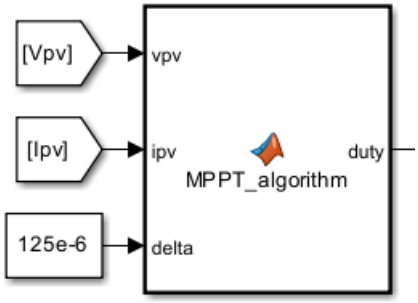
Vector of time values:

[0 1.0 1.001 2.0 2.001 3.0 3.001 4.0 4.001 5.0 5.01 6.0].'

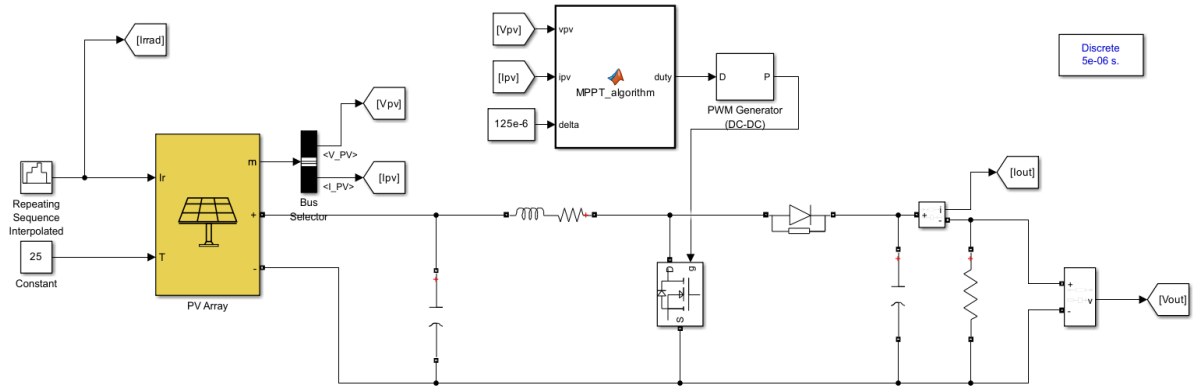
Step 3: Make the connections for the Inductor, Capacitor, MOSFET, Diode, Resistor, Current Sensor and Voltage Sensor as shown below.



Step 4: Select MALTAB Function block and write regarding script inside the block for generating the Duty cycle by taking input as the Voltage and current from the PV Array and also taking a constant value as delta as shown in the figure.



Step 6: The output from the Algorithm is sent to MOSFET through the PWM generator as shown. This completes the circuit of the Solar PV Charger.

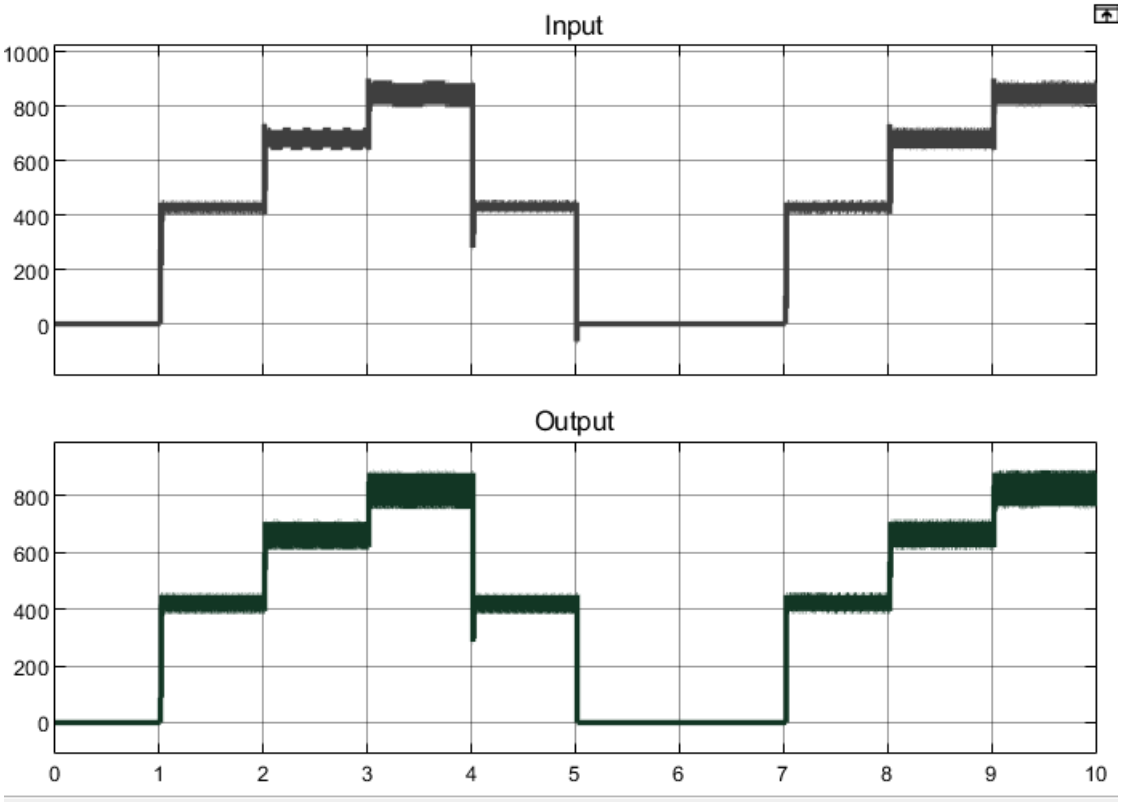


Step 7: Measure the input and output Voltage, Current and Power by using scope blocks.

RESULT AND ANALYSIS

Final Outcome:

The Design of the Solar PV based Charger is achieved successfully by the following steps which are mentioned above. The input and output power characteristics are shown below.



CONCLUSION

Summary:

Since the aim of the project is fulfilled by designing the Solar based charger for the Electric Vehicles by understanding the integration of the renewable energy sources in EV Charging Infrastructure.

Final Thoughts:

Through this project I have understood the significance of renewable energy sources like solar energy and the its role in the Electric Vehicle charging infrastructure.

References:

Atawi, Ibrahem E., Essam Hendawi, and Sherif A. Zaid. "Analysis and design of a standalone electric vehicle charging station supplied by photovoltaic energy." *Processes* 9.7 (2021): 1246.

Singh, Aanya, et al. "Design and analysis of a solar-powered electric vehicle charging station for Indian cities." *World Electric Vehicle Journal* 12.3 (2021): 132.