

# **Design and Analysis of Boost Converter**

Project synopsis submitted in partial fulfilment

for the Award of

*CERTIFICATION*

in

Electric Vehicle Course

by

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DATE: 7<sup>th</sup> August, 2024

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# **INTRODUCTION**

## **Project Overview:**

The main aim of this project is to design the Boost-Converter which is an electrical device which used to step-up the DC voltage. In an Electric Vehicle boost converter has wide range of applications. For instance, it is used in Battery Packs of the Electric Vehicle.

## **Objectives:**

The goal of this project is to design and analyse the Boost converter using MATLAB by focusing step-up voltage regulation and its impact on efficiency in different operating conditions.

## **Significance:**

This assignment helps to understand about the importance of boost converter which is very essential device in the Electric Vehicle technology because of its own nature of boosting up the voltage which ensures the smooth and safe operation of an EV.

# **Tools and Materials**

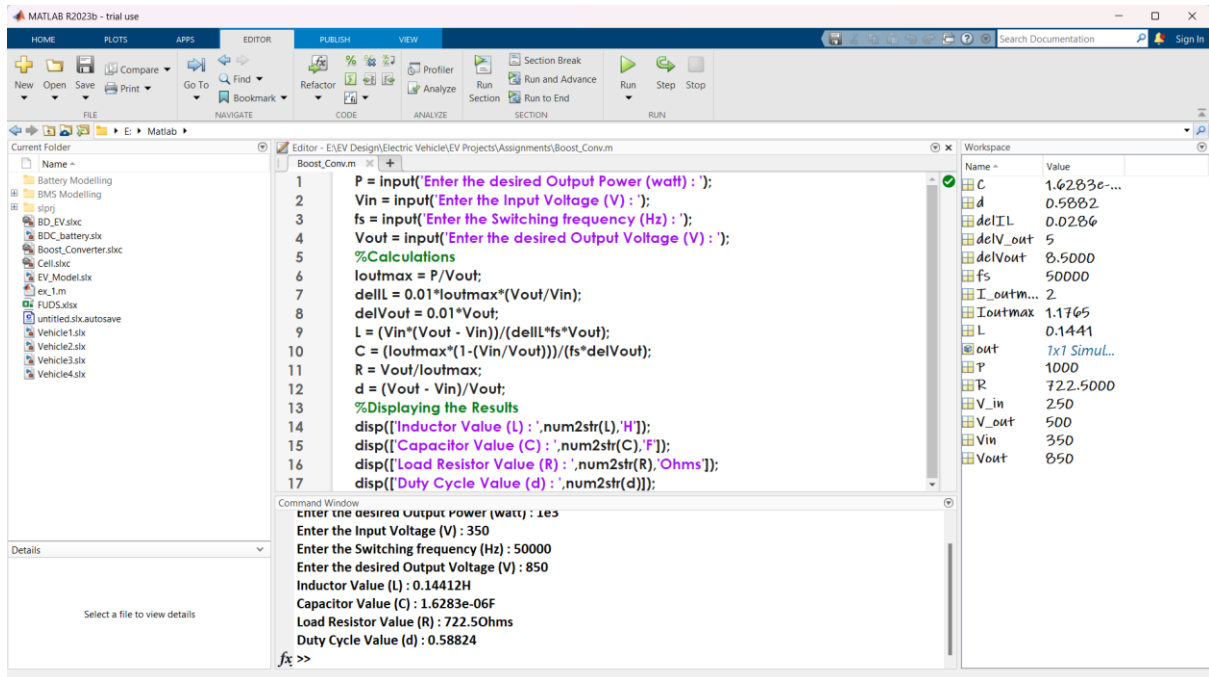
## **Software Tools:**

The Boost converter is designed by using MATALAB software of version R2023B. The Simulink environment in the MATLAB is more used for the design and analysis of boost converter.

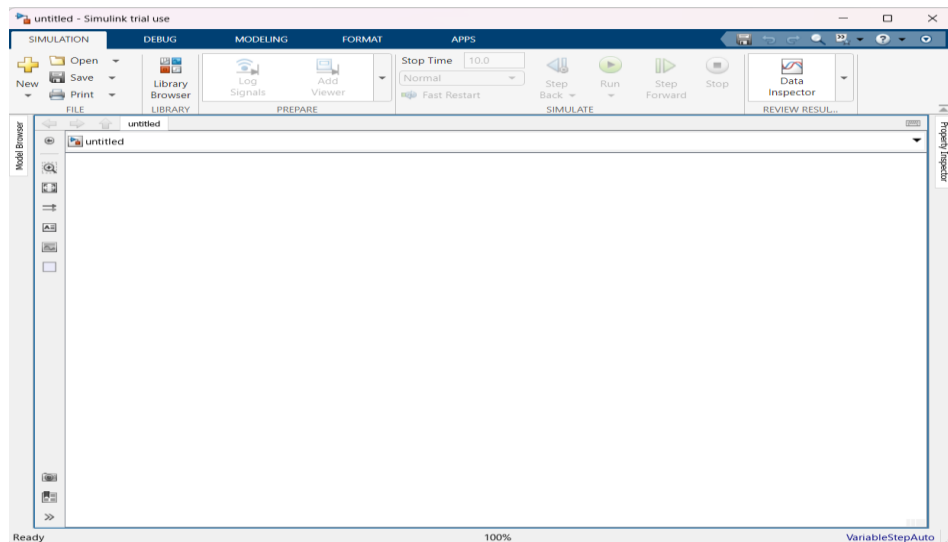
# METHODOLOGY

## Designing Procedure:

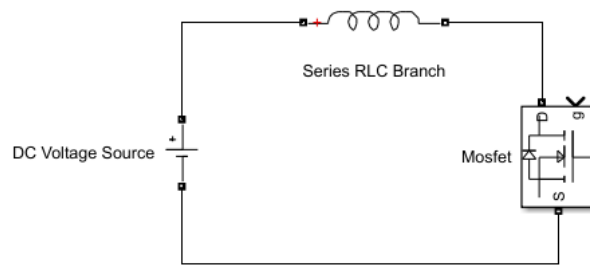
**Step 1:** Open MATLAB and prepare the required script.



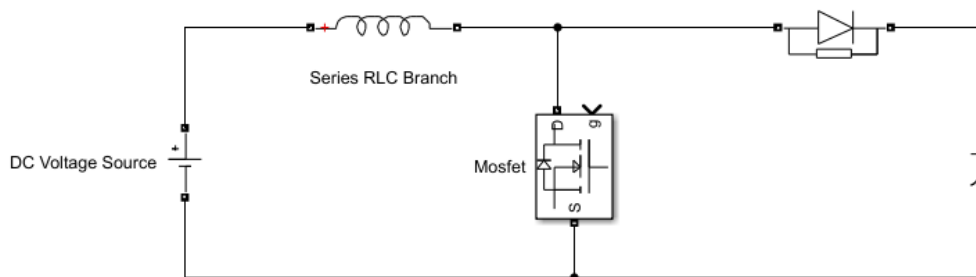
**Step 1:** Open the Simulink environment in the MATLAB Software.



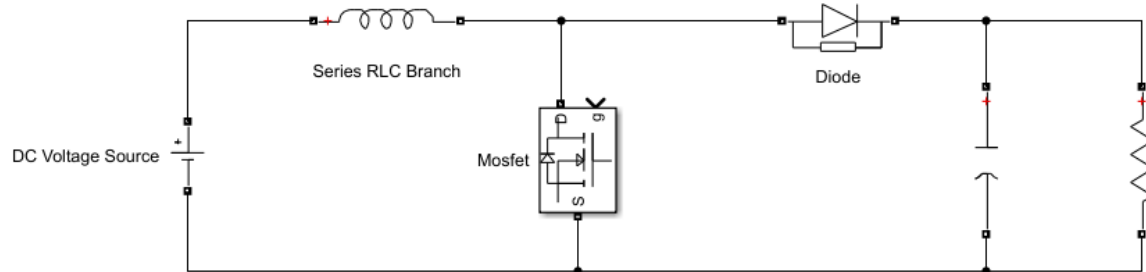
**Step 2:** Make the Connections of the DC voltage source, Inductor, MOSFET as shown.



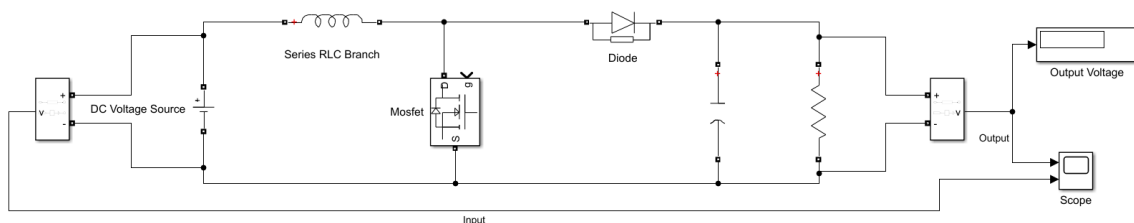
**Step 3:** Connect the Diode to the Capacitor and connect this assembly to the node of MOSFET and Inductor Connection as shown below. This makes the basic circuit of the Buck converter.



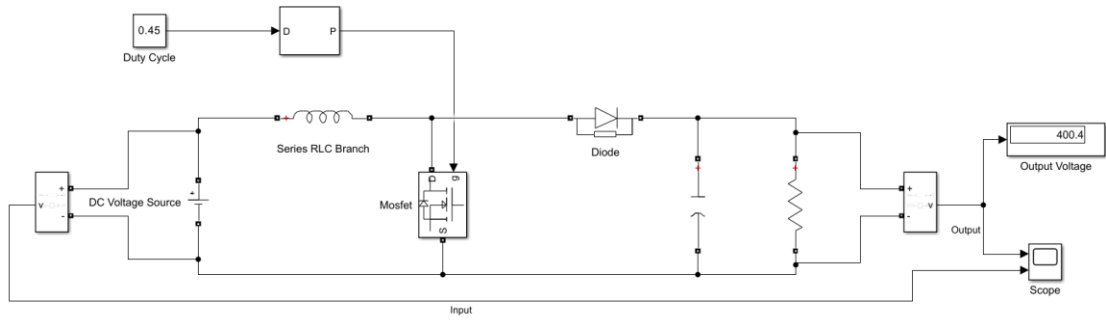
**Step 4:** Then connect load to the circuit as shown.



**Step 5:** Connect the voltage measurement block to the Load and DC voltage source to measure the input and output voltages. Also connect the scope and display blocks to identify the results.



**Step 6:** Connect the PWM Generator to the MOSFET as shown and provide duty cycle to the PWM generator with the help of constant block.

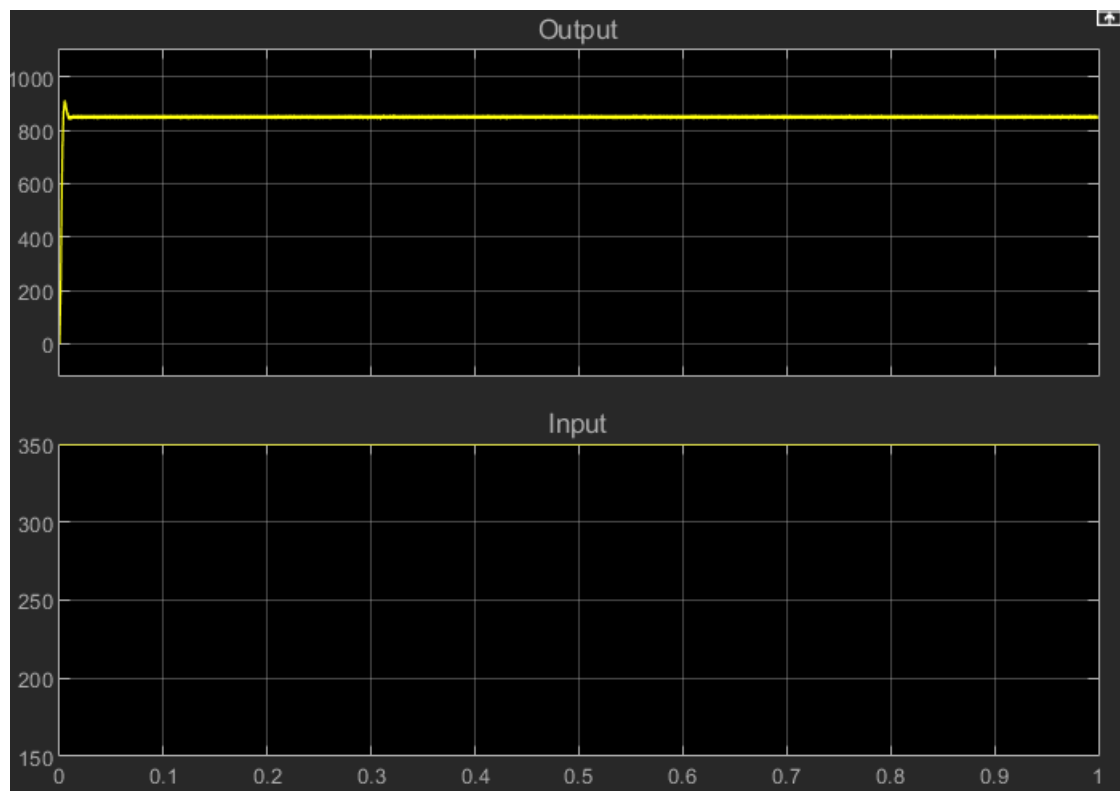


**Step 7:** Then Simulate the model and identify the output voltage.

## **RESULT AND ANALYSIS**

### **Final Outcome:**

The Design of the Boost Converter is achieved by following the steps which are mentioned above. The Converter is designed to Boost up the Voltage of 350V to the Voltage of 850V. The obtained results are shown below.



### **Result Analysis:**

The Duty Cycle of the Boost Converter is given by the following formula,

$$\text{output voltage/input voltage} = 1/1-d$$

$$850/350 = 1/1-d$$

Therefore, Duty Cycle  $d = 0.58$ .

By this we achieved our desired output voltage i.e. 850V in Boost Converter.

**Note:** The required calculations are done in Boost\_Conv.m file which is attached to this Document.

## **CONCLUSION**

### **Summary:**

Since the aim of this project is fulfilled by Designing the Boost Converter which is an Electronic Device which was used to Step Up the DC Voltage. The Results are also analysed to achieve the desired output.

### **Final Thoughts:**

Through this project I have an idea of the significance of the boost converter and the role of this converter in an Electric Vehicle. This Converter steps up the Voltage from the Battery of the vehicle to required voltage for specific applications to ensure smooth and safe operation.

### **References:**

Hasaneen, B. M., and Adel A. Elbaset Mohammed. "Design and simulation of DC/DC boost converter." *2008 12th International Middle-East Power System Conference*. IEEE, 2008.