GRID-CONNECTED PV WITH BOOST CONVERTER AND INVERTER

A project report submitted in partial fulfillment of the requirements
For the award of the degree of

BACHELOR OF TECHNOLOGY
IN
ELECTRICAL & ELECTRONICS ENGINEERING

Submitted by

MYLARA LOKESH
(18815A0234)

G VARA LAKSHMI
(17811A0205)

CH RAMA KRISHNA PRASAD
(18815A0208)

R SARAT SATEESH
(18815A0227)

S NAGA SATISH
(18815A0228)

Under the Esteemed Guidance of

Dr. T SRINIVASA RAO

Professor

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Permanently Affiliated to Jawaharlal Nehru Technological University, Kakinada, AP)
(An NAAC Accredited Institution)
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CERTIFICATE

This is certify that the project report entitled **"GRID-CONNECTED PV WITH BOOST CONVERTER AND INVERTER"** is a bonafide work submitted by **MYLARA LOKESH, G VARA LAKSHMI, C RAMA KRISHNA PRASAD, R SARAT SATEESH** and **S NAGA SATISH** in partial fulfillment of the requirements for the award of degree of

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Internal Guide
Dr. T Srinivasa Rao
Professor & HOD
Dept. of Electrical & Electronics Engg.
Narsipatnam.

Dr. T Srinivasa Rao
Professor & HOD
Dept. of Electrical & Electronics Engg.
Avanthi Institute of Engg. & Tech. AIET,
Narsipatnam.

Abstract

This project work is taken from the NTNU renewable energy laboratory project, "Grid Connected PV Systems with Smart grid functionality". It solves the problem of shading to the available NTNU PV modules which is sensitive to the exiting central inverter system topology by proposing a PV system which is more efficient and reliable. This project is focused on the design of the PV-grid connected inverter power stage that supports the proposed PV system under study. As part of the NTNU renewable energy laboratory project, a single phase 1kW, 230V, dual power stage inverter is designed. The important parameters required for inverter stage including input inductance and capacitance, DC –Link capacitance and LCL filter were designed.

In chapters 1 to 2, the PV system overview and grid connected inverter technology is discussed. Photovoltaic characteristics that help the development of a proposed PV system are pointed out. The real scenario of the available NTNU PV system and the challenges facing its poor efficient to generate electricity is explained in Chapter 2. Chapters 3 to 4, present different topologies that are possible in the design of the power stage inverter of which full bridge converter topology is chosen due to its numerous advantages. The significance of dual stage and galvanic isolation to PV-grid inverters is depicted in chapter 3.

The energy conversion efficiency, maximum power point tracking, anti-islanding, power quality and cost have been mentioned in Chapter 4 as the most important criteria to be considered when designing any power stage inverter. In chapter 5 the parameters for power stage inverters are estimated and proposed. The boost inductor and input capacitor which are important components to voltage source inverter (VSI) are calculated. Switching scheme and the L-C-L filter is proposed to give a clear sinusoidal output phase voltage of 230V from a DC capacitance bus estimated to handle 400V. The parameters are designed in MATLAB Simulink and the desired output simulation results are discussed in Chapter 6.

Lastly, the conclusion of this thesis is made and proposes the scope of the future work. This is the next part of the NTNU renewable energy laboratory project. The proposed control schemes would compromise with the inverter power stage and would results in the smart grid system. The proposed control shall be able to integrate the available renewable energy sources available in the laboratory and shall be implemented in MATLAB Simulink.