**CANDIDATE’S DECLARATION**

We hereby declare that the work that is being presented in this report entitled **“*Development of AC-DC Bidirectional Converter for interconnecting AC grid with DC grid*”** in partial fulfilment of the requirement for the award of the degree of ***Bachelor of Technology*** in ***Electrical Engineering*** submitted to the ***Department of Electrical Engineering, Indian Institute of Technology Roorkee, India*** is an authentic record of our own work carried out during the period from August 2013 to May 2014 under the guidance of ***Dr. Pramod Agarwal, Professor***, Department of Electrical Engineering, Indian Institute of Technology Roorkee.

The matter embodied in this project report has not been submitted by us for the award of any other degree or diploma.

Date:   
Place: IIT Roorkee

Rahul Jangid (10115080)

Nimit Jain (10115071)

Mohit Tibrewal (10115068)

**CERTIFICATE**

This is to certify that the project work entitled *‘****Development of AC-DC Bidirectional Converter for interconnecting AC grid with DC grid***’ done by **Rahul Jangid, Nimit Jain, Mohit Tibrewal**, students of **Bachelor of Technology, Department of Electrical Engineering, IIT Roorkee,** is a record of the bonafide work carried out by them under our supervision and guidance for the partial fulfillment of the requirement of their Bachelor of Technology degree. The matter embodied in this project has been carried out in the Electrical Engineering Department at IIT Roorkee, Roorkee -247667, during **August’ 2013 to May’ 2014**. Their performance was excellent. I wish them success in all their future endeavors and research.

**Dr. Pramod Agarwal**

Professor  
Department of Electrical Engineering

IIT Roorkee

Date:  
Place: IIT Roorkee

**ACKNOWLEDGEMENT**

We would like to express our sincere gratitude to Dr. Pramod Agarwal, Professor, Department of Electrical Engineering, Indian Institute of Technology Roorkee for their valuable guidance, support, encouragement and the inspirational support throughout the Project. We express deep and sincere sense of gratitude to all teachers of Electrical Engineering department for their encouraging and caring words and suggestions which have contributed towards completion of this project. We are indebted to all our classmates for taking interest in discussing our problems and encouraging us. We convey our deep sense of gratitude to the Head of Electrical Engineering Department (HOD), who directly or indirectly helped us during the work. Finally, we would like to express our deepest gratitude to the Almighty for showering blessings on us during the course of work.

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**ABSTRACT**

The aim of the project is to design and implement a bidirectional AC-DC converter for interconnecting AC grid to DC grid. This device is one of the core components of the upcoming smart grid infrastructure which would comprise of distributed energy feed-in points which would be a mix of AC and DC sources. This scenario would necessitate multiple energy conversions between energy storage, production and consumption systems – which could imply high energy conversion losses. Therefore to reduce this a common AC and a DC grid would be an optimal solution and thus the need for a bidirectional convertor would naturally arise.

To the best of our knowledge, currently a viable design for such system isn’t in operation however research has been going on globally. Briefly, bidirectional converter provides the ability to transfer energy from DC grid (through battery) to AC grid (to AC loads) but also transfers energy from AC grid (using Wind Energy) to DC grid to charge the battery (energy storage). The battery to grid (B2G) mode allows power utility companies to offset peak power consumption thus allowing household consumers and industry corporations to save money on their electricity bills.

This project describes a design and provides the implementation details for a Single phase PWM AC-DC bidirectional converter. Although the Single phase PWM AC- DC design requires a more complex controller than its counterparts. The converter is realized by developing the bidirectional converter in MATLAB and its interconnection between AC grid and DC grid (battery). As explained before, this interconnection is crucial for current electricity distribution system because it enables connection of distributed energy resourced (DERs).