NCPRE

National Center for Photovoltaic Research and Education
Power Electronics

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January 13rd 2017

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Deliverables: Phase-I

Motivation:

Development of low-cost and robust power electronic solutions for PV applications in rural areas

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Deliverables: Phase-I

A. Stand Alone PV Based Single Phase Power Generating Unit for Rural Household Application

➢ Salient Features:

- 12V battery compatible system.(1-ph, 230 V, 500 VA)
- Galvanic isolation by using HF transformer
- Battery over charge and over discharge protection
- SPWM Inverter ensuring Sine wave output.
- MPPT Tracking for maximum utilization of PV power.

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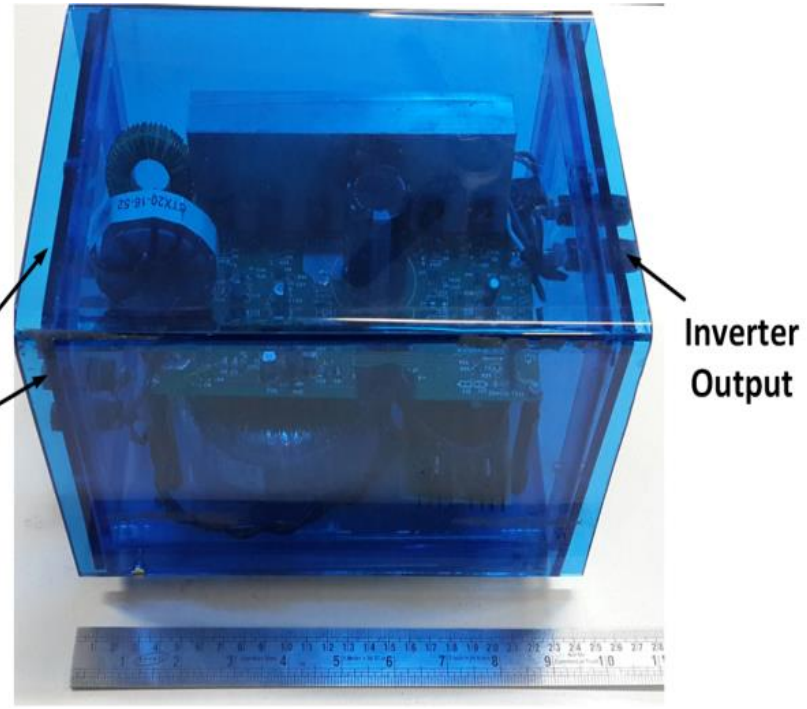
Deliverables: Phase-I

- **B. 300 VA low cost PV Battery integrated standalone inverter for rural area**

➢ **Salient Features:**

- 12 V/24 V Battery PV compatible
- Integrated MPPT and charge controller
- DC link capacitor selection for longer life time.
- Reduce number of power electronics switching devices.
- Low cost and high reliability.



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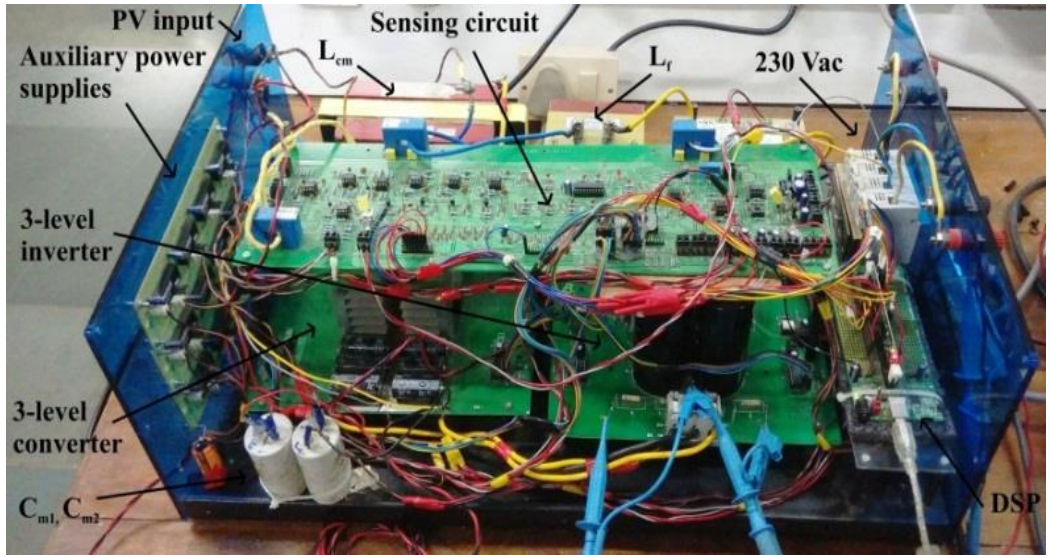
Deliverables: Phase-I

C. 5 kVA SiC devices based high performance transformer-less on-grid inverter for residential application

➢ **Salient Features:**

- 94% part load efficiency, with 2% THD
- Low leakage current with reduced magnetics using multilevel converter and inverter



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Deliverables: Phase-I

- **D. Power electronic interfaced solar powered irrigation water pump**

➢ **Salient Features:**

- Induction motor drive of 3hp capacity
- SVM and V/f control of IM

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Deliverables: Phase-I

- **E. Low-cost BLDC motor for PV based deep bore-well water pumping**

➢ **Salient Features:**

- Higher flux concentration, low flux leakage and robust
- spoke type rotor
- Sensor less closed-loop speed control along with MPP
- tracking

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Activities in Phase -II

- To convert the five semi-engineered products developed in Phase – I into viable industry level products.

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Activities in Phase -II

- **Hardware-in-Loop Simulation for Testing Small and Medium Power Grid Connected Solar Inverters and their Control and Protection**

Motivation: To develop a platform for testing both power hardware and control/protection functionalities of a solar PV dc-ac converter in a Hardware-in-Loop scheme facilitating:

- Transparency to the user
- Due respect to distribution standards relating to ant islanding protection, fault current contribution, protection etc.

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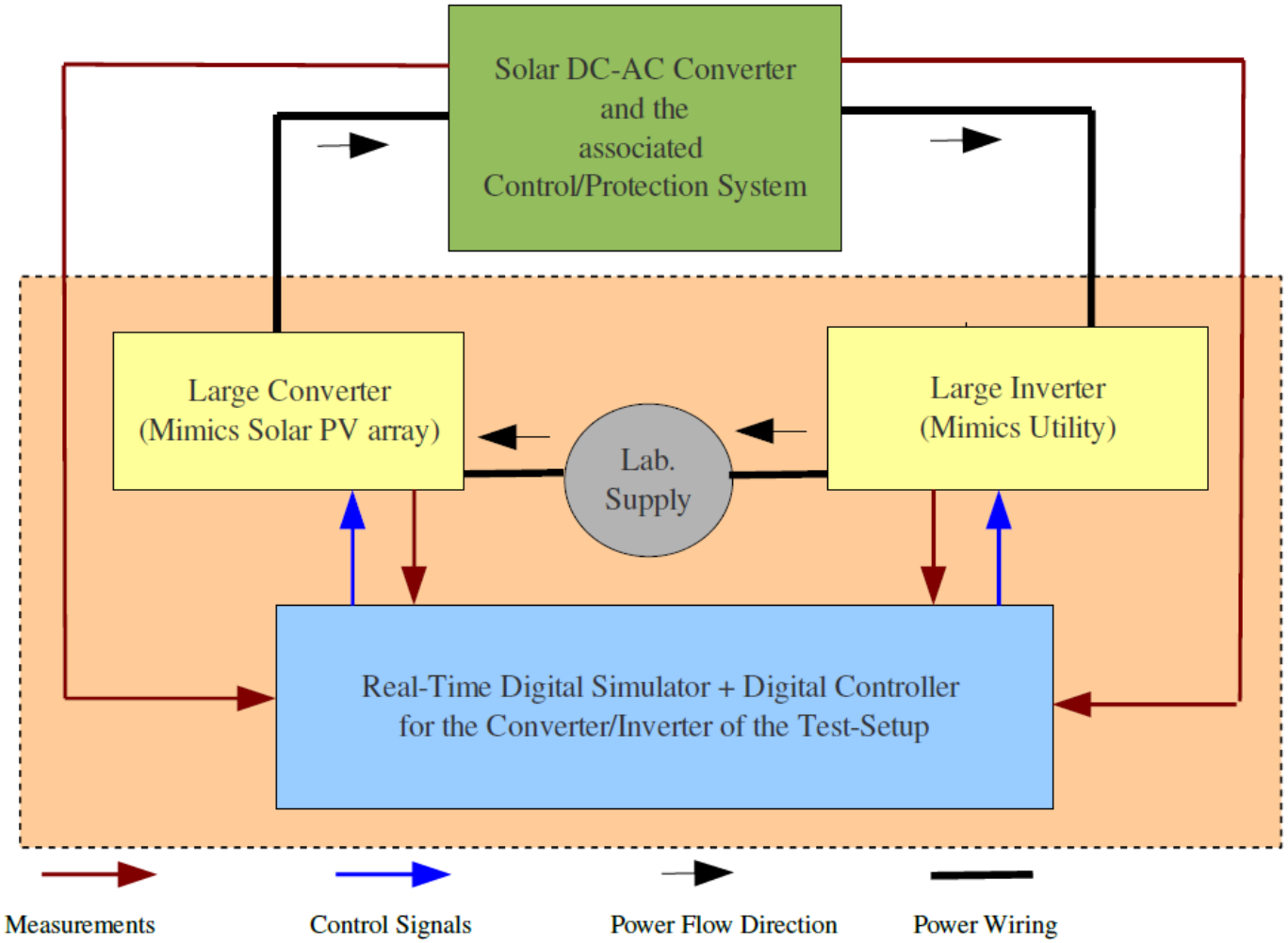
Activities in Phase -II

- Development of a large inverter which mimics a power distribution system
- Emulation of the behavior of the distribution system
- Real Time Digital Simulator (RTDS) as a digital controller for the system for testing feedback controller functionality and to ensure protection features
- Design , integration, simulation and analysis of the whole setup



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Activities in Phase -II

- Development of intelligent battery chargers for the Li-Cd cells developed in Phase-I
- Grid connected solar power plants – Inverter configuration, control issues and protection
- Remote monitoring of performance of installed solar power plants
- Evaluation of existing solar power plants by employing professionals

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