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ROLL NO: ECP19004

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LABORATORY: E-mobility Research Lab

AREA OF RESEARCH: Grid connected PV system, PV microgrid and its power electronics based modules.

TITLE/TOPIC (If Applicable): Design, optimization and performance evaluation of power electronics based system for photovoltaic microgrid.



SUMMARY: Microgrids are essentially modern, sustainable, small-scale electrical power distribution systems. They can afford benefits such as enhancing system reliability, reducing capital investment and carbon footprint etc. Microgrids can contain renewable energy sources (solar, wind, hydro etc.) as well as non-renewable energy sources (diesel generators, gas turbines). However, solar energy or photovoltaic (PV) is the the most abundantly available renewable energy source. Apart from the solar PV modules, the system components of a PV micro grid comprise a power conditioning unit (PCU) and a protection system. The PCU contains all the power electronics system including dc-dc converter, inverter, controllers etc. On the whole the entire system performance is based on the efficiency of the individual components.

To achieve efficient, less complicated and cost-effective control strategies in PV microgrid, this research focuses mainly on its power electronics parts i.e. DC-DC converter with high gain along with a machine learning based MPPT control technique and to design a Z source inverter (ZSI) for the PV microgrid with an improved harmonic elimination performance. To develop a Virtual Reactive power control technique for the grid connected PV microgrid is also a part of this research.

EXPERIMENTAL SET-UP (If Any): 125W PV array set up with the PCU system.