# University of Central Florida

## *PV Power Conversion with Micro Inverter*

## *(Formerly titled: PV Energy Conversion and System Integration)*

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**Description:** The objective of this project is to develop a system-driven Plug'N'Gen solar power system demonstrating architecture of decentralized, low-cost, mass-produced, PV panel-mounted micro-inverters. This system will be able to compete with today's centralized multi-kW PV inverters that require cost prohibitive professional installation. The project tasks are: 1) novel inverter topology and control concepts; 2) advanced digital control algorithms; 3) SmartTie interface with the utility grid; and 4) low cost and ultra-compact PV inverter in package.

**Budget:** $1,267,000
**Universities:** UCF
**External Collaborators:** U. S. Department of Energy awarded the UCF PIs a two year $1,400,000 project (DE-EE003176) called "Photovoltaic Power Electronics Initiative (PERI)"

**Executive Summary**

Renewable energy, especially PV energy has developed very fast in the last decade to solve the problems of the limited conventional fossil fuels and the rising environmental pollution. In contrast with centralized PV generation, distributed PV generation takes the granularity of the PV system down to the single PV panel giving rise to an AC PV module. AC PV modules with integrated micro inverters have significant advantages over traditional PV systems, such as simple maintenance, maximum energy harvest, installation cost reduction, and high system reliability. However, technical challenges including efficiency, cost, power density and reliability are still barriers to the application of micro inverters. The research described in this report constructs a micro inverter system with novel soft switching and maximum power point tracking (MPPT) technique to provide a solution to the micro-inverter applications.

The objective of the project is to develop low cost, ultra-compact, micro inverters for MW-class solar farms. The tasks include improving efficiency, power density, and effective maximum power tracking DC/DC converter stage and grid-tied 3-phase DC/AC inverter stage. A 400W two stage micro inverter was built. A solar array simulator AGILENT MODELS E4360A is implemented as a PV source and the operation of the micro inverter is demonstrated.

This Project has been completed. Final Report found here.