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Research and Development of a Smart Module Integrated Converter for the Future of Renewable Energy

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University Research Grant Program Final Report Summaries

Project: Research and Development of a Smart Module Integrated Converter for the Future of Renewable Energy

Phong Tran – Department of Physics and Astronomy - University of Montana

\$5,000

Grant approved: April 2014

Summary

This research focused on developing of a Smart Module Integrated Converter for grid-connected solar photovoltaic (PV) system. This technology enhances the commercial micro-inverters with novel network-supported, grid-adapted functionalities. The micro-inverter utilizes open source and reference design from Microchip to keep design and production at low cost.

The project performed six tasks under this grant:

- 1) Evaluation of a commercial micro-inverter from Enphase in term of performance under grid stresses.
- 2) Fabrication of a micro-inverter circuit based on Microchip reference design.
- 3) Development of a new control algorithm for the micro-inverter to stabilize the voltage profile at the output of the PV system.
- 4) Development a new voltage-ride-through controller to adapt with changing in voltage grid.
- 5) Design of an active anti-islanding protection mechanism.
- 6) Setup of a mobile 800W PV system at Clapp Building for testing of the new micro-inverter.

Other main results

The project resulted in 1 peer-review paper which was presented at University of Illinois on February. Two other articles are drafted for final submission.

The project resulted in 1 patent pending by UM Office of Technology Transfer.

The PI involved students in Physics and Astronomy Department in discussions about renewable energy and Mr. Jarnadan Pokharel from Aaniiih Nakoda College in Summer Workshop at UM to install a photovoltaic system.