

Project or Master Thesis:

Implementation and Testing of Distributed PV- Battery Architectures Using Reconfigurable Solar Converter (RSC)

Project Description: There are different options for integrating energy storage to a utility-scale solar PV system. Different integration solutions can be compared with regards to the number of power stages, efficiency, storage system flexibility, and control complexity. From an energy source standpoint, a stable energy source that can be dispatched and utilized at the request is desired. The RSC concept arose from the fact that energy storage deployment for solar PV systems has the highest value if there is enough gap or a minimal overlap between the PV power generation and release time. RSC provides significant benefits over other integration options, noting that just one-stage converter is used. After verifying multi-mode operation with RSC, different system benefits of this topology such as peak-shifting and ramp rate control can be investigated. This project describes a single phase distributed multilevel modular RSC in an expandable, retrofit, transformer-less configuration.

Requirements: A prior knowledge of power electronics and acquaintance with Matlab/Simulink is desirable but not strictly mandatory. Graduate students of ECE department with the background in C programming, and hardware implementation are highly encouraged to apply.

Project Outcome: By doing this project the student can gain knowledge about challenges of PV/Battery integration systems. She/he can also learn different methods of modelling and simulation, experimental experiences and working in a well-equipped lab are other advantages of this project. This work has great potential to be published in highly credible journals, as it has already been patented, and some preliminary results have been accepted to be published in some well-known conferences such as APEC, IEEE PES T&D, IEEE PES General meeting, and etc.

The start time: Immediately

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