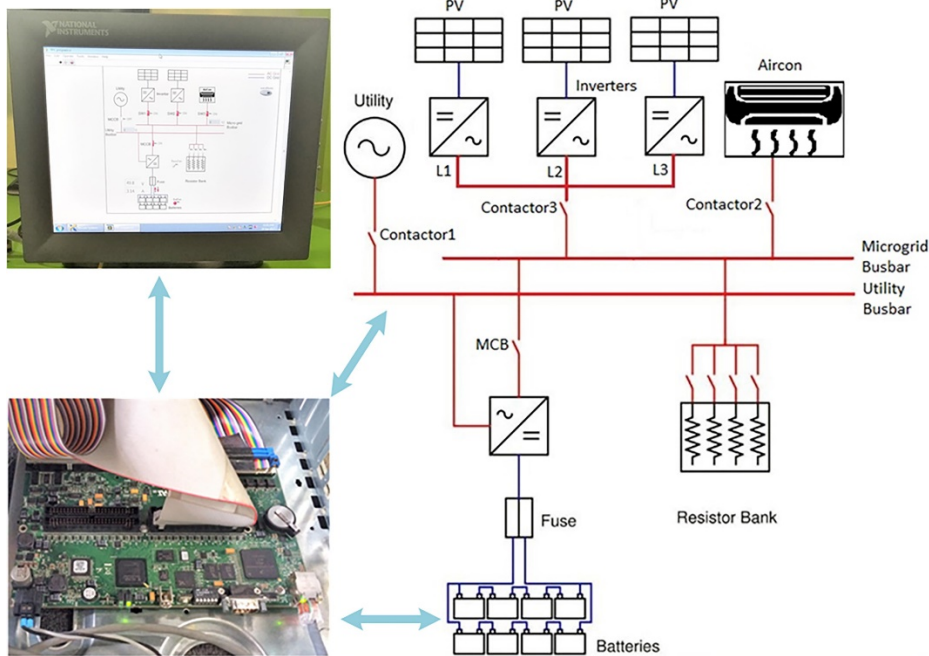


Turning Grid-Tied Photovoltaic Systems into an Autonomous Microgrid



Technology Overview

The proposed technology turns a grid-tied PV system into an autonomous microgrid during major grid disturbances, and enabling the grid-tied PV system to continue supplying the local loads. When utility failures occur, the grid forming inverter takes over controlling the microgrid voltage and frequency. The developed microgrid supervisory controller (MGSC) balances the generation and load to achieve the target of maintaining microgrid stability and maximizing the output power of grid-tied PV system.

Technology Features & Specifications

The developed hardware and software reconfigure a grid-tied PV system and turn a grid-tied PV system into an autonomous microgrid during major grid disturbances, enabling the grid-tied PV system to continue supplying the local loads. In the event of utility failures, the grid forming inverter takes over controlling the microgrid voltage and frequency, with the microgrid supervisory controller (MGSC) balancing the generation and load to achieve the target of maintaining microgrid stability and maximizing the output power of grid-tied PV system.

The prototype system consists of inverters/chargers (18 kW), storage batteries (12.5 kWh), and diversion loads (15 kW), which is used for an existing grid-connected PV system comprising three grid-tied inverters (15 kW), none of which has the frequency shift power control function or any other communication capability. The input variables to the MGSC, developed on the NI sbRIO-9642 real-time processor, include the exchange power at point of common coupling, the grid-tied inverter output power, the battery voltage and temperature. During a power failure, the prototype system turns the grid-connected PV systems into a microgrid to continuously supply electricity from the grid-tied PV systems.

Potential Applications

The developed microgrid supervisory controller (MGSC) provides back up power supply using solar energy. The autonomous microgrid can be deployed in HDB blocks with grid-tied PV installation, which will benefit the residents by increasing the service quality. The autonomous microgrid can also be used in commercial buildings and condominiums that have grid-connected PV systems.

Customer Benefits

The benefit will be providing back-up power systems using solar energy and ensuring critical electrical devices to operate continuously when the utility is down.

OVERVIEW

- Technology Category Energy - Sensor, Network, Power Conversion, Power Quality & Energy Management
Energy - Solar
- Technology Status Available
- Technology Readiness Level [TRL4](#)
- Keywords Photovoltaic system, PV Microgrid
- Tech Bundles [Energy Management Systems](#), [SPECS](#)



CONTACT:

Technology Development and Innovation Office

Website : www.np.edu.sg/tdi

Email: dept-tdi@np.edu.sg