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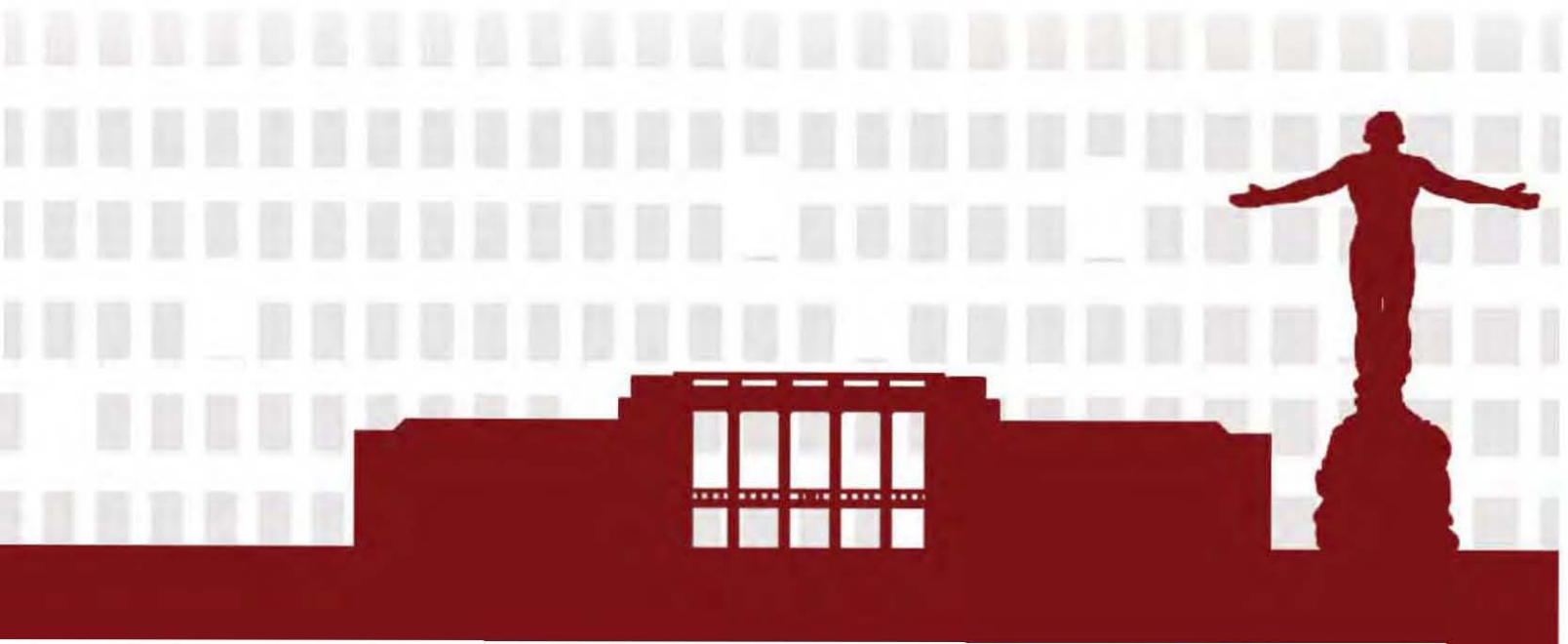
on Semiconductor and Electronics, Information and Communications Technology and Energy

16-17 November 2015
Metro Manila, Philippines



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EXPERIMENTAL TEST-BED FOR STUDYING MICRO GRID PERFORMANCE

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ABSTRACT

The technical advancement of renewable and dispersed generation sources have led to a proliferation of small and micro grids, which serve the electrical energy demand local and isolated communities. These micro grids have helped improve the reliability of supply for end-user, ensure flexible operation. Along with other development in the energy usage profile, such as the increasing presence of electric vehicles and load demand response initiatives, there is a need to study and derive control strategy for micro grid, to ensure economic and reliable operation. The current research project aim at developing an experimental test-bed for data acquisition, measurement and identification of micro grid dynamic performance, in order to derive methods for islanding detection and micro grid control strategies.

The studied micro grid in this research consists of synchronous generators, transformers, motor loads, and static loads. The micro grid can operate in autonomous mode, as well as in grid connected mode. The micro grid is based on the Power system Simulator (NE9171), developed by TQ [1]. The Power system simulators can be extended with external modules to study different aspect of micro grid operation, such as the integration of inverter-based generation sources. The specific study conducted in this research are:

Development of an experimental setup to measure the micro grid dynamics performance, and identification of the micro grid frequency response in the islanded mode of operation.

Determination of a suitable algorithm to detect islanded mode of operation, based on real-time measurement data.

The experimental test-bed is illustrated in the figure 1. It consists of synchronous generator module, static and electronic controlled load modules, and induction motor. The operation of the grid can be supervised controlled by controlled CB and data acquisition system. The data acquisition system is designed specifically for this study, which includes 6 analogue inputs, 8 binary inputs with sampling rates of 1000Hz.

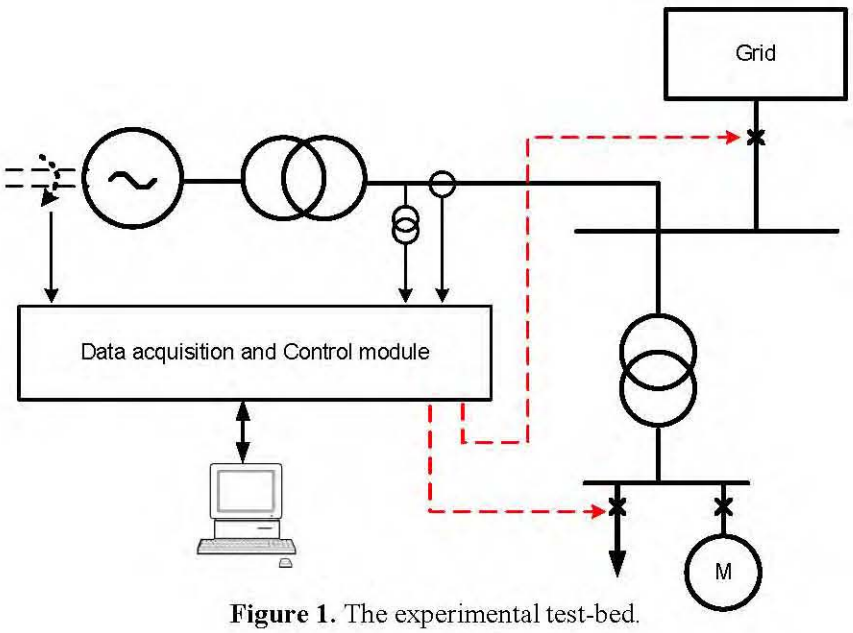

Figure 1. The experimental test-bed.

The performance of the power system model in Fig. 1 is measured with various disturbances, such as the close/open of load CB, grid connection CB. The disturbances are performed at various operating conditions. These experiments help construct a dynamic model for the micro grid [2]. Besides, based on the comparison between system responses with and without grid connection at various operating conditions, novel strategies for islanding detection can be derived [3,4].

Acknowledgment
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