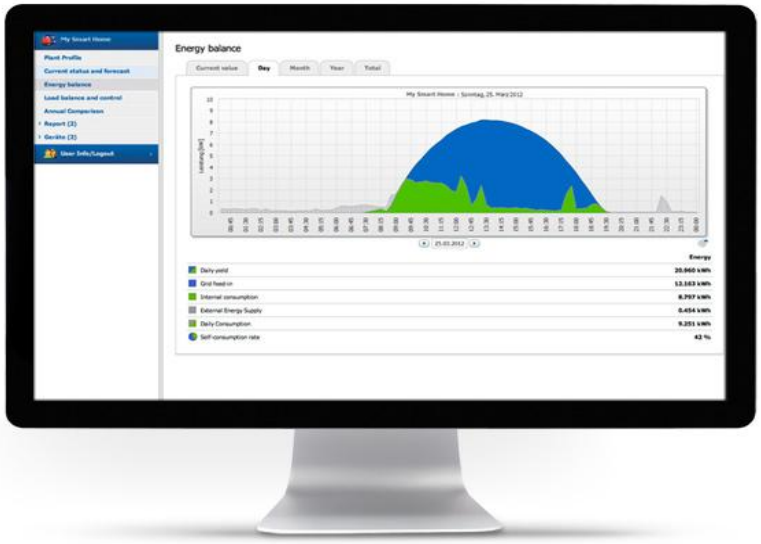
School of Engineering & Energy

Murdoch UNIVERSITY

MONITORING AND DATA ACQUISITION SYSTEM FOR THE PHOTOVOLTAIC TRAINING FACILITY ON THE ENGINEERING AND ENERGY BUILDING

A report submitted in partial fulfillment of the requirements for the degree of Bachelor of Engineering



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Abstract

Solar energy is developing fast in Australia, particularly with the installations of grid-connected photovoltaic (PV) systems. Increasing photovoltaic penetration levels causes; however, power quality issues to electricity network operators, due to intermittency of solar energy. In this report, we discuss the need for high resolution data on solar radiation and system performance to be used for solar energy forecasting in the short, medium and long term. This document proposes the implementation of a monitoring system for the Photovoltaic Training Facility on the rooftop of the Engineering & Energy Building at Murdoch University. The design process is described here to illustrate how the final system has been adapted to specific requirements for this facility. The design of the monitoring system has been chosen to address the issue of solar energy intermittency in addition to fulfilling general requirements for monitoring PV array performance. Because the facility is not yet commissioned, the study only focused on environmental data monitoring with recommendations for further work involving integration of inverters' communication. The designed monitoring system consists of various environmental sensors including pyranometers, anemometers, RTD temperature sensors and a wind vane, as well as communication interfaces for the various inverters. Data acquisition was selected to be based on remote I/O modules from the Advantech's ADAM 4000 Series that were satisfying the requirement of sampling at a rate less than 1 second. In addition, the report describes the development of two user interfaces using the Labview programming software to monitor data from the facility. Testing of programs through recording solar radiation over a 1 hour period confirmed the possibility to collect measurements of solar radiation fast enough so that intermittency of solar energy can be observed. Data will be documented and shared to provide a useful resource on Perth solar energy and PV intermittency.

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