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Wireless Monitoring of Urban Wind Turbines by ZigBee Protocol: Support Application Software and Sensor Modules

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Abstract

This paper is about wireless monitoring of an urban vertical axis wind turbine, focusing on the layered system used for the computational framework of sensors, data acquisition, data processing and storage system interconnectivity. A low power wireless networks employing ZigBee protocol is used for the sensors modules connectivity. A voltage and current sensor and an infrared photoelectric sensor developed for the monitoring are succinctly described. The usability in a Smart Grid environment were taken in consideration in the design of the modules, wireless networks creation and the computation engineering.

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1. Introduction

Exploitation of wind energy conversion into electric energy is reported as in increasing development in the first decade of the 21st century [1]. Wind energy conversion integrates the mix generation of power systems and has a leveled cost competing with conventional thermal generation in nowadays. Also, wind energy is one of the valuable disperse energy sources envisaged for future small scale development in urban areas exploitation [2], where the Vertical Axis Wind Turbine (VAWT) has advantages over the Horizontal Axis Wind Turbines (HAWT) [3] due to a better adequacy on wind conditions.

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