

A survey of wireless sensor network approaches and their energy consumption for monitoring farm fields in precision agriculture

Mohammad Hossein Anisi · Gaddafi Abdul-Salaam · Abdul Hanan Abdullah

© Springer Science+Business Media New York 2014

Abstract Precision agriculture (PA) is the use of information and communication technology together with best agricultural practices for farm management. PA requires the acquisition, transmission and processing of large amounts of data from farm fields. A wireless sensor network (WSN) is a system for monitoring agriculture fields. Several researchers have used WSNs to collect the required data from the regions of interest for their intended usages in various applications. In a WSN, the energy consumption of the sensor nodes is the main issue, due to its direct impact on the lifetime of the network. Many approaches have been proposed to address this issue using different power sources and types of nodes. Specifically, in PA, because of the extended time period that is required to monitor fields, using an appropriate WSN approach is important. There is a need for a comprehensive review of WSN approaches for PA. The aim of this paper is to classify and describe the state-of-the-art of WSNs and analyze their energy consumption based on their power sources. WSN approaches in PA are categorized and discussed according to their features.

Keywords Wireless sensor networks · Energy consumption · Topologies · Power source

Abbreviations

AG	Above ground
BS	Base station
CP	Center pivot
ET	Evaporation–transpiration
FW	Full-wave
GW	Gateway

M. H. Anisi (✉)
Department of Computer System and Technology, Faculty of Computer Science and Information Technology, University of Malaya, 50603 Kuala Lumpur, Malaysia
e-mail: anisii@gmail.com; anisi@um.edu.my

G. Abdul-Salaam · A. H. Abdullah
Faculty of Computing, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia