Agricultural and Environmental Applications of RFID Technology

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ABSTRACT

RFID (Radio Frequency IDentification) technology bridges two technologies in the area of Information and Communication Technologies (ICT), namely Product Code (PC) technology and Wireless technology. This broad-based rapidly expanding technology impacts business, environment and society. The operating principle of an RFID system is as follows. The reader starts a communication process by radiating an electromagnetic wave. This wave will be intercepted by the antenna of the RFID tag, placed on the item to be identified. An induced current will be created at the tag and will activate the integrated circuit, enabling it to send back a wave to the reader. The reader redirects information to the host where it will be processed. RFID is used for a wide range of applications in almost every field (Health, education, industry, security, management ...). In this review paper, the authors will focus on agricultural and environmental applications.

Keywords: Information and Communication Technologies (ICT), Intelligent Systems, Management, Product Code, RFID

1. INTRODUCTION

Based on electromagnetic and magnetic effects, RFID technology is a broad-based rapidly expanding technology impacting business, environment and society. It empowers people to make better decisions, better data accuracy, better inventory management, better production and better protection of environment. Because of the large variety of its applications, RFID technology is booming. From EPC global (EPCglobal Inc, 2007) another catalyst accelerator of this booming is the fact that the performance of labels, referred to as RFID tags, has improved, especially with the emergence of the protocol of Ultra High Frequency Generation 2 (UHF Gen 2) launched by EPC global (Electronic Product Code). This protocol enjoys

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a high level of standardization, reliability and information security.

2. RFID PRINCIPLE

RFID technology hangs on the idea of assigning a unique number to each individual item (object, animal, human being). To setup an RFID system, three main components are required as shown in the Figure 1:

- The tag: also called transponder, is an integrated circuit, commonly referred to as microchip, attached to a minuscule (metallic) antenna. Every tag has its own identifier code that will be used to uniquely identify the item associated to it.

- The reader: is used to create an interrogation zone in which the RFID tag will be read. It collects information from the tags, filter them and transfer them to the processing unit. In the case of a passive tag, the reader also serves to power the tag up. Moreover, the reader manages the different antennas it is connected to in order to achieve a maximum read rate.

- The server / host: is the processing part of the RFID system. The host is a computer that runs, in addition to the enterprise application, an application called middleware that is an interface between the reader and the application layer. The middleware, the brain behind the smart system, manages the different readers and instructs each one on how to interact with the RFID transponders. It is also the component that is responsible for communicating filtered events back to the application. The host may be one processing unit or an entire enterprise system composed of servers (web, databases...). The host may be one processing unit or an entire enterprise system composed of servers (web, databases...)

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Figure 1. RFID architecture
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