RFID Technologies in Healthcare Setting:
Applications and Future Perspectives

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ABSTRACT

The paper discusses the use of RFID technologies in healthcare setting examining the status of applications and prospective views. The authors have identified two classes of applications of RFID technologies in healthcare setting: people monitoring/management and items/assets management applications. While for the perspective views it is provided their classification in: future scenarios, emerging applications and needs. Moreover, a discussion on components, development, key strengths and critical issues affecting the RFID usage in healthcare setting is given in the paper.

KEYWORDS

1. INTRODUCTION

Radio frequency identification (RFID) is a widely used technology based on radio frequency electromagnetic fields to obtain data for tracking and identifying people, products and goods. It found a strong interest and use in healthcare setting where the increased attention to patients' assistance and health has stimulated its development and use (RFID Journal, 2012). At the begnning this was mainly connected with the serious problems of the healthcare sector in the management of resources for disease prevention, and the costs of healthcare that represent an always existing problem (Correa et al., 2005). The RFID technologies contribute in changing this scenario since they are leading to an increased accessibility for healthcare providers, more efficient tasks and processes management and a higher quality of healthcare services using limited human resources. Many are the applications of RFID technologies in healthcare; they can be used for physical asset management (Kwok, S. et al., 2008), inventory management (Choy, K. et al., 2007), supply chain management (Park, K. et al., 2010), production (Kwok, S. and Wu, S., 2009) etc. In all these applications, RFID technologies have the potential to transform healthcare services by enhancing the quality of care, improving patient safety, reducing medical errors, saving costs and overall contributing to the quality of care delivered to patients. However despite these key strengths, the applications of RFID technologies in healthcare setting raises also important issues in particular connected with privacy and security. For example, patients might be concerned about their privacy when hospital staff tracks their whereabouts through RFID. Moreover when RFID technologies are used as means of identification, illegal copying of tags can pose security threats. The data security law states that people related data can only be collected and handled if the person has granted permission or by order of court. Moreover, other issues are connected with the high upfront costs, technological limitations, social and legal issues etc. However despite

these critical issues the developments in RFID technologies continues to yield wider reading ranges, larger memory capacities and faster processing. In the future, RFID technologies will contribute to further improve the efficiency of drug inventory and medical device management within the hospital supply chain. (Kaur & Kaur (2012).

Starting from these considerations, the paper discusses the applications of RFID in healthcare setting and their perspective views. Moreover components, development, key strengths and critical issues affecting the RFID usage are discussed in the paper.

The paper is structured as follow. Section 2 provides open challenges and describes the motivation of the study. Section 3 briefly describes the components of RFID technologies. Section 4 discusses applications of RFID technologies in healthcare setting. In Section 5 a discussion is given. Section 6 provides a discussion on perspective views of RFID in healthcare setting. Finally, Section 7 concludes the paper.

2. OPEN CHALLENGES AND MOTIVATION

RFID is a technology that has attracted the interest of the many researchers because of the extraordinary benefits it offers over the other existing identification and data capturing technologies (Prathiba & Jain, 2015). According to Antic & Tokic (2012) "RFID is used extensively today around the world and in a world of ways. In 2010 three key factors drove a significant increase in RFID usage: decreased cost of equipment and tags, increased performance to a reliability of 99.9% and a stable international standard around UHF passive systems". In healthcare setting, RFID technologies are applied to people (patients/staff) and items/assets, allowing wards and treatment areas detecting and recording interactions (Vasu, 2012). RFID technologies are transforming how some hospitals operate and, they have an even bigger role to play in the hospitals of the future. A Research and Markets report (http://www.businesswire.com/news/home/20150113005541/en/Research-Markets-GlobalSourcing-RFID-Tags-Market#.VLhyvSfEiLY) asserts that "forecasts global sourcing of RFID tags will have a compound annual growth rate of 22.4% through 2018". Yet another market report (http://www.businesswire.com/news/home/20150113005541/en/Research-Markets-Global-Sourcing-RFID-Tags-Market#.VLhyvSfEiLY) puts the RFID market at $10 billion by 2020. Passive RFID tags market alone will grow to almost 7 billion tags in the next year that number is expected to grow to 25 billion tags by 2020 with more tags deployed on high complexity retail items and high-value.

However this widespread development of RFID technologies in healthcare setting presents different open challenges that we classify in two different macro-areas: (i) people monitoring/ management and (ii) items/assets management (as shown in Table 1).

People monitoring/ management involves all applications related to people (patients/staff) such as: position tracking, patient's identification/health monitoring and staff management. The use of RFID technologies in this area introduces a new set of challenges, in particular with respect to the development of policies/measures/systems for ensuring data security and privacy. Health information collected in connection with RFID technologies can present a lot of implications such as:

Table 1. Open challenges of RFID technologies in Healthcare setting

MACRO-AREA	OPEN CHALLENGES
PEOPLE MONITORING/ MANAGEMENT	Data security and privacy
ITEMS/ASSETS MANAGEMENT	Fundamental Technical Organizational

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