Chapter 1

RFID in the Healthcare Industry

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ABSTRACT

With its potential and unique uses, healthcare is one of the new sectors where RFID technology is being considered and adopted. Improving the healthcare supply chain, patient safety, and monitoring of critical processes are some of the key drivers that motivate healthcare industry participants to invest in this technology. Many forward-looking healthcare organizations have already put the potential of RFID into practice and are realizing the benefits of it. This study examines these empirical applications and provides a framework of current RFID implementations in healthcare industry and opportunities for continued applications. The framework also presents a categorical analysis of the benefits that have been observed by the healthcare industry. In addition, major implementation challenges are discussed. The framework suggests asset management, inventory management, authenticity management, identity management, and process management are the broad areas in which RFID adoptions can be categorized. Even though this categorization captures most of the current and potential research, more empirical studies and evaluations are needed and more applied investigations have to be conducted on integrating the technology within the industry in order to fully utilize RFID.

INTRODUCTION

Although RFID has been around for more than 50 years, it has only recently received much attention due to the very well publicized and promoted mandates by Wal-Mart and the United States Department of Defense (DoD) for its use in their supply chains. This increased awareness of the technology has resulted in various uses in a variety of industries, well beyond the niche applications of the past 50 years. As one extension of its use, RFID has started to emerge as a major technology in the healthcare industry. The technology has some compelling advantages that make it particularly attractive for healthcare including robustness, unobtrusiveness, ease of use, and value.
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proposition. The Food and Drug Administration (FDA) of the Department of Health and Human Services (HHS) recommended using RFID on all drugs at the unit level to prevent drug counterfeiting (Wicks et al., 2007). In addition, a number of applications, trials, and pilot projects have proven to improve the quality of care and reduce costs. Furthermore, many of these RFID applications have unquantifiable benefits that include saving lives, preventing injuries, and reducing medical errors. Since the healthcare market's consumption of RFID services is expected to increase more than 15 times, from $94.6 million in 2009 ($5.56 billion overall RFID market) to $1.43 billion in 2019 (over $10 billion projected overall market), it makes sense to take a closer look at the current status to see how RFID is being used in the industry (Harrop et al., 2010). Major applications of RFID in healthcare include tracking (i.e., assets, inventory, people), identification and authentication, automatic data collection and transfer, and sensing (Vilamovska et al., 2009). As RFID technology continues to mature (i.e., continues to get better, faster, cheaper), the next topic that needs to be discussed is how to strategically implement RFID into healthcare operations.

In this chapter we intend to provide an overview of current RFID technology implementations in healthcare industry and potential opportunities for expanding them. In addition to its short-term benefits and long-term payoffs, we also discuss main implementation challenges. A categorization framework of RFID uses and opportunities are introduced that suggest five empirical application areas: asset management, inventory management, authenticity management, identity management, and process management. Representative applications in these areas are given to provide good insight into business cases of RFID in healthcare.

RFID TECHNOLOGY BACKGROUND

Radio Frequency Identification is a data collection technology that utilizes wireless radio communication (radio frequency signals) to identify, track, and categorize objects (see Figure 1). The basic RFID system consists of three main components:

- The RFID reader, which by itself contains the processing unit, antennas, and the cables joining them; its main task is to send electromagnetic waves to the surrounding environment and listen for electromagnetic responses from the RFID tags. Upon receipt of the tags’ data, the reader submits the RFID reads to the target database.
- The RFID tag, which is a microchip bound to a small antenna, transmits the data stored in it as the electromagnetic response to the reader.
- The database where all the raw read data is to be amassed, and ultimately converted into meaningful numbers and patterns.

Figure 1. Object/device interactions in an RFID system