Chapter 14
RFID Applications in E–Healthcare

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ABSTRACT

Pervasive healthcare is the ultimate goal of all healthcare facilities and e-healthcare is the most talked about medical assistance these days. Healthcare organizations are exploiting RFID to maximize use of tools and equipment, keep tabs on medicinal drugs, boost patient flow and plug gaps in patient safety. RFID technology has become a hot topic in all scientific areas and is entitled as a major enabling technology for the automation of many work processes involved in the health sector. This chapter talks about many singular RFID applications that have been successfully developed or are in development, particularly the ones designed for the healthcare industry. It also discusses issues related to technology and healthcare and measures to overcome them. Furthermore, the chapter gives insight on the future of RFID technology and what more it has to offer to the healthcare community in the future.

INTRODUCTION

Radio Frequency Identification, also known as RFID is grouped under the broad category of automatic identification technologies. RFID is a system that transmits identity information of a living or non-living thing, wirelessly via radio waves. A typical RFID system comprises a tag

and reader. An RFID tag contains a microchip attached to a radio antenna mounted on a substrate and it can store up to 2 kilobytes of data. An RFID reader also contains an antenna with which it can retrieve data stored on the tags and then sends the data in digital form to a computer system. RFID has been in use for over a decade, but until recently, its application was limited. Today, RFID is being used for not hundreds but thousands of applications such as (Thornton, 2006, pp.33-35):

- Supply chain including wholesale and retail inventory management
- Item-level tagging of consumer goods on retail shelves
- Contactless payment systems at the retail point of sale
- Asset tracking like luggage, medicines, equipment, etc.
- Pharmaceutical anti-drug counterfeiting
- People, livestock and wildlife tagging
- Automobile keyless start systems
- Passport and border control
- Toll payment system
- Access control
- Smart cards
- Logistics

The healthcare industry is a substantial market for RFID applications since healthcare facilities today face limited resources and rising expenses. Emerging information technologies like the RFID technology can offer means to measure and control the resources and workflow processes in order to improve patient care. As every other technology, RFID too has its pros and cons. People, that is, organizations, developers, consumers or researchers are concerned about the privacy and security threats that it puts forth. Users feel vulnerable because of the concerns (privacy/security/technical) that exist with RFID. Measures have been found to overcome these issues, but they are not yet strong enough to eliminate these threats completely. However despite these shortcomings, RFID seems to have a welcoming future especially in healthcare wherein several new RFID applications are being developed repeatedly. Throughout the chapter, the progress of RFID over the years has been analyzed; the advantages and disadvantages are discussed; impact of the technology on the healthcare industry and the threats and concerns posed by it along with their measures; the future of RFID in healthcare is also talked about towards the end of the chapter.

BACKGROUND

What is RFID?

RFID, the short for Radio Frequency Identification is a wireless communication technology that identifies living or non-living things. It is one of the many automatic identification technologies which unlike others, uses radio frequency waves to transfer identifying information between tagged objects and readers. Although, it was originally designed to transmit identity information over a RF filed, RFID technology has grown to encompass a wider range of applications as mentioned earlier in the chapter – asset tracking, supply chain management, work process validation, secure access control, etc. which incorporate additional sensors and processing to allow for a wide array of complimentary data such as location, temperature, proximity information to conveyed (Kamel & Liang, 2009).

How it Works?

RFID system architecture consists of: a tag attached to items, animals or persons; a reader that creates an RF field to detect radio waves and a computer network to connect the readers.

An RFID tag consists of a microchip that stores identity information and a metal coil that acts as an antenna to communicate the information via radio waves. The tags can be classified based on their energy source into active and passive. Active tags have their own transmitter and power source that enables them to run their microchip's circuitry and broadcast signals to the readers. Passive tags, on the other hand, do not have their own power source and instead they scavenge power from the electromagnetic radiation emitted from the readers. Passive tags can operate over longer periods of time, but can only transmit signals over a shorter range. Active tags, however cannot function once their embedded power source runs out, but can transmit signals over longer distances. RFID tags

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