

Section 01. Innovations in Engineering

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Healthcare Improvement Empowered by the RFID Technology

Nowadays, healthcare processes are rapidly changing. Every second plenty of companies try to ruin old biases and set up the new point of view. That is why the problems with resolving and identifying data as well as tracking information are tremendously vital. As a result, we need fast, powerful and simultaneously cheap solution to tackle with this challenge.

According to the huge amount of observations, the RFID (Radio Frequency Identification) technology is one of the most appropriate tools to be used. The reason for this is a well-balanced combination of the quite low price and the high efficiency of data processing. In addition, RFID technology has already proved its convenience in such various areas as security, library funds and service industries. Thus, we can surely claim about its integration into the healthcare system.

Let us move on to the RFID mechanism and its construction. In general, RFID has been developed for unique identification of items (objects) and contains several components, which interact with each other. It should be noted that RFID uses software and hardware parts. More details will be given afterwards.

It is known that RFID system consists of tags that have unique ID for identification. Another component is RF antennas used for reading tags and having their own magnetic field. RFID reader is another one to handle antenna signals and manipulate with tag information. Also, communication infrastructure takes place and works as a middle layer between application software and reader. And finally, it is the application software that enables users to look through RFID information.

RFID tags can be grouped into three categories based on frequency range used to communicate data. They can be listed as following: low frequency (LF), high frequency (HF) and ultra-high frequency (UHF). Generally speaking, the lower is frequency, the shorter is reading range and slower the data reading rate. Therefore, **Low Frequency (LF) RFID** operates within the range of 30 KHz to 300 KHz, and has the reading range up to 10 cm. **High Frequency (HF) RFID** operates within the range 3 MHz to 30 MHz and provides reading distances of 10 cm to 1 m. Having a frequency range between 300 MHz and 3 GHz, **Ultra-High Frequency (UHF) RFID** offers and provides faster data transfer rate and reading ranges up to 12 m.

In spite of convenient way of use, RFID solutions are able to possess inappropriate combination and selection of components, which may contain some errors and mistakes. In addition, the wrong software configuration can cause some threads and vulnerabilities. The list of advantages and disadvantages can be seen in Table 1.

Table 1 Advantages and disadvantages of RFID system

Advantage	Disadvantage
High speed	Interference
Multipurpose and a great number of formats	High cost
Man-power reduce	Some material may create signal problem
High accuracy	Overloaded reading (fail to read)
Complex duplication	
Multiple reading (tags)	

It should be concluded that due to huge changes related to the healthcare system of Ukraine, we have to empower healthcare processes with new technological solutions. Unfortunately, all improvements are quite expensive and will not be carried out without foundation. But some of them are really useful and deserves our attention, namely, RFID. It gives a great possibility in such various ways as equipment handling, drugs transportation, blood sample administration, patients' notes management and others. So, one small step for a medicine is followed by one giant leap for mankind.