ISSN : 2394-2975 (Online)
ISSN : 2394-6814 (Print)
Vol. 3, Issue 2 (April - June 2016)
International Journal of Advanced Research in Education & Technology (IJARET)

Radio Frequency Identification as Human Implant with Reference to Location Proximity

Shubhada Talegaon
Dept. of MCA, Parul University, Post Limda, Vadodara, Waghodia, Gujarat, India

Abstract
Radio frequency identification (RFID) is used in real life application such as logistic and supply chain visibility, item level inventor tracking, race timing, Real time location system and health care by using electromagnetic field to automatically identify the tags. In healthcare with relation to patient, RFID is used either by using band on the patent wrist or by implanting chip in human body. This paper presents view on Radio Frequency Identification (RFID) technology for human implants and examine how patients biological function can be remotely controlled The aim of this study was to express and display the role of RFID technology in improving patient safety and increasing the impact of it in healthcare.

Keywords
RFID, Electromagnetic Field, Tag, Microchip, Healthcare

I. Introduction

RFID is automatic data collection technology. It is wireless communication. It uses radio waves to read and capture information stored on a tag attached to an object. A tag can be read from several feet away and does not need to be within direct line-of-sight of the reader to be tracked. It identifies 1000 item per seconds. RFID can tell what an object is, where it is, and even its condition, which is why it is integral to the development of the Internet of Things. RFID works with low frequency fom 30 KHz to 300 KHz, high frequency from 3 to 30 MHz.and ultra high frequency from 300 MHz to 3 GHz.

There are two types of RFID system – Active RFID and Passive RFID. In active RFID systems, tags have their own transmitter and power source. Usually, the power source is a battery. Active tags broadcast their own signal to transmit the information stored on their microchips. typically operate in the ultra-high frequency band. passive RFID systems, the reader and reader antenna send a radio signal to the tag. The RFID tag then uses the transmitted signal to power on, and reflect energy back to the reader. Passive RFID systems can operate in the low frequency(LF), high Frequency(HF) or ultra high frequency (UHF) radio bands.

II. RFID in Healthcare

Radio frequency identification (RFID) is a wireless technology capable of automatic and unambiguous identification without line of sight by extracting a unique identifier from microelectronic tags attached to objects. Perhaps as many as 98,000 people, die in hospitals each year as a result of medical errors that could have been prevented.[11

III. Implanting RFID in Humn Body

While implanting RFID in living body care must be taken that It should not give side effect of etching the skin. To avoid this it is been casted, and also care is taken that it is transparent to the radio frequency.

While implanting the chip problem may occur that chip may move from the place under the skin to avoid this special material is used to allow the tissue to grow around it so that chip will remain intact. Radio frequency waves are used to activate the microchip.

The device is place with hyperdermic type needles which decide the shape and size of the device. Usually device is the size of grain of rice.

RFID tag such as Veritag is implanted under human. In 2004 Food and Drug administration authority has given permission to implant RFID chip in human body[2]

The intent is to provide immediate positive identification of patients both in hospitals and in emergencies. Doctors, emergency-room personnel and ambulance crews could get immediate identification. Patient's pre-existing medical condition or allergy, is taken into account immediately. The 11-millimeter RFID tags will be implanted in the fatty tissue of the upper arm. The estimated life of the tags is twenty years.

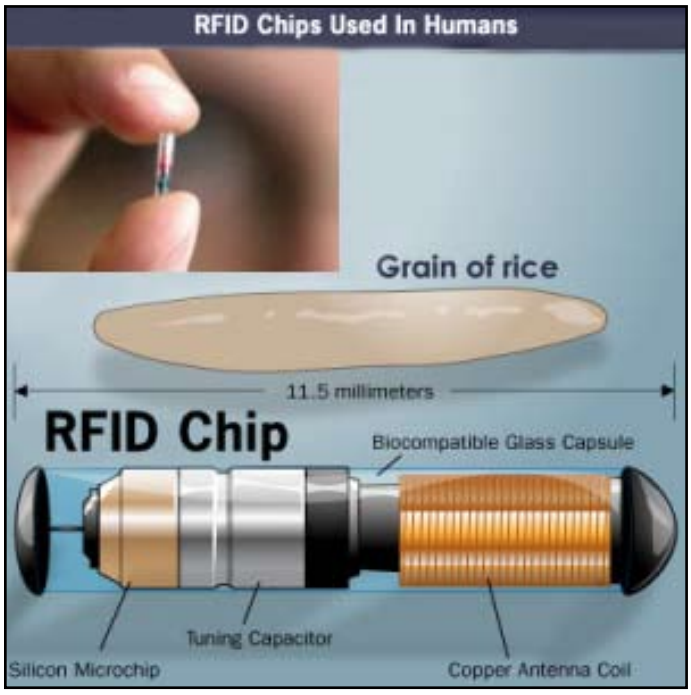

Fig. 1: Rice grain size RFID chip

IV. How Exactly it Works?

There are three parts to an RFID system: the tag, the reader, and the software that connects the RFID measurement to information in the digital world. There are different types of tags, but passive tags are the type currently being implanted in people. Passive tags send their own signal out only after they're triggered by a reader, which also provides the power for the tag to respond to the trigger signal. The passive tags provide information, just something like an ID number. After the ID number is read, the software will connect it to individual information.

ISSN : 2394-2975 (Online)
ISSN : 2394-6814 (Print)

Personal implanted RFID tags contain a unique identifier for each individual, which can be linked to information about an individual.

V. Helping Hand for Doctores

The benefits of RFID in a medical setting are clear: With access to an individual's medical history, doctors can quickly reach intelligent decisions about medication and other treatments; and since the ID travels inside an individual, there's no risk of being mis-identified in the hospital

VI. Implant in Diabetic Paitent

RFID tags implanted in diabetics can link clinical personnel to the medical records of people unable to communicate.

Checking blood glucose levels regularly is critical to properly managing diabetes. The conventional method – a finger prick – is invasive, painful and often inaccurate

The RFID microchip measures the glucose concentration levels of diabetic patients. -implantable bio-sensor chip has a passive transponder, glucose sensor and integrated circuitry that allow anyone implanted with the microchip to painlessly scan it to determine their level of glucose concentration.[3] The RFID microchip quickly and accurately transmits the glucose data back to a wireless scanner that displays the glucose level. The RFID microchip is powered by the scanner signal, avoiding the need for a battery in the microchip.

VII. Implant In Alzheimer's Patient

Rice-sized RFID chip is implanted into the arm so that it can be scanned and easily obtained in a medical emergency. It encodes a person's medical records in a 16-digit code. This technology being used to keep track of Alzheimer's patients if they should wander and become disoriented.[4]

When an unresponsive patient enters the hospital, the staff can use an RFID interrogator to scan that person's arm. If the patient has had a chip embedded, the reader will indicate its ID number. That number can then be inputted manually, or directed wirelessly to the Web-based database. If the hospital is an approved care provider, it can immediately access the patient's identification and health records. [5]

VIII. Implant in Heart Patient

The tiny sensor is placed in the pulmonary artery between the heart and lungs where it monitors changes in blood pressure. [6] The system is wireless and can alert doctors to any decline in a patient's condition. sensor is inserted into the artery using a cardiac catheter (thin tube) that can travel up through a vein in the leg to a person's heart. This is not a very invasive procedure, requiring no sedation, and the sensor can remain in place for life, as it has no battery or replaceable parts.

The grain-sized RFid Tag is implanted into the human body, which keeps track of the heart pulse in the form of Voltage levels. A RFid Reader is placed into the Cellular Phone. The RFid Reader sends a Command to the RFid Tag which in turn sends these Voltage pulses in the form of bits using the Embedded Software in the Tag as Response which is a continuous process. These bit sequence is then sent to Software Program in the Cellular Phone as input and checks for the Condition of Heart Failure.[7] If any sign of Failure is sensed then immediately an ALERT Signal will be generated and in turn results in the AUTODIALING to the Locating & Tracking Station. This station with the use of GPS System comes to know the Whereabouts of the Victim. The Locating & Tracking Station also simultaneously alerts the Rescue Units.

IX. Implant for Orthpedic

Researchers at the University of Pittsburgh have developed a system, known as the Ortho-Tag, including an RFID tag that would be affixed to an orthopedic implant, thereby enabling sensors built into the tag to track the device's health and use within a patient's body. The tag would convey that information via RF signals transmitted through human tissue to a reader placed against a patient's skin.[8]

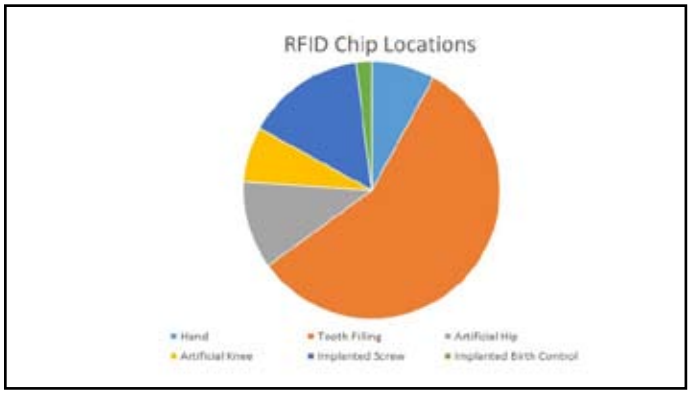

Fig. 2: RFID Chip location in human body

Above diagram shows that , the most frequently identified location for an RFID microchip is in tooth fillings [10]

X. Conclusions

The convergence of various scientific fields, such as artificial intelligence, biotechnology, cognitive science, information technology, and robotics will probably increase the application of human-implanted microchips, including RFID chips.

To minimize medical errors and improve clinical workflow, implement the RFID system with the clinical system. There may be some health issues such as any foreign object that enters the body, implantable RFID tags could pose health risks. These chips are extremely small to minimize trauma, but injection sites still may become infected, and the chips may also work their way to the surface of the skin over time. It is proven that cases are too rare to be distinguished from the risk of cancers around any implanted item. Other objection is related to Ethical and privacy issue: the consensus appears to be that the maximum range for these types of tags is a few feet, and even if someone gets access to ID number, it wouldn't be easy to get access to the records linked to that number. Even so, the question of whether you want anyone to be able to track your movements without your knowledge is inevitable

References

[1] *http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3872592/*
[2] *http://www.technovelgy.com/ct/Science-Fiction-News.asp?NewsNum=199*
[3] *http://www.diabetesincontrol.com/glucose-sensing-rfid-microchip/*
[4] *http://www.geek.com/news/rfid-chips-used-to-track-alzheimers-patients-1374311/*
[5] *http://www.rfidjournal.com/articles/view?3340*
[6] *http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/medicine/heartandlunginstitute/*

newssummary/news_25-8-2015-11-39-50
[7] http://science.opposingviews.com/advantages-disadvantages-rfid-technology-humans-18010.html
[8] http://www.rfidjournal.com/articles/view?8538
[9] http://science.opposingviews.com/advantages-disadvantages-implantable-rfid-tags-18587.html
[10] http://witscience.org/analysis-of-radio-frequency-identification-rfid-chip-prevalence-in-3-discrete-united-states-populations/