Radioisotope Management System Using RFID

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1. Introduction

RFID (Radio Frequency Identification) is widely used for industry. In this paper we propose that RFID Reader and RF Tag can be used for management of radioisotope effectively and systematically.

2. Subject

Most of radioisotope for research or medical treatment was stored in refrigerator in principle. In case of high frequency or long-life one, were used and stored repeatedly.

Currently bar-code is used to manage these radioisotopes systematically. When check the stock, however, take out whole provisions and confirm one after another. Also If it's lost in the usage. Radiation exposure can be happened unnecessarily at process when confirm radioisotope these cases.

To solve this problem, attaching RF tag (isotope particulars inputted) to isotope when radioactive isotope carrying in, one can know present save contents using RFID reader even if do not confirm one after another in save place such as refrigerator.

This data, interlocked with PC database management program can be managed systemically. Specificarion about RFID reader and RF card, we used, it's like this as follows.

2.1. RFID Reader

Mobile Hybrid Computer combines UHF RFID automated data capture technologies.
UHF RFID supports multiple EPC protocols.
Tag read rates provide a flexible solution for item level inventories or pallet verification.
Supports Cisco Aironet (802.11b).

2.1.1. RFID Specifications

Tag & Protocol Support: Class 0, Class 1.
Software Upgrade: Class 1 Generation 2.
Class 0 Read Rates: 100 tags in 7 seconds
400 tags in 90 seconds
Class 1 Write Rate: 1 tag in 0.5 seconds
Antenna: 3dB Width, 180° Forward
Operating Frequency RFID: 902MHz to 928MHz
Polarization: Linear Vertical
Read Range: 5' / 1.5 m
Write Range: 12" / 15.2 cm

2.1.2. System

Operating System: Windows® CE
Microprocessor: Intel® XScale™ PXA255, 400 MHz
Memory: RAM: 64 MB; Flash: 64 MB
Communications Port: USB 1.1 (ActiveSync) & RS-232 (ActiveSync and other RS-232 protocols)
Dock Communications: USB 1.1 (ActiveSync) & RS-232 (ActiveSync and other RS-232 protocols)
PC Card: Internal PC Card Type I/II slot
Beep Tone: 86dBA (at 24" / 61cm) / 100dBA (at 10 cm) (typical) Programmable for pitch and duration Power Options
RFID Rechargeable Captive Lithium Ion battery pack (2200 mAh)
Rechargeable Li-Ion battery pack (2000 mAh)
Advanced Power Management: (without PC Card & backlight): Sleep/off mode with programmable timeout:
5 mA; Idle mode: 60 mA (typical); Operating mode: 155 mA (typical). Rechargeable lithium
backup battery: Low battery indicator (display icon)
Radio Support: Cisco Aironet (802.11b)
System Support: VT100/220, HP700/92, IBM 3270/5250
terminal emulators; Browser support via Microsoft® Internet Explorer; TCP/IP Communications

2.2 RF Tag

Read/Write (256bit) Tag Inlays

Tag classification
by power existence and nonexistence

Active
Tag transmits radio signal
Battery powered memory, radio & circuitry
High Read Range (300m)
Semi-Passive
Tag reflects radio signal from reader

Battery powered memory & circuitry
Medium Read Range (10m - 30m)
Passive
Tag reflects radio signal from reader
Reader powered
Shorter Read Range (10cm -10m)

2.3 Spot test

RF tag was attached at real radiation isotope case, and then read that RF tag by RFID reader after storage for each 3 days refrigerator and refrigerator. The spot test is performed at Seong Gyun Gwan university RI laboratory.

Fig.1. reading RF tag (at 4℃)

Fig.2. Reading RF tag in refrigerator (at - 20℃)

As a result all of RFID reader could read RF tag of radiation isotope case that is kept refrigerator and refrigerator during 3 days just as Fig. 1, Fig 2 without error. And there was no adhesive strength, and moisture problem.

2.4 Database Program

database program that can input ID code, nuclide, and record to manage radioisotope communicate with RFID reader by Microsoft ActiveSync.
Achieve role that foretell inventory existence and nonexistence to data that read from RFID, and inform to gouge administrator so that manager can do judgment by loss availability and waste treatment.

3. Conclusion

That can use RFID in actuality radiation isotope management through verification by above experiment data and database program, is judged, and can help to systematic RI management, and it may become opportunity that can computerize do loss and exhaust management specially.