Innovative Hospital Management: Tracking of Radiological Protection Equipment

Holger Fritzsche, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany
Elmer Jeto Gomes Ataide, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany
Afshan Bi, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany
Rohit Kalva, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany
Sandeep Tripathi, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany
Axel Boese, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany
Michael Friebe, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany

https://orcid.org/0000-0002-8624-0800

Tim Gonschorek, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany

ABSTRACT

The healthcare industry is consistently developing a constant supply of medical equipment, e.g. radiation protection wear. These must be inspected regularly to ensure safety and quality. As this equipment keeps on moving from department to department, it has to be located in one place for annual inspection and must be properly documented after quality check. Conventionally, barcodes, QR codes, and manual entry of the required data are used as a tracking method which requires tedious human efforts without delivering the expected results for registration, tracking, and maintenance. A fully or semi-automated computerized system would be desirable in this case. Radio frequency identification systems which consist of tag, reader, and database can be used for tracking. This article presents new innovative RFID based system which is dedicated to quality assurance of radiological protection wear specifically lead aprons. This process facilitates the service management of hospitals.

KEYWORDS

App Development, Biodesign, Database, Information System, Inventory, Maintenance, Medical Devices, Radiation Protection Wear, Registration, RFID

DOI: 10.4018/IJBCE.2020010103

Copyright © 2020, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.
INTRODUCTION

Registration, maintenance and service of medical equipment is an important aspect of safety and quality assurance. When it comes to radiation protection equipment, any minor defect can cause severe damage to patients and medical staff. Therefore, such equipment must be checked regularly. Currently, this is achieved by visual inspection test along with a radiation test. In order to acquire quality assurance these equipment and devices are managed by data entry of serial numbers and bar codes using excel sheets. As quality check is supposed to be done periodically which make it quite time consuming as entering departments, examiners, dates, defect, defect type with pictures is hectic job to complete proper documentation in tabular form. This acquisition works relatively well for limited number of articles but normally in Germany every hospital has huge amount of articles such as vests, aprons, thyroid guards and cover plates.

To tackle with this problem, the development of the interfaces was performed in two phases considering the use case requirement in each case. The use cases are derived from the existing manual process. Considering the effort put by an individual in completing the whole process. The time taken by a user in manual format is around 10 minutes for inspection of each item. And an additional time of 30-45 minutes to enter the test results into an excel sheet thus making the task complicated.

By introduction of this mechanism the time is expected to be reduced down to 5 minutes per inspection with an ability to fetch multiple type of reports giving the user more flexibility with the data stored. All this is achieved by assigning each equipment with a unique RFID tag allocated with a 24 hexadecimal ID, herein referred as tag ID. Every article is checked by hand and is located, sorted and processed according to the serial number. There is a need of more efficient, accurate and precise RFID tracking system that can be used to register, track and maintain unlimited number of articles. RFID based system have a lot of applications in many industries and can achieve accurate results. Purpose here is to develop an easy to use system which can encounter every kind of management issues for such equipment. A guided process by support of a computer program and handheld reader can serve the problem or else NFC technology can be used to identify all the devices placed in closed vicinity. This paper will discuss how to set up such a system and how handy and time efficient the application is.

BACKGROUND

One of the case studies form Wayne Memorial Hospital, USA, the “Radar Find” was used as a relevant base example for this survey. This application incorporating RFID is mostly used by medical and support staff to keep track of the location and status of tagged assets including: infusion pumps, diagnostic systems, blood warmers and computers on wheels, wheelchairs and other equipment (Journal, 2018). First few related examples where surveyed in which RFID system has several applications deployed in hospitals and medical clinics. National Cheng-Kung University, Taiwan:
Related Content

Investigating the Collective Behavior of Neural Networks: A Review of Signal Processing Approaches
[www.igi-global.com/chapter/investigating-collective-behavior-neural-networks/21554?camid=4v1a](www.igi-global.com/chapter/investigating-collective-behavior-neural-networks/21554?camid=4v1a)

A Framework for the Design of Web Service Based Clinical Management Systems to Support Inter and Intra Organizational Patient Journeys
[www.igi-global.com/chapter/framework-design-web-service-based/26233?camid=4v1a](www.igi-global.com/chapter/framework-design-web-service-based/26233?camid=4v1a)

Accessible Interface for Context Awareness in Mobile Devices for Users With Memory Impairment