



RCOI - RFID CARDS TO OBTAIN INFORMATION

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The aim of this work is a project to use RFID (Radio Frequency Identification) in order to work with bi-directional information, from and to an information system (RCOI – RFID Cards to Obtain Information). The case study in this paper is the use of RCOI in a school tour for foreigner visitor. All the visitors receive an RFID card at the entrance, which can identified several of his attributes, like nationality, gender, and so on. The card goes all the tour in the person pocket, and as she or him pass through a door to a different room, the system use an RFID antenna in the door and automatically records the pass. In other way others RFID antennas are at the expose element, and as the person approach to them the system automatically starts a record audio/multimedia in a device nearby the element, that reports information about it using the respective language without any contact neither form the visitor or the school workers. Some carefully situations must have in mind, like the approach of a visitor from a foreigner country. The system must have one of two behaviors wait until the actual explanation is over or until the actual visitor goes away. With this kind of system the system can record an historical of the interest of the visitors by very different perspectives. With the collect information we can create knowledge like the top visited rooms, the gender that show more interest in e specific piece, and create new experiences having the base knowledge. The system presented can easily have other applications like museums, factory tours, and stands presentations.

Keywords: RFID; Information Systems; Multimedia; Knowledge.

1. Introduction

Nowadays the information gains in importance if can be associate to techniques and tools that provide access, analyses and management as soon as possible. Quick reaction is always a competitive advantage in any kind of organization.

In other way the collect of the information made exclusively by human, are not error free. So we watch growing smart environments.

Smart environments will be populated by different kinds of computing devices with varying processing power, energy resources, memory capacity, and different means for interacting with users. Handheld devices such as mobile phones or PDA's, computer-augmented everyday artefacts, RFID-enabled consumer products, and wall-sized displays are only some of the devices that are likely to play a role in future smart environments. However, as pointed out by Mark Weiser [1], "the real power of the concept [of Ubiquitous Computing] comes not from any one of these devices; it emerges from the interaction of all of them". One core challenge in smart environments is therefore to exploit their heterogeneity by building applications that make use of and combine the specific capabilities provided by different types of computing devices. One of the most important participants in smart environments is RFID.

Radio Frequency Identification (RFID) systems make possible the identification of objects in an environment, with neither physical nor visual contact. They consist of transponders inserted into the objects, of readers which communicate with the transponders using radiofrequencies and usually of a database which contains information on the tagged objects. This technology is not fundamentally new. It has ex-

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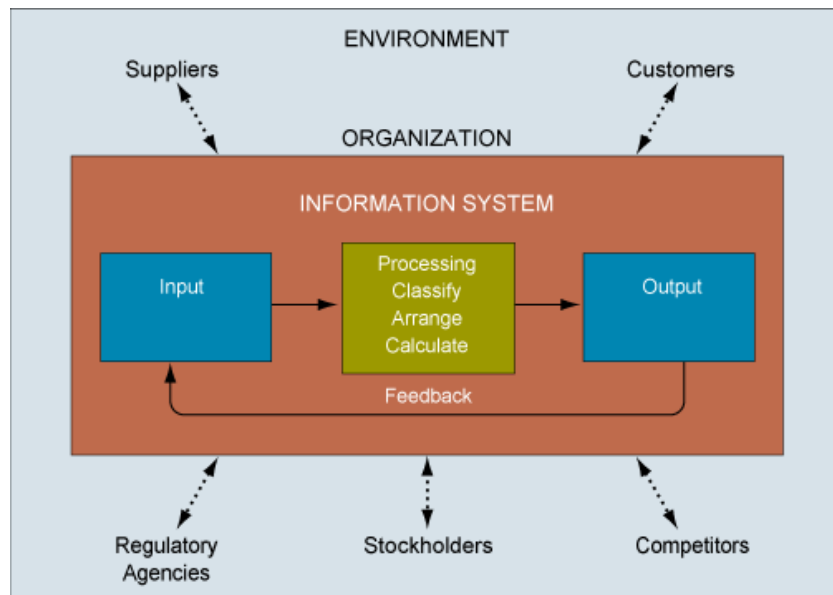
1 isted for several years, for example for ticketing on public transport, on motorway tollgates or ski-lifts
 2 and also for animal identification.
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5 2. INFORMATION SYSTEMS

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 7 An information systems is a set of interrelated components that collect (or retrieve), process, store,
 8 and distribute information to support decision making and control in an organization. [2]
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10 The attitude of business towards Information Technology (IT) is constantly changing, and increasingly
 11 sophisticated. New systems and tools are becoming available. Additionally, there is a constant exchange
 12 of ideas between the IT and the business communities, arising out of the development of knowledge-
 13 based systems. Today, when modern visual programming tools, combined with the support of rapid web-
 14 based application development environments and sophisticated end-user hardware technologies, are
 15 available, it would appear that the whole software development process is becoming easier. However,
 16 this statement can apply only in those cases where the software complexity of the solution and of the
 17 users' requirements is relatively small.
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19 The distribution of scientific and technical information is an important factor in the development and
 20 the organization of an cultural area. New communication technologies play an increasingly important
 21 role in this regard. As they become accessible to an ever-greater populace, they are integrated into the
 22 corpus of everyday working tools and they participate in the strengthening of interpersonal relations,
 23 knowledge transfer and network organization. New information systems based on these technologies
 24 encourage the dissemination of knowledge and allow a structured organization, much as the editor of a
 25 scientific journal organizes its content, presentation and function in society.
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Fig. 1 Information Systems Functions. [2]

3. RFID

RFID systems are composed of three key elements [3]:

- the RFID tag, or transponder, carries object identifying data.
- the RFID reader, or transceiver, reads and writes tag data.
- the back-end database associates records with tag data collected by readers.

Every object to be identified in an RFID systems is physically labeled with a tag. Tags typically are composed of a microchip for storage and performing logical operations, and a coupling element, such as an antenna coil, used for wireless communications. Memory on tags may be read-only, write-once read-many, or fully rewritable. The application depends of the frequency of the tag. (table 1)

Table 1 Frequency and applications.

| Frequency | Description | Typical application |
|------------------------------------|-------------------------------|-----------------------|
| Low 100-500 kHz | Low read range | Access control |
| | Cheap | Animal identification |
| | Low read speed | Inventory control |
| | Not sensible to orientation | Car immobilizer |
| | Read through metallic objects | |
| Medium 10-15 MHz | Low energy level | |
| | Low/Medium read range | Access control |
| | Potential Cheap | Smart Cards |
| | Low read speed | |
| | Sensible to orientation | |
| High 800-950 MHz 2.4-5.8 GHz | High data transfer | |
| | Medium energy level | |
| | High read range | Monitoring |
| | Expensive | Highway gate payment |
| | High read speed | |
| | Sensible to orientation | |
| | High data transfer | |
| Visual contact | | |
| High energy level | | |
| Low read through metallic | | |

Tag readers interrogate tags for their contents through an RF interface. As well as an RF interface to the tags, readers may contain internal storage, processing power, or an interface to back-end databases to provide additional functionality.

Tags may either be actively or passively powered. Active tags contain an on-board power source, such as a battery, while passive tags must be inductively powered via an RF signal from the reader. The distance a reader may interrogate tags from is limited by the tag's power. Consequently, active tags may be read from a greater distance than passive tags. Active tags may also record sensor readings or perform calculations in the absence of a reader. Passive tags can only operate in the presence of a reader and are inactive otherwise. Readers may use tag contents as a look-up key into a database storing product information, tracking logs, or key management data. Independent databases may be built by anyone with

1 access to tag contents, allowing unrelated parties to build their own applications on any level of the sup-
2 ply chain.

3 The back-end database may also perform functions on behalf of either the readers or tags. Readers
4 must be able to address a particular tag, or singulate it, from among a population of many tags.
5

6 This process can be identified as traceability. A tag transmits the information to an identifier, this
7 information can be used to trace an object or a person in time and space [4]. If a link can be established
8 between a person and the tags he is carrying, the tracing of objects can become the tracing of a person.
9 The use of this information can be the support to arrange the best way for organize the elements to visit
10 in the museum either make the best visit trace.
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12 **4. The System - RCOI**

13 **4.1 The RCOI architecture**

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16 The RCOI is prototyped as server/client architecture. As an RFID system, all the objects to visited in
17 the museum are labelled with a RFID tag, and also having an RFID reader. This label objects has tow
18 objectives:
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- 20 - identified the visitor;
- 21 - and get coherent information about the object to visitant (same language).
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24 In a first step the proximity of the visitor to the object, deploy a reaction that gives him the coherent
25 information about the object, then related information is transmitted and recorded in the main system.
26 This information respects to the characteristics of the tour, like the amount of time spend by the visitor to
27 that object. This kind of information gives knowledge, like if an specific object is more visited by male
28 or female gender, or if exists a sequence tour every time that an object is visited.
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30 After the complete tour, the system analyse the collected information in order to suggest information
31 to print in the flayers, or to rearrange the objects organization in the museum to provide the best tour to
32 the visitors.
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35 The next figure shows samples of RFID tags, which can be used in the presented system. Nail tags are
36 indicated to use in wood, and wrist bands or plastic cards are indicated to use by the visitors.
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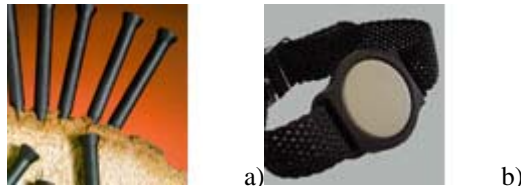


Fig. 1 Nail Tag a) - Wrist Band b)

4.2 Ethics Issues

RFID tags have very promising applications in many domains (retail, rental, surveillance, medicine to name a few). Unfortunately the use of these tags can have serious implications on the privacy of people carrying tagged items. So as part of this issue we have to consider ethics problems. An attacker may want to trace a given tag, either deterministically or probabilistically, starting from either an active or passive attack. So in our case the minimum information about a person is record in the respective tag during the tour. Only generically information as gender, country, etc.



Fig. 2 Sample of a Card with RFID chip.

5. Conclusions and Further Work

We have created a prototype system to give and collect information. RCOI collect information based on people tour.

As we perform improves in the RCOI, we should concerned about creating models that allow us to migrate this kind of system to other applications that have the same elements involved, its easy to guess that tours in churches have the same modus operandi.

Expect RFID readers to become increasingly more “intelligent.” Readers will perform many of the data processing, analysis, and management tasks within a local network of cooperating tags and readers. They will accomplish what today is mostly done by centralized computers.

The use of RFID tags, or location sensitive equipment, can enhance tours that are normally guided. Technologies like GPS and similar positioning systems or RFID tags could be used as tours guides. In the future the devices will be smaller. Already cell phones are equipped with more functionality and this will only improve. It is likely that in the future users will have one device that will integrate various technologies, which serve all their mobile needs. We expect that these devices will be smaller, less expensive, and more powerful.

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