ISSN: 2277-3754
ISO 9001:2008 Certified
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 3, Issue 3, September 2013

A Prototype System for Medical Patients Control RFID Tags

Bárbara Emma Sánchez Rinza, Julio Jesús Salas Conde, Alonso Corona Chávez* ,
Benemérita Universidad Autónoma de Puebla, *INAOE
Facultad de ciencias de la computación, * Departamento de electrónica

Abstract*— At present when a patient is hospitalized, the attending physician is in the hospital a certain time, and tells the nurse or doctor on call what medicines and care the patient should have. But, when the doctor in charge is going to his office, home, etc. he will not see the patient's progress until the other day. That is why this paper uses automatic identification technology using RFID tags, the label is placed on the medical record information, so, the nurse will be depositing in the file at a given time, each time every 2hrs etc. depending on the severity of the patient and the head physician could see this, no matter the distance. Thus, when he arrives to his home or office he could follow patient's evolution in order to keep a better record of the patient by using the web and Care2x system. And he may also send instructions to the nurse or doctor on call remotely, using a web page.

***Index Terms*—RFID, tags, CARE 2x.**

I. INTRODUCTION

Imagine that a hospital doctor, concerned about his patients, he is restless of having control of his patients no matter if he is at home, on holiday or even in the same hospital; to know if they are in their room, in the emergency room, in the hallway or even out of the hospital also the patient information and medical history, for some people it seems difficult to achieve but technology allows us to make this a reality, being achievable through RF (radiofrequency) technology and computer technology. This paper talks about how this is possible, using a program developed in Visual Studio 2008, to access the database of commercial medical software (Care2X), read a file number and record it on an RFID tag through a device MP9311.

II. PROCEDURE FOR PAPER SUBMISSION

A. Components of an RFID system

One of the elements of an RFID system are the RFID antennas (worth mentioning that in this work was fabricated the antenna that was used), distinguished RFID reader. RFID antennas are which transform the currents in waves and the waves in oscillating currents [8]. RFID antennas create a level playing field around three-dimensional shape, called "beam", "pattern" or "bulb". An RFID antenna has the ability to increase the radius of action as possible and also increase the density of the electromagnetic field as possible. That is, the more powerful and heavier its field it will be better its reading. See figure 1 [8].

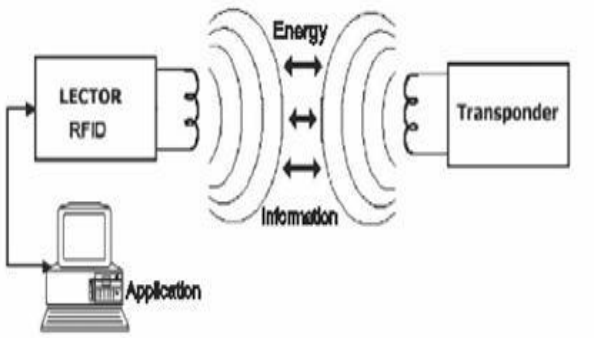

Fig 1. Schematic of a RFID System

With RFID it is possible to make simultaneous readings of objects, products, vehicles or people, significantly speeding up the process of identification, without implying that the product label is in line with the reader. The chip stores a unique identification number for each product, perform the following steps:

- The reader sends a series of radio frequency waves to the label, which are captured by the micro antenna.
- Waves activate the chip, which, through the micro antenna and by radio waves, transmitted to the reader the information you have in your memory.
- The reader receives the information that is labeled and sends it to a database where you have previously registered product features and can process it as appropriate for each application. See Figure 2[4].

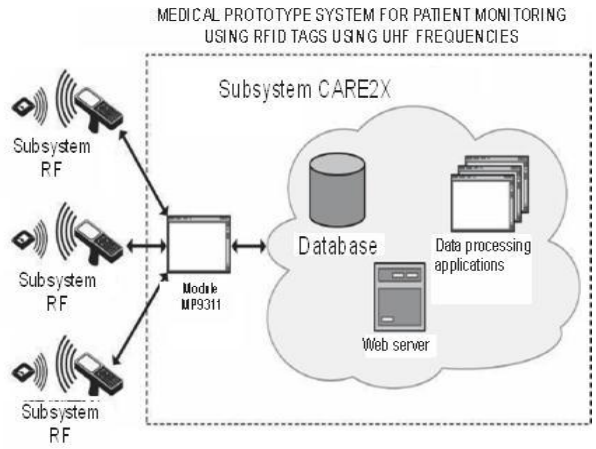

Fig 2. Radio System for Medical Control

ISSN: 2277-3754
ISO 9001:2008 Certified
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 3, Issue 3, September 2013

For the creation of an RFID system must consider factors such as:

- The range, where you can maintain communication.
- The amount of information that can be stored on the label.
- The speed of the data flow, which can get between reader and tag.
- The physical size of the label.
- The reader's ability to maintain communication with multiple tags at once.
- The robustness which provides communication to possible interference of materials between reader and tag [3].

MP9311 module is a module integrated RFID, with UHF frequency designed for use in print / programmer' stransponder, and other equipment manufacturer labels. This module is able to operate within the range of 902 MHz to 928 MHz for North American version and 865 Mhz to 869 Mhz for the global version. It also supports the following protocols UHF. Furthermore UHF supports the following protocols:

- ISO 18000-6A y -6B
- IEM Marin 4022, 4222 y 4223
- Intermec Intellitag
- Philips UCODE EPC 1.19
- EPC Class 1
- EPC Class 0 including Impinj 0- y Matrics 0+
- EPC Class 1, generation 2

In addition to a multiprotocol architecture, The MP9311 includes a serial port which can be optionally configured to TTL digital input and output lines. The MP9311 reader is included in a protected aluminum and contains all the digital components, analog and RF energy and input and output connections. Contains antenna port MMCX type, integral power supply connector Input / Output, we can see in Figure 3, the reader MP9311 and components that were used for this work.

Fig 3 MP9311 Reader and Accesories

En la tabla 1 se darán las especificaciones de dicho lector [10].

Parámetro	***Valor***
Frequency (North America) Energy transmitted	865 a 928 Mhz 0.002 a 0.6 Watt (conducted)
size of pass energy transmitted	0.1 dBm
Carrier Frequency Stability	+/- 10 ppm
Receiver Sensitivity	-96 dBm
Conecctions	Serial (RS232 o TTL), Digital I/O
Supply Voltage	5.0 Vdc +/-10%
Current	0.8 – 2.0 Amp, máximo
Covering material	Aluminion
Dimensions MP9311-xRx	2.74 x 3.74 x 0.57 in (69.6 x 95.0 x 14.5 mm)
Weight	127.6 g (4.5 oz)

Table 1 MP9311 reader specifications.

Table 2 gives the specification of the antenna used.

Antenna Parameter	Northeamérica FCC	***European Union ETSI 302-208***	***300-220***
Frequency	902 a 928 Mhz.	865 a 868 Mhz.	869.525 Mhz.
Polarization	Circular o Linear	Circular o Linear	Circular o Linear
impedance	50 Ohms.	50 Ohms.	50 Ohms.
SWR, maximum	1.75:1	1.75:1	1.75:1
Antenna gain	9 dBi, Max		

Table 2 Specifications of the antenna [10]

III. CARE2X SYSTEM

Care2x System is an integrated computer system for health agencies, developed since 2002 by Elpidio Latorilla and by a worldwide group of programmers and based on open source standards. Care2x integrates data, functions and workflow in a health care. At the time, consists of four main components. Each of these components can also be operated individually.

- HIS - Hospital Information System / Health Services
- PM - Medical Practice Administraction
- CDS - Central Data Server
- HXP - Data Exchange Protocol Health

This software is distributed freely under the GNU license. Following are some of the screens that show us that we can perform functions. With this system we can admit patients and search for any of them and even modify their information as shown in the following Figures 4 [15].

ISSN: 2277-3754
ISO 9001:2008 Certified
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 3, Issue 3, September 2013

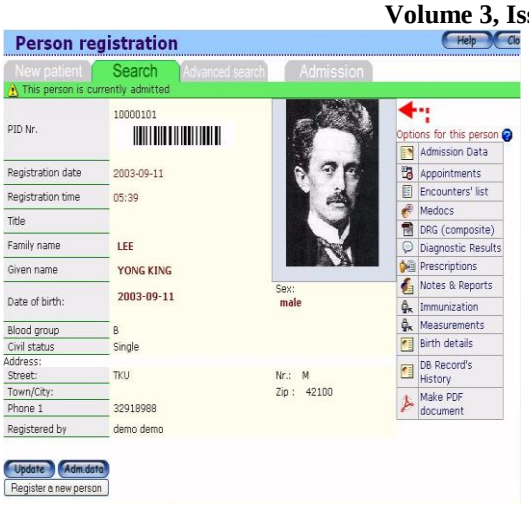

Fig 4. Seeking people registration.

We can identify the patient using their personal data, their assigned number (curp) or barcode as shown in Figure 5 [15].

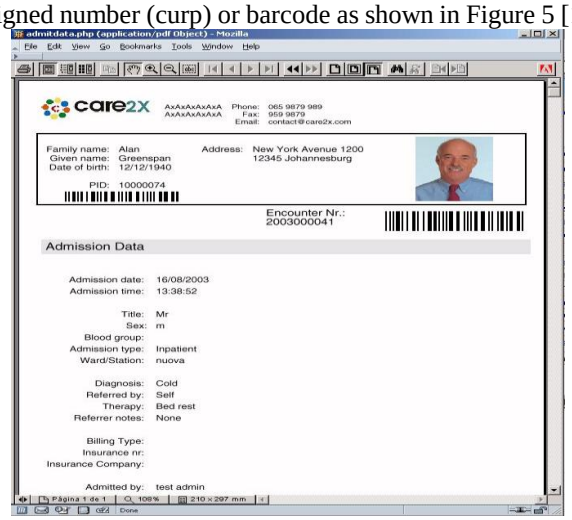

Fig 5. Identification of patients.

We can admit the patient to hospital assigning in some area of the hospital, figure 6

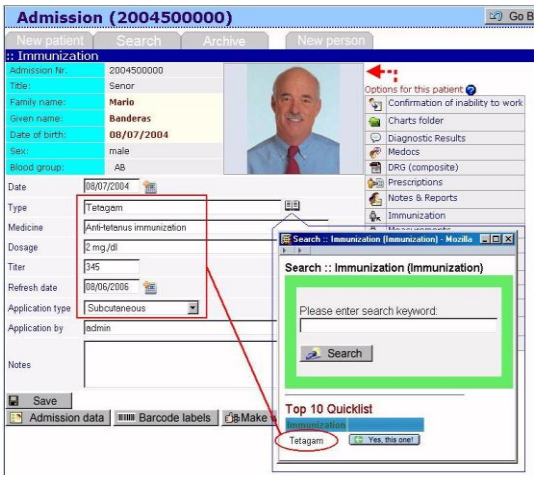

Fig 6, assignment of patients

We can have pictures of the condition of the patient and even edit and modify as shown in the following Figure 7.

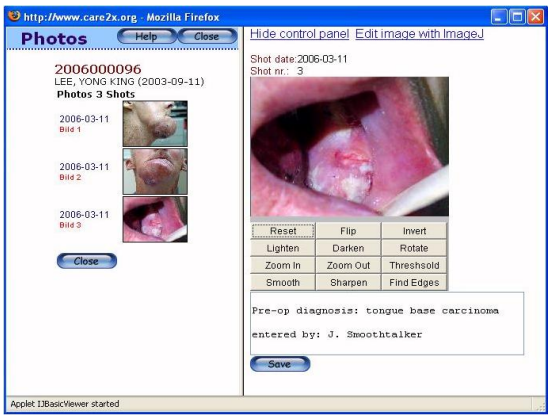

Fig 7 patient records. [15]

You can take the patient's medical record as shown in the following figure 8.

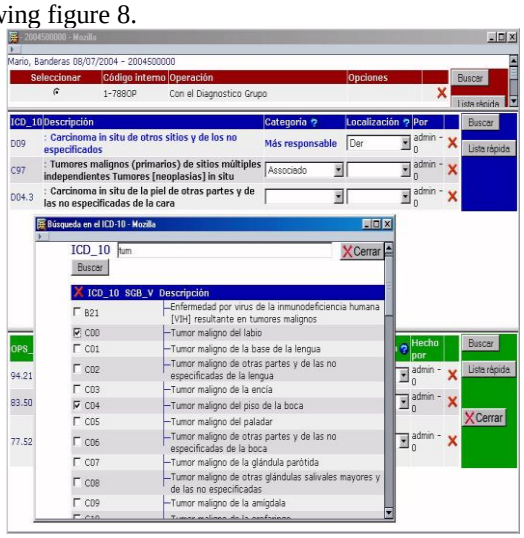

Fig 8web project creation RFID

IV. RF SUBSYSTEM

This section will explain how was integrated radio frequency subsystem Care2x system so that we can connect the reader and to read and store information in our database. The RF subsystem is a Web project is developed in Visual Studio 2008 as opposed Care2x system, because the input and output commands to the RFID reader through the port of the computer, but this does not affect the operation of our project, since the two platforms can coexist on the same system. Figure 9 shows the creation of the new website for the RF subsystem

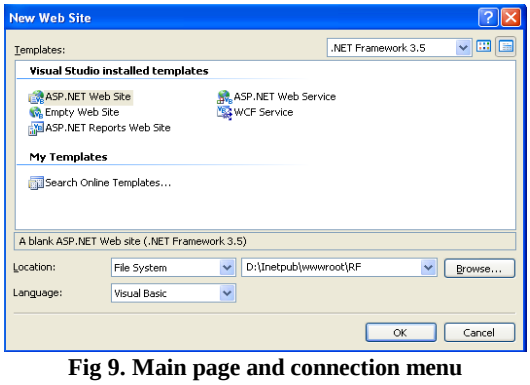

Fig 9. Main page and connection menu

ISSN: 2277-3754
ISO 9001:2008 Certified
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 3, Issue 3, September 2013

Once completed and configured RF subsystem Web, the first thing you will proceed to open a browser and type the web address in our system, the first screen shows a menu where we choose. Configure port and then make the connection to the RF reader. Figure 10 shows the design of the main page and the connection menu.

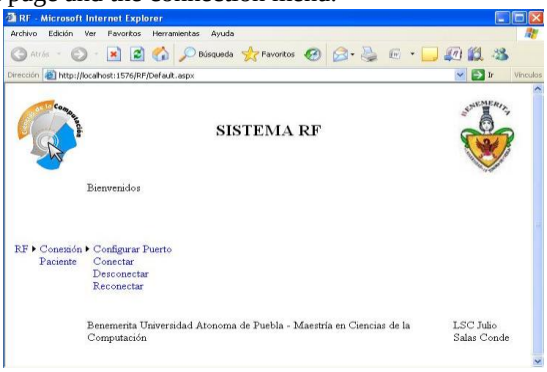

Fig 10. Port Configuration

It shows a screen in which the fields are set to proceed with the connection of the reader as we can see in Figure 11.

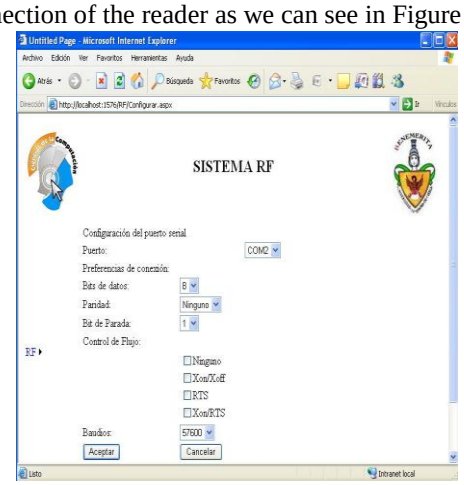

Fig 11 Port Configuration

The identification number of the patient is discharged from our table "care_person" of Care2x Database and this will record it as an identifier which the RFID tag reader via, which is connected to our system, by which we access the page Patient in our RF system and choose which patient is to be recorded in the RFID reader as shown in Figure 12.

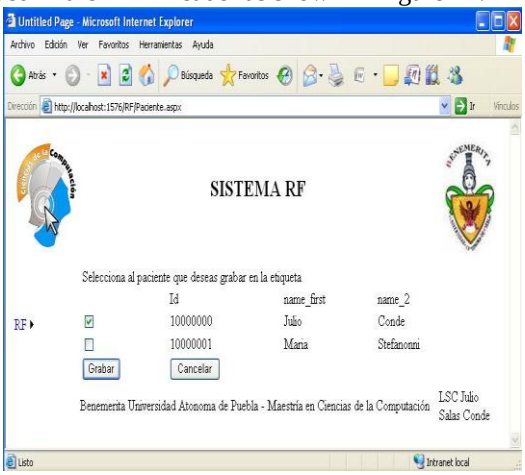

Fig 12. Patient selection record on RFID

In the absence of errors the system will mark that was successful the label engraving, or if there is a problem we will mark it was not successfully recorded.

V. CONCLUSION

Care2x system was studied which is a medical system very robust and helpful in medicine, analysis and design as well as its behavior, can install on your own server, see its code, tables and how to relate to each other in order to understand and be able to associate system that could access the table of patients Care2x Database to get the patient identifier so you can burn the label radio frequency, in order to relate the RF system with Care2x system so we can fully exploit its application in a hospital. It installs and runs on a server, its configuration to support a Web system both open source and closed source; installing a complete system care, and the development of a Web system for access to a port and recorded in the same information in a database. The system is working excellently. This work aims to encourage medical facilities managers to consider using this technology, motivate them to implement it in their workplaces in order to streamline their processes, to have anywhere in time and in the patient information for personal use, as many people come to the hospital unconscious, and through this system, doctors would know to check their curp, which has suffered ailments, chronic diseases, allergies etc. also if you have a history inherited-relatives of patients if they wish or to bring the monitoring of the patient, if doctors are outside the hospital.

REFERENCES

[1] Revista It Profesionals, n.1 vol 4, April 2004.

[2] L.I. Luis Miguel Godínez González, RFID Oportunidades y riesgos, su aplicación práctica, Alfaomega.2009, ISBN 978 970 15 1311 8.

[3] José María Ciudad Herrera, Eduard Samá Casanovas, Estudio, Diseño Y Simulación De Un Sistema De Rfid Basado En Epc, Universidad Politécnica de Cataluña, reporte técnico de 2008

[4] Tom Karygiannis, Bernard Eydt, Greg Barber, Lynn Bunn, Ted Phillips, Guidelines for Securing Radio Frequency Identification (RFID) Systems, National Institute of Standards and Technology, April 2007 reporte tecnico.

[5] Paul Hartman, RF SAW inc., Daniel Wengels Tom kerr, vocollect,inc. IEEE magazine Applications and practice RFID, university of Texas at Arlington,2007

[6] Gaynor Backhouse, Rob van Kranenburg, Matt Ward, RFID: Frequency, standards, adoption and innovation, JISC Technology and Standards Watch, May 2006.

[7] Klaus Finkenzeller, RFID HANDBOOK Fundamentals and Applications in Contactless Smart Cards Identification, WILEY, 2003,ISBN 0-470-84402-7

[8] "DIPOLE RFID Engineers", http://www.antenasrfid.com/

[9] C Fenni CONFIGURACIÓN DE LECTORES Y ANTENAS RFID, 2005, ISBN 866 652 3052

[10] User's Guide MP9311 Low-Power UHF Reader Moudle" SAMS[YS], First Edition August 8, 2005

ISSN: 2277-3754
ISO 9001:2008 Certified
International Journal of Engineering and Innovative Technology (IJEIT)
Volume 3, Issue 3, September 2013

[11] Yolanda Jurado Rojas, Técnicas de investigación documental, CENGAGE, 2008, ISBN-10: 9706862455

[12] James A. Senn, Análisis Y Diseño De Sistemas De Información, Segunda Edición, Editorial Mc Graw Hill 2000, ISBN438 152 8.

[13] Antonio Martin Sierra, Desarrollo de Aplicaciones WEB con ASP.NET 2.0, ALFAOMEGA., 2007 **ISBN:** 9701512623.

[14] Cesar Pérez, Microsoft SQL Server 2005. Administración y Análisis de Bases de Datos, Alfaomega Ra-Ma., 2008, ISBN-10: 9701512464

[15] www.care2x.org

AUTHOR'S PROFILE

Bárbara Emma Sánchez Rinza Bachelor in Physics, Master Degree in Optics, Doctor's Degree in Optics. She has written 41 chapters of books, 29 national and international articles, 12 memoirs. She has participated in 104 conferences in different forums. She has directed 27 Bachelor Thesis and 6 Master Thesis.

Julio Jesús Salas Conde student of the Master Degree of the Computer Faculty of the "Benemerita Universidad Autonoma de Puebla"
Alonso Corona Chavez INAOE's Researcher