RFID Based Electronic Health Record System

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Abstract:

RFID based Electronic health record system is a new technology which helps to maintain hospital record. By using this technology the efficacy and ease of maintenance increased. Present days there are many health care errors occur because patient information is not available, the Electronic Health Records (EHR). Hospitals are particularly interested in increasing the quality and efficiency of patient identification and monitoring procedures. Mostly patient health records are stored in separate systems, there is still a huge stack of paperwork left for health care providers to fill out in order to comply with different guidelines. Many health care errors happen when significant data is missing or simply not available, the electronic health records (EHRs) may easily alleviate the distress of most doctors and nurses working in today’s care system.

Keywords: RFID reader/writer, RFID Tag, EHR and e-health, Personal Health Record (PHR).

1. Introduction:

The present method used by general practitioner is to patient record data on paper, this method reflected low cost and easy to use. But there are several disadvantages with this method, especially when health records must be kept for a long period of time. The storage space, paper-based records require a significant amount of storage space in comparison with electronic/digital records. The costs involved with electronic storage media are cheaper as compared to traditional storage media. More problems can occur when a patient’s paper records are stored at different levels of several health elements [1]. To eliminate the mentioned disadvantages and weaknesses the use of electronic medical records becomes imperative.

The ability to generate a complete record of a clinical patient encounter as well as supporting other care-related activities directly or indirectly via interface including evidence-based decision support, quality management and outcomes reporting by EHR. Hospitals need to improved patient care by reducing wait times in the emergency time [2].

The standard-based secure access to patient’s personal data by using RFID system. With these system improve efficiency in medical emergency period while increasing the patient care. The RFID hardware is used to get the patient ID and corresponding previous existing information on the Tag. The hardware will send the patient ID to the serial port of the system. The present chapter describes about an electronic health record system by using RFID Reader/Writer and corresponding Tags. The software was developed by using MATLAB-GUI. The present information is present in the Tag and along with the present data, the previous data is maintained in a database by using My-SQL database.

2. Architecture of EHR system

The architecture of the EHR system consisting the fields of blood type, medical allergies, or other health history. The RFID Tags will be used for identifying the patients with a UID number as default [3]. In addition, all the patient’s paper medical histories and other important document information is placed with in RFID TAG. The RFID TAG’s memory can be erased and written many times. the reusable RFID TAGs can reduce the cost of the system. The data layout that will be used for writing information into TAGs through an editor. To establish all the necessary fields so the required patient information along with the medication corresponding visiting time will be written into the TAG memory and retrieve when require previous data. The architectural elements are shown in figure 1.
RFID (Radio frequency identification) system consisting three main parts. One is RFID reader/writer, Antenna and TAG. RFID reader/writer is wireless non-contact electromagnetic fields to transfer the data. TAG contains memory is used to store information by means of electronically [4]. RFID Consisting two types of antennas first one is reader antenna and second one is TAG antenna [5]. An RFID reader emits radiation if the TAG is in the field of emission information read by the reader. There are so many types of RFID reader and different TAGs are available. Depending up on the application requirement these systems are designed. The classification may be with frequencies used by the RFID system, communication distance and manufacturers.

4. ATMega 328p Microcontroller

The present system design by using atmega328 microcontroller to read the data which is read by the RFID reader and process further. Atmega 328 is high-performance Microchip 8-bit AVR RISC-based microcontroller consisting flash memory of 32KB, EEPROM of 1KB, 23 I/O lines, three flexible timer/counters with compare modes, internal and external interrupts, a byte-oriented 2-wire serial interface, SPI serial port, 6channel 10-bit A/D converter[6].

RFID reader[7] TX line is connected to the RX of atmega328p controller and RX line of reader is connected to the TX of 328P controller. The atmega328p any digital line is used for serial port read and write by software serial command. The serial lines are further connected to the Personal Computer.

5. GUI(Grafical User Interfacing)

The Graphical User Interfacing (GUI) is design by using software Matlab. The Electronic Health Record is an application developed in Matlab GUI. To start the application located on the desktop of PC, which is executed by clicking on the EHR Icon the corresponding GUI of “RFID BASED ELECTRONIC HEALTH RECORD “opened as shown in figure 2. The GUI consisting the following Tag templates in a button such as CONNECT TAG, READ, WRITE, RECORD, CLOSE along with the fields of UID, Name, Gender, Date and Time, Blood group, Sugar, BP, chronic diseases, allergies and Health history[8,9]. If a Patient already issued with a Tag, by clicking the connect Tag button, the Tag is within the field of reader, the Tag UID is displayed in the field under the UID as shown in figure2. A new patient can be registered, by allocating with another new Tag having UID, by click on the connect Tag UID is already exists in every Tag in default.
Pressure, Blood glucose and other clinical parameters which are stored in a Personal Computer and later on the administrator transfer the same information of the Health Record onto the Tag through the RFID reader. The software package has been developed in such a way that is suitable for corporate Hospital systems for issuing Master Health Checkup details in terms of e-record instead of paper file. We successfully developed, implemented and tested this application by using different Tags. Real time test was performed many times by using RFID Reader/Writer with different Tags successfully.

References


