

Smart Shelf- Easy File Accessing Technique

Reshma Reji ¹, Jintu Babu ², Ashil Benny ³, Joseph Sham ⁴

UG Scholars, Department of Electrical and Electronics Engineering, AJCE, Kanjirappally, India^{1, 2, 3, 4}

Abstract: Radio frequency identification (RFID) is a term that is used to describe a system that transfers the identity of an object or person wirelessly, using radio waves. It falls under the category of automatic identification technologies. It is a new generation of Auto Identification and Data collection technology which helps to automate business processes and allows identification of large number of tagged objects like files, books, using radio waves. This paper proposes the RFID based Smart Shelf which helps to access files in the hospitals easily. The proposed system is based on the RFID readers and passive RFID tags that are able to electronically store the information that can be read by using a RFID reader. This system would be able to identify the location of the files, issue and return the files via RFID tags.

Keywords: Radio Frequency Identification Technology, RFID tags, RFID readers.

1. INTRODUCTION

Radio Frequency Identification (RFID) is an automatic identification method that is used to store and retrieve data using RFID tags. [1]. The technology requires the corporation of RFID readers and RFID tags. The RFID based Smart Shelf facilitates to provide the location of files in the shelf and also the fast issuing of files with the RFID enabled modules. It directly provides the file information to the system and reduces the manual typing. The RFID tags can contain the identifying information such as the file number, without having being pointed to a separate database. The information is read by the RFID reader and with the help of Arduino Mega microcontroller the information will be sent to the system. The system has been taken to reduce the time taken in searching a file, and manual interaction are not needed for RFID tag reading and to improve utilization of the modern technology in hospitals. The remaining sections of the paper are organized as follows: Section II briefly reviews the concept of RFID technology and need for this technology in hospitals, Section III describes the methodology used for implementing the system, and Section IV draws the conclusion of the project.

2. LOGIC

A. Concept

The concept of RFID technology can be an extension to the electronic barcode that is used to identify, track or detect holdings in the daily maintenance in hospitals. [2] This system consists of RFID tags that provide hospitals with more effective way of managing their files while providing greater customer service to their patients. The technology works on small tags, which allows it to be placed on each file in the shelf.

The tag consists of antenna and tiny chip which stores small amount of data to identify each file. The data in each tag can be read by the RFID reader which is placed in each row of the shelf. In addition to the tags, the RFID system requires a means for reading or checking the stored data from the RFID tags and for communicating the tag data to the system. This is achieved by using Arduino Mega microcontroller, RF data modem which is connected to the RFID reader and the system.

RFID tags responds for the radio query sent from the reader and transmit their unique ID code.

B. Components

RFID system consists of the following components:

- RFID Tags
- RFID Readers
- Antenna
- Server

RFID Tags: Tags are thin label that can be attached to the cover of each file or book that are used. Tags are made up of carbonic structure which contains a magnetic strips placed inside the tags which helps in sensing the tags. The tag contains a unique serial number which is used for the authentication of the user.

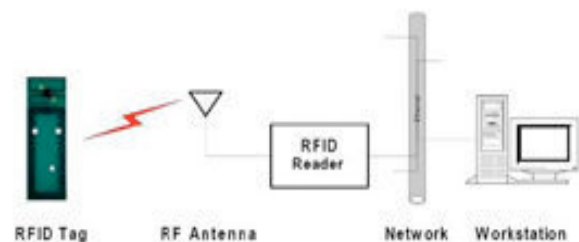


Figure 1: RFID system

RFID readers: Readers are used to interrogate data stored in tags. It contains a radio frequency module, control unit and antenna to do the interrogation process.



Figure 2: RFID readers

The antenna kept inside the reader generates an electromagnetic field and when the tag passes the field the data stored on the chip in the tag is interrupted by the reader and stores the information about the files, which in turn is sent to server during the file search via microcontroller.

Antenna: Antennas are kept inside the readers. It generates electromagnetic field which gets activated when the tag passes the field and enables to read and/or write data to the reader by producing radio signals.

Server: Server is a computer that contains database which stores the information regarding the files position and current status are stored and this information can be retrieved when needed.

RF Data Modem: RF modem (module) is a small electronic circuit used to transmit and receive radio signals. The module is connected with the microcontroller which helps to retrieve data and transmits the data to the server.

Arduino Mega 2560: the Arduino Mega 2560 has a number of facilities for communicating with a computer or other microcontrollers. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the board. It has 256kB of flash memory for storing code.



Figure 3: Arduino Mega 2560

LED: When a suitable voltage is applied to the leads, electrons recombine within the device releasing energy in the form of photons. This effect is called electroluminescence and thus produces light. This is placed in each row of the shelf for identification.

C. RFID in Hospitals

Hospitals traditionally follow a paper-based system to capture the information about the patient during registration and keep updating manually.[3] This is a time taking process and is also not accurate because its hand written. The problems faced by the paper – based management system are:

- Inability to sort data fields in paper record
- Accessibility of records
- File storing facility
- Lost of records

Among these the proposed system will automate the following tasks using RFID technology,

- Better file management
- Helps in storing the data
- Ability to find the physical location of the files
- Fast processing
- Security level

3. METHODOLOGY

The process involved is divided into two modules that are described as follows:

A. Module 1 : Initial setup

Whenever a new file is arrived, an RFID tag is attached into each file with relevant information such as file number, patient register number. All the detailed information of the file will be stored in the computer database by the staff.

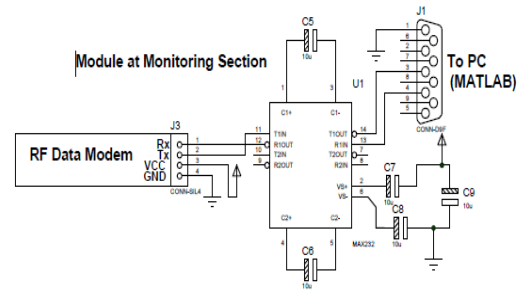


Figure 4: Circuit Diagram of Initial Setup

B. Module 2 : Issue process

When the staff requires a file to be issued, he has to search the file using the patient's registered number. During this a radio signal is transmitted to the RF data modem and the microcontroller checks for the file which is stored from the reader.

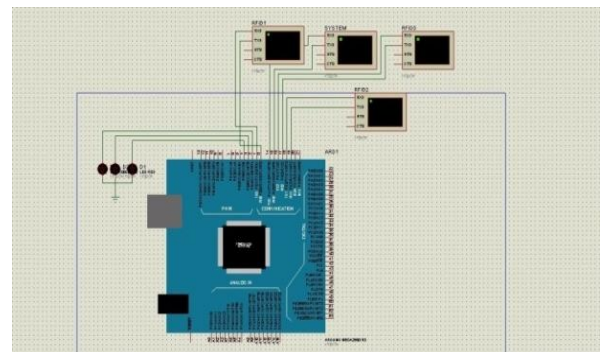


Figure 5 : Simulation done for Issue Process

If the search is matched the microcontroller returns the data to the modem which points out the location of the file in the system. The user can take the file from the corresponding shelf.

C. Working Principle

Initially the details of each file will be stored in the system and each file is attached by a RFID tag. This is done by interfacing the system using MATLAB. When the tag passes the field of the reader the information will be stored in the reader from which the data is sent to the microcontroller.

The below figure shows the schematic block representation of the actual system. When the user search for the file, the data stored in the microcontroller is sent to the system via transmitter and check the location of the file in the system. If the file is found the transmitter (RF data modem) sends the signal to the microcontroller to

light the LED in the corresponding row. The flow chart of the process is shown in figure 7.

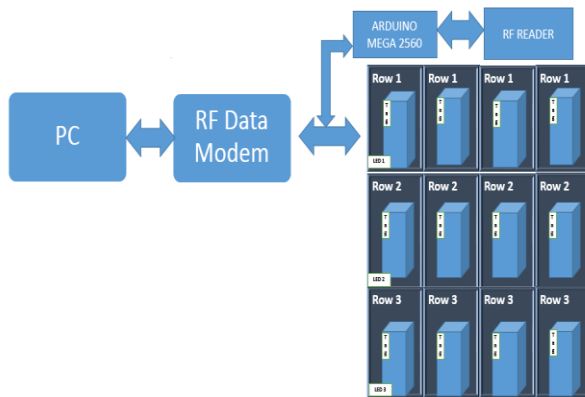


Figure 6 : Block Schematic Representation of System

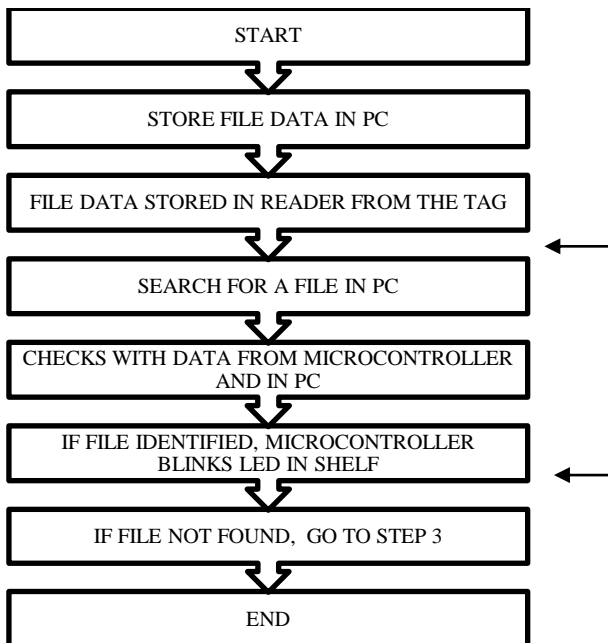


Figure 7: Flow chart for the working of System

4. CONCLUSION

The proposed system based on the file management system in hospitals substitutes the current method of sorting, handling, searching and keeping of records. This concludes the importance of the RFID technology and usage of computer database in the hospitals. The system aimed at reducing the time taken in retrieving the files and better storing of files. Radio Frequency Identification (RFID) systems used enhances the customer service, improves the security of the files and provide a constant update of the files arrived in the shelf. The efficiency of the system depends upon the information to be written in the tag.

ACKNOWLEDGEMENT

We thank almighty for bestowing upon us all his blessings for the compilation of his paper. We extend our sincere thanks to **Prof. PC Thomas**, Head of Department for

providing us with guidance and facilities for the project and publishing of the paper. We express our sincere gratitude to Ms. Manjusha V A and Ms. Rani Chacko, staff in charge who coordinated the project, for his cooperation and guidance for preparing and presenting this paper. We also extend our sincere thanks to all other faculty members of Electrical and Electronics Department and my friends for their support and encouragement.

REFERENCES

- [1] Radio Frequency Identification Based Library Management System, Priyanka Grover, Anshul Ahuja
- [2] RFID – Based Hospital Real- time Patient Management System, Belal Chowdhury, Rajiv Koshla
- [3] Review on Hospital Management System, Darshana Shah, Aditya Bakshi