Literature Survey notes: ENGINEERING

RFID Based Security System

[1]D.Vinay, [2*]K.Madanmohan, [2]S.Iswarya, [2]S.Rameshprabhu, [2]R.Gokulraju

Abstract:This project RFID based security system is developed to build a security system for a home/office to prevent the other persons enter into the important room/chamber by controlling radio frequency identification by checking a suitable RFID card. Most educational institutions administrators are concerned about student security. The conventional method allowing access to students inside a college /educational campus is by showing photo I-card to security guard is very time consuming and insecure, hence inefficient. Radio Frequency Identification (RFID) based security system is one of the solutions to address this problem. This system can be used to allow access for student in school, college, and university. It also can be used to take attendance for workers in working places. Its ability to uniquely identify each person based on their RFID tag type of ID card make the process of allowing security access easier, faster and secure as compared to conventional method. The RFID tag gives the unique id whenever it reads the card information. This id information is send to the micro controller to check the correct card to take a security action. If the card id matches with the original information, it allows the authorized person to enter into the room, if not gives the buzzer as an indication of wrong person tried to enter into the room. Student or workers only need to place their ID card on the reader and they will be allowed to enter the campus. And if any invalid card is shown then the buzzer is turned on.

1. INTRODUCTION

The security system is basically an embedded one. Embedded stands for hardware controlled by software. Here, the software using a microcontroller (PIC controller) controls all the hardware components. The microcontroller plays an important role in the system. In present system there are no efficient methods for accurate identifications, there are certain places where accuracy is important mainly in banking, health care and government sectors. This application will provide RFID tag based system which uses microcontroller.

*Correspondence to: madanmohank84@gmail.com

[1] Department of Mechatronics Engineering, Akshaya College of Engineering abd Technology, Coimbatore – 642109, Tamil Nadu, India

The main objective of the system is to uniquely identify and to make security for a person. This requires a unique product, which has the capability of distinguishing different person. This is possible by the new emerging technology RFID (Radio Frequency Identification). The main parts of an RFID system are RFID tag (with unique ID number) and RFID reader (for reading the RFID tag). In this system, RFID tag and RFID reader used are operating at 125KHz. The microcontroller internal memory is used for storing the details. The PC can be used for restoring all the details of security made. RFID is one the fast growing technology all over the world for identifying and tracing goods. This system can help hospitals to find expensive equipment in less time and provide better services for patients. These technology is also widely used in pharmaceuticals and logistics.

This report provides a clear picture of hardware and software used in the system. It also provides an overall view with detailed discussion of the operation of the system. Shown below is a typical RFID system. In every RFID system the transponder Tags contain information. This information can be as little as a single binary bit, or be a large array of bits representing such things as an identity code, personal medical information, or literally any type of information that can be stored in digital binary format. Shown is a RFID transceiver that communicates with a passive Tag. Passive tags have no power source of their own

and instead derive power from the incident electromagnetic field. Commonly the heart of each tag is a microchip. When the Tag enters the generated RF field it is able to draw enough power from the field to access its internal memory and transmit its stored information.

When the transponder Tag draws power in this way the resultant interaction of the RF fields causes the voltage at the transceiver antenna to drop in value. This effect is utilized by the Tag to communicate its information to the reader. The Tag is able to control the amount of power drawn from the field and by doing so it can modulate the voltage sensed at the Transceiver according to the bit pattern it wishes to transmit.

2. LITERATURE SURVEY

This project explained how the RFID system was used for security purpose overcoming the old techniques [1]. The author clearly pointed out RFID's typical applications and how can it be implemented [2]. Explanation about the comparison of bar codes and RFID was discussed in this paper [3].Inth is paper, experiment study was conducted tostudy the architecture of RFID and its components [4]. This paper pointed out to optimize the cost of security system using RFID. L. Bolotnyy and G. Robins, "PHYSICALLY UNCLONABLE FUNCTION-BASED SECURITY AND PRIVACY IN RFID PERVASIVE COMPUTING AND COMMUNICATIONS" has explained that it is impossible to create a RFID tag with same unique identification code of another RFID tag.

3. EXISTING SYSTEM

The existing system of security is by either showing the identity cards at entrance to the security guards or scanning through a bar code reader. Both consumes much time when compared to RFID system. Manual showing of identity cards to security guards is an old process and there is a possibility of hoax so it is not much appreciated. Bar codes must be kept insight of scanner which consumes much time and sometimes scanner does not scan due to improper placing. Even biometric system using finger print scan is not efficient as oil from fingers get accumulated on the scanner and the finger print can be faked when it comes to security. Biometric system is also an expensive one to setup. To overcome the old existing system RFID system can be used to get expected efficient systems.

OVERVIEW OF RFID TECHNOLOGY

RFID system consists of three components namely transponder (tag), interrogator (reader) and computer containing the database, as shown in Fig. 1. The interrogator reads the tag data and transmits it to the computer for

authentication. The information is processed and upon verification, access is granted. The system offers diverse frequency band ranging from low frequencies to microwave frequencies

Low Frequency: 125-134 KHz
High Frequency: 13.56 MHz
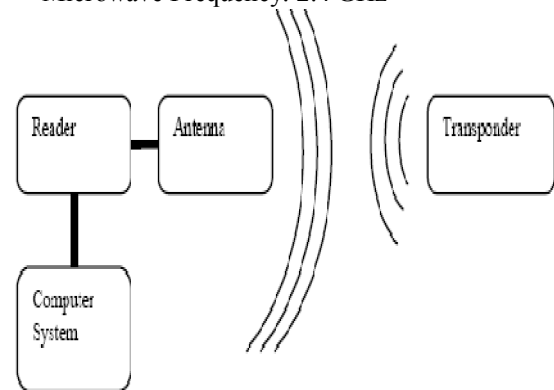Ultra High Frequency: 902-928 MHz
Microwave Frequency: 2.4 GHz

Fig.1 Basic RFID System

Depending upon the source of electrical energy, RFID tags are classified as either active or passive. The active tags use a battery for powering the circuit on the tag and transmit the tag information upon the reader request. However, these tags are very expensive and seldom used. On the other hands, passive tags get energy from the reader to power their circuit. These tags are very cost-effective and hence most of the applications use them. In the present work, passive RFID tags have been used. A passive RFID tag transmits information to the reader when it comes in the vicinity of electromagnetic field generated by the reader. The phenomenon is based on Faraday's law of electromagnetic induction. The current flowing through the coil of interrogator produces a magnetic field which links to the transponder coil thereby producing a current in the transponder coil. The transponder coil then varies this current by changing the load on its antenna. This variationis actually the modulated signal (scheme is known as load modulation) which is received by the interrogator coil through mutual induction between the coils. The interrogator coil decodes this signal and passes to the computer for further processing.

4. RELATED WORK

Many researchers have utilized RFID technology in developing access control system. Filipe has developed an RFID based monitoring and access control system consisting of RFID terminal, camera, server and an alert device. Upon detecting a transponder, the terminal captures a photo and transmits the data including the UID and photo to the server

through TCP/IP connection. The server searchers the database for this particular query and sends the results back to the terminal to allow or deny the access. The system also monitors illicit acts e.g., a person tries to enter when the door is open without completion of authentication process and turns on the
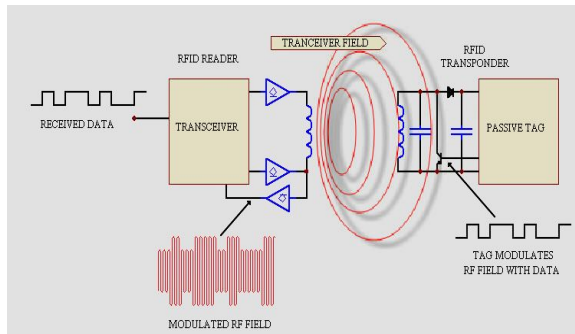

Fig 2. Working of RFID

Xiang-Lei Meng has described an RFID based embedded security authentication system with novel face recognition structure. The system comprises of two phases namely registration and recognition. In registration phase, ten pictures of user face with different emotions are collected and Eigen information is obtained with an extraction algorithm. This information along with a UID is written on RFID tag. In recognition phase, a camera tracks the face and an extraction algorithm returns eigen information of the face in the picture. This information is then matched with the information already stored on the tag for authentication. The entire processing is done on embedded ARM11 processor, S3C6410 instead of computer terminal/server which has resulted in faster response time, about 57ms with authentication accuracy up to 86.5%. The performance of the system is compared with the existing database systems and is found to have far better response time with the same authentication accuracy. Dong-Liang Wu has described an access control system based on RFID in conjunction with face recognition based on neural network.

5. PROPOSED SYSTEM

The shortcomings of old existing system can be overcoming by using RFID based security system. It does not need any insight scanner as the reader has scanning range up to 4 meters and even above according to the type of RFID tag and RFID reader used. It does not consume much time when compared to other systems. Every RFID tag has its own unique code and the same code is very difficult to generate it is merely impossible. So it has greater security. It isalso very economical in setup and installation and also a very simple system with high range of accuracy. The only major limitation

alert device using web services. The performance of the system is tested by installing RFID kits with antennas covering a range of 10cm and satisfactory results are obtained.

here is that it hastendency or capability to read only one RFID tag at an instance. It does not require much space as the components are not big. RFID based security system can be controlled using Arduino Controller, Microcontroller AT89C52, a family of 8051 microcontroller, PIC Controller etc… Here PIC Controller as it is economic, reliable, has high range of accuracy and requires low operating voltage.

6. ACCESS CONTROL

RFID Readers placed at entrances that require a person to pass their proximity card (RF tag) to be read before the access can be made.

7. PRODUCT TRACKING AND INVENTORY CONTROL

RFID systems are commonly used to track and record the movement of ordinary items such as library books, clothes, factory pallets, electrical goods and numerous items.
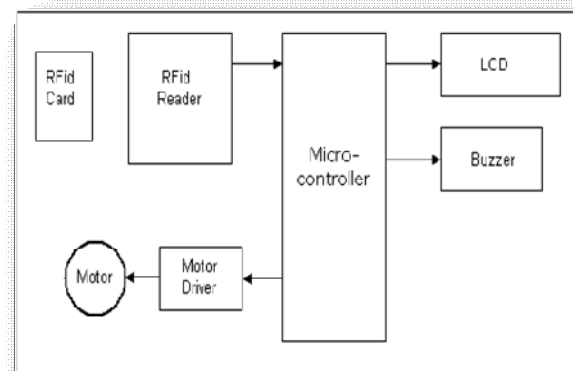

Fig. 3. BLOCK DIAGRAM OF RFID SYSTEM

8. COMPONENTS OF RFID

A basic RFID system consist of three components:
• An antenna or coil
• A transceiver (with decoder)
• A transponder (RF tag) electronically programmed with unique information

These are described below:
• Diodes
• Voltage Regulator
• Resistors
• Capacitors
• Transistors
• LED
• LCD Display
SOFTWARE
• MPLAB and CCS C Compiler
• Language: Embedded C or Assembly

allowing a person to enter room or else UNAUTHORIZED and does not allow the access.

11. SYSTEM   HARDWARE   &   SOFTWARE REQUIREMENTS
HARDWARE
• PIC 16F877A Microcontroller

• Relay Driver
• RFID Reader

12 ABOUT THE PROJECT

The main objective of this project is to provide security in an organization by allowing only the authorized personnel to access the secure area. The security of any organization is a priority to the authorities. The concern is for the physical property and also for the intellectual property. For this reason only the authorized person with a valid RFID tag is allowed into the secured premises. demodulating the radio frequency signal that is being transmitted. Thus, once the person shows the RFID tag to the card reader it scans the data present in the tag and compares with the data present in the system.

When the data matches with that in microcontroller (PIC), the load will be turned on which is driven by a relay and it displays a message AUTHORIZED
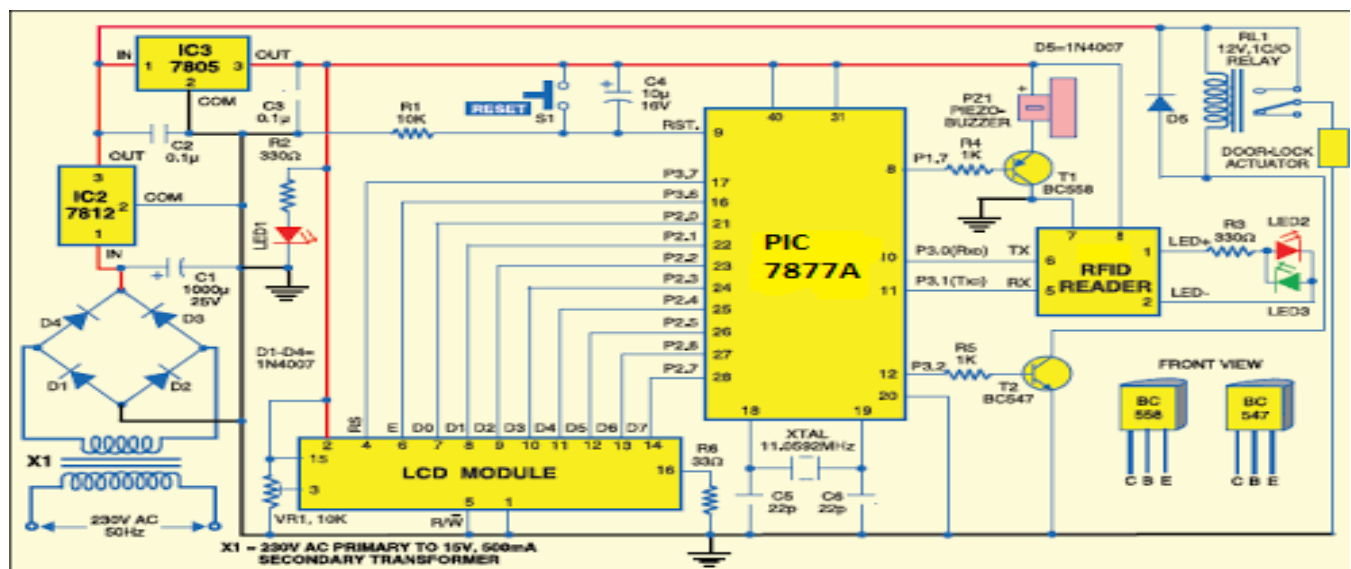

Fig. 3.

9. ADVANTAGES & LIMITATIONS
ADVANTAGES

1. No "line of sight" requirements: Bar code reads can sometimes be limited or problematic due to the need to have a direct "line of sight" between scanner and a bar code. RFID tags can be read through materials without line of sight.
2. More automated reading: RFID tags can be read automatically when tagged product comes past or near a reader, reducing the labor required to scan product and allowing more proactive, real-time tracking.
3. Improved read rates: RFID tags ultimately offer the promise of higher read rates than bar codes, especially in high-speed operations such as carton sortation.

4. Greater data capacity: RFID tags can be easily encoded with item details such as lot and batch, weight, etc.
5. "Write" capabilities: Because RFID tags can be rewritten with new data as supply chain activities are completed, tagged products carry updated information as they move throughout the supply chain.

LIMITATIONS

Some common problems with RFID are reader collision and tag collision. Reader collision occurs when the signals from two or more readers overlap. The tag is unable to respond to simultaneous queries. Systems must be carefully set up to avoid this problem Tag collision occurs when many tags are present in a small area; but since the read time is very

fast, it is easier for vendors to develop systems that ensure that tags respond one at a time.

TYPICAL APPLICATIONS OF RFID
- Work-in-Process
- Container/ Yard Management
- Automatic vehicle identification
- Document tracking
- Patient Monitoring
- Item visibility and status
- Inventory management

14. CONCLUSION

RFID based security and access control system is more secure and fast responded as compared to the other system like biometric. The advantage of the RFID system is contact-less and works without-line-of-sight. By using PIC controller it is easy to access and works very quickly while burning the code it is like plug and play device. It is easier to use and accurate also. Hence this project can be useful for implementation of access control application for tracking system as well as providing the security benefits. This project can improve by raising the range of reader in which the tag read. This project is also cheap and can be used on large scale.

10. SCOPE OF FUTURE WORK

This project can be further enhanced by interfacing it with GSM technology. Any attempt for unauthorized access can be intimated to security personnel through an SMS. Further, cameras can be used to capture the images of the unauthorized person. Thus, there are various applications of this project at different-different places. RFID helps in building a smart grocery store. It depends upon how original one could be to enhance the use of this project. But for us this project is practical for future uses such as Smart card can be interfaced with wireless technologies to make it completely portable in the near future. Payment of bills using mobile can be implemented. A low cost RFID scanner can be manufactured and used which can scan multiple tags (products) simultaneously for faster processing and lesser resources. Automatic scanning & availability of products can be introduced. Pay preparation feature will be the latest trend in upcoming years due to the boost in the ecommerce industry.

Fig.11.1 Prototype model of project