Journal of Management Engineering and Information Technology (JMEIT)
Volume -3, Issue- 3, Jun. 2016, ISSN: 2394 - 8124
Website: www.jmeit.com | E-mail: editorjmeit@outlook.com|jmeit@outlook.com

RFID Based Hostel Security System With Real Hardware Implementation

Vijay Laxmi Kalyani, Kavita patidar, Harshita Sharma

***Vijay Laxmi Kalyani**, HOD, ECE department, Govt. Women Engineering College, Ajmer*
vijaylaxmikalyani@yahoo.com
***Harshita Sharma** B.Tech Student IV year, ECE branch, Govt. Women Engineering College, Ajmer*
Harshitasharma51994@gmail.com
***Kavita patidar,** B.Tech Student IV year, ECE branch, Govt. Women Engineering College, Ajmer*
kavitapatidar46@gmail.com

ABSTRACT-Nowadays, hostel facility is spread day by day around the world either we talk about any college or a coaching institute. As number of student come from different cities for pursuing better education, thus there is a great demand of hostel and PG's. As we have seen from the last few years there is gradual increase in student migrant and 40-45% of them are girls due to which need of hostel increases and for hostel owner first preference is safety of their hostel student and does not allowed any other person to enter in the hostel and it's not possible for single person or warden to keep watch on all student , hence for all these problem there is only one alternative i.e. electronics or another name for this is RFID. As RFID (radio frequency idenification) is a technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, or person. RFID is coming into increasing use in industry as an alternative to the bar code. The advantage of RFID is that it does not require direct contact or line-of-sight scanning. The system uses a RFID reader module and RFID tags which uses serial communication UART for communication. This RFID module senses the 12 bit ID of the tag once it is brought within the range. The unique ID is then sent to the Microcontroller for further processing via UART protocol. Thus a new concept using RFID technology introduce in hostel security. Thus in this paper the author(s) introduces the RFID based hostel security system with real hardware implementation.

KEYWORDS: - RFID reader, Tag card, RFID module, steeper motor, Microcontroller

I. INTRODUCTION

Most educational institution's administrators are concerned about student security. The conventional method allowing access to students inside a college/educational campus is by showing photo i-cards to security guard is very consuming and insecure, hence inefficient RFID based security system one of the solution to address this problem . This system can be used to allow access for student in School College, and university. This system can also 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 compare to conventional method. Student and 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. A RFID stands for Radio-Frequency Identification. The acronym refers to small electronic devices that consist of a small chip and an antenna. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card; it provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information [1]. The advantage of RFID is that it does not require direct contact or line-of-sight scanning. The system uses a RFID reader module and RFID tags which uses serial communication UART for communication. This RFID module senses the 12 bit ID of the tag once it is brought within the range. The unique ID is then sent to the Microcontroller for further processing via UART protocol. Thus we introduce a concept of RFID in our hostel security. Due to this advantage of RFID it's very suitable to use this concept in hostel security. As we introduce a concept i.e. RFID based hostel security system in which each student have tag cards whose information is stored in a microcontroller, the tag card whose information is not in microcontroller is not allowed to enter in the hostel. If the code get matched with the information that already present in the microcontroller ,the gate open automatically and after few seconds it automatically get closed.

II. RFID

Radio-frequency identification (RFID) use electromagnetic field to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source such as a battery and may operate at hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC). A radio-frequency identification system uses tags, or labels attached to the objects to be identified. Two-way radio transmitter-receiver called interrogators or readers send a signal to the tag and read its response. RFID tags can be either passive, active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader. However, to operate a passive tag, it must be illuminated with a power level roughly a thousand times stronger than for signal transmission. That makes a difference in interference and in exposure to radiation. RFID tags

Journal of Management Engineering and Information Technology (JMEIT)
Volume -3, Issue- 3, Jun. 2016, ISSN: 2394 - 8124
Website: www.jmeit.com | **E-mail:** editorjmeit@outlook.com|jmeit@outlook.com

contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory. The RFID tag includes either fixed or programmable logic for processing the transmission and sensor data, respectively.
An RFID reader transmits an encoded radio signal to interrogate the tag. The RFID tag receives the message and then responds with its identification and other information [2].

III. BLOCK DIAGRAM

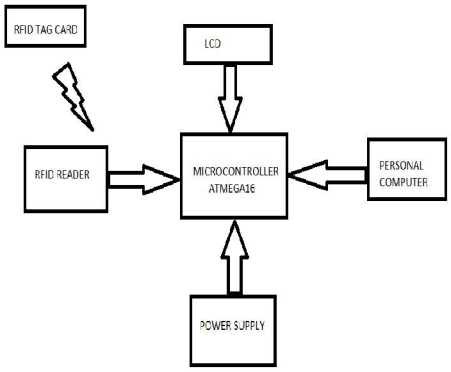

Figure-1 block diagram of RFID

It consist of following component:-

1. RFID Tag
2. RFID reader
3. Microcontroller
4. RFID module
5. Microcontroller (AT Mega 16)
6. Power supply

IV. RFID MODULE

RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used & supported by our Reader is 125 KHz. An RFID system consists of two separate components: a tag and a reader. Tags are analogous to barcode labels, and come in different shapes and sizes. The tag contains an antenna connected to a small microchip containing up to two kilobytes of data. The reader, or scanner, functions similarly to a barcode scanner; however, while a barcode scanner uses a laser beam to scan the barcode, an RFID scanner uses electromagnetic waves. To transmit these waves, the scanner uses an antenna that transmits a signal, communicating with the tags antenna. The tags antenna receives data from the scanner and transmits its particular chip information to the scanner.

Figure-2 RFID Reader modules

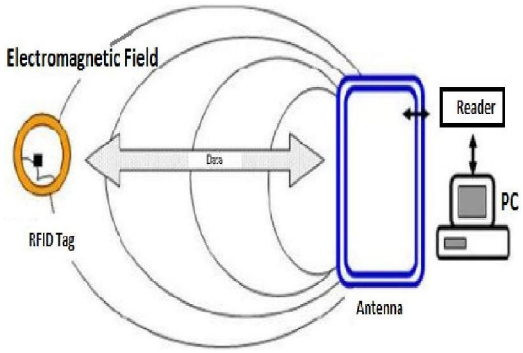

Figure-3 Working of RFID module

Source- [Journal of Management Engineering and Information Technology (JMEIT) Volume -2, Issue- 3, Jun. 2015, ISSN: 2394 - 8124]

V. RFID TAG CARDS

A radio-frequency identification system uses tags, or labels attached to the objects to be identified. Readers send a signal to the tag and read its response. RFID tags can be either passive, active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of an RFID reader. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader. However, to operate a passive tag, it must be illuminated with a power level roughly a thousand times stronger than for signal transmission. That makes a difference in interference and in exposure to radiation.

Tags may either be read-only, having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user. Field programmable tags may be write-once, read-multiple; "blank" tags may be written with

Journal of Management Engineering and Information Technology (JMEIT)
Volume -3, Issue- 3, Jun. 2016, ISSN: 2394 - 8124
Website: www.jmeit.com | E-mail: editorjmeit@outlook.com|jmeit@outlook.com

an electronic product code by the user [3]. RFID tags contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory. The RFID tag includes either fixed or programmable logic for processing the transmission and sensor data, respectively.

An RFID reader transmits an encoded radio signal to interrogate the tag. The RFID tag receives the message and then responds with its identification and other information. This may be only a unique tag serial number, or may be product-related information such as a stock number, lot or batch number, production date, or other specific information. Since tags have individual serial numbers, the RFID system design can discriminate among several tags that might be within the range of the RFID reader and read them simultaneously.

Figure-4 RFID Tag cards

VI. CIRCUIT DIAGRAM

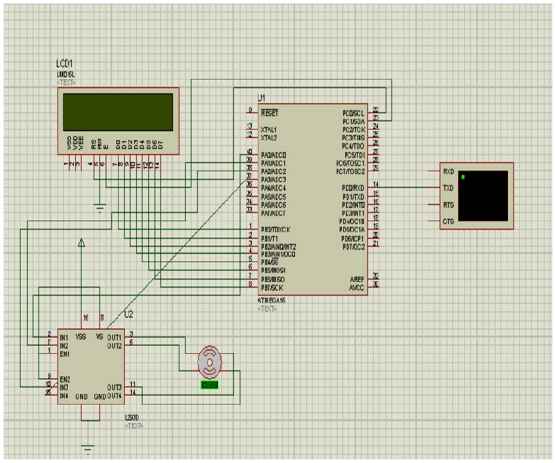

Figure- 5 Circuit diagram

VII. PROGRAM

```
#include <avr/io.h>
#include <util/delay.h>
#define F_CPU 1000000UL
#define Baud Rate 1200UL
#define ubrr_value ((F_CPU/(16UL*Baud Rate))-
1)

void init()
{
        //int ubrr_value;
        UBRRL=12;
        //UBRRH=ubrr_value>>8;
        UCSRA=(1<<U2X);
        UCSRC=(1<<URSEL)|(1<<UCSZ0)|(1
<<UCSZ1);
        UCSRB=(1<<RXEN)|(1<<TXEN);

}
void trans(unsigned char ch)
{
        int i;
        while(!(UCSRA&(1<<UDRE)))
        {
        }
        UDR=ch;

}

unsigned char rec()
{
        while(!(UCSRA&(1<<RXC)))
        {

        }

        return UDR;
}
void lcd()
{
        cmd (0x01);
        cmd (0x80);
        cmd(0x06);
        cmd (0x0e);
        cmd(0x38);
}
void cmd(int x)
{
        PORTB=x;
        PORTC=0x02;
        _delay_ms(2);
        PORTC=0x00;
}
void print(char *p)
{
   while(*p!='\0')
        {
        PORTB=*p;
        PORTC=0x03;
        _delay_ms(2);
        PORTC=0x01;
        p++;
   }
}
void stepper()
{
unsigned char
v[]={0x09,0x05,0x06,0x0a};//stepper motor bit
pattern for full step sequence Forward Direction
unsigned char
w[]={0x0a,0x06,0x05,0x09};//Stepper motor for
Reverse Direction
```

```
unsigned int k,l,m,n;                    //Global
declaration

for(n=0;n<10;n++)        //This loop for Deg of
rotation
{
for(k=0;k<4;k++)        //loop for 4 values for
stepper motor sequence
{
PORTA=v[k];             //Forward Direction
_delay_ms(10);          //2ms delay

}
}
PORTA=0x00;
_delay_ms(3000);
for(m=0;m<10;m++)
{
for(l=0;l<4;l++)
{
PORTA=w[l];             ////Reverse Direction
_delay_ms(10);
}
}
PORTA=0x00;
//_delay_ms(3000);
}



int main(void)
{
        DDRB=0xff;
        DDRA=0xff;
        PORTA=0x0f;
        DDRC=0xff;
        init();
        lcd();
        //print("show your tag");
        char a[13];int i=0;
        int data;
        char b[12]="090074701518";
        char c[12]="090074605C41";
        char d[12]="09007391F11A";
        while(1)
        {cmd(0x01);
                print("show your tag");

                for (i=0;i<12;i++)
                {
                        a[i]=rec();
                }


                if (strncmp(a,b,12)==0)
                data=1;
                else if (strncmp(a,c,12)==0)
                data=2;
                else if (strncmp(a,d,12)==0)
                data=3;

                Switch (data)
                {    Print ("show your tag");
                        case 1:
                        cmd (0x01);
                        print ("KAVITA");
                        stepper();
                        break;
                        case 2:
                        cmd(0x01);

        print("CHANCHAL");
                        cmd(0xc0);
                        print("GAJAL");
                        stepper();
                        break;
                        case 3:
                        cmd(0x01);

        print("HARSHITA");
                        stepper();
                        break;
                        default:
                        cmd(0x01);
                        print("PLEASE
TRY AGAIN");
                        _delay_ms(20);
                        break;
                }


                data=0;
        }
}
```

VIII. WORKING

In this paper "RFID BASED HOSTEL SECURITY SYSTEM "we deal with the following process. Here we are using 9v adapter to run microcontroller but we required only 5v, so we first convert 9v into 5v by using 7805 IC . Now, output from 7805 IC given to the electrolyte capacitor the main function of electrolyte capacitor is to filter all the Ac components. Output from the electrolyte capacitor now divided into subparts. In this whole duration LCD display "SHOW YOUR TAG CARD" , now we swap a tag card in front of RFID reader so that it detect the code which is present in the tag card and send to the microcontroller. Here we are using passive tag card. If the code is present in the micro controller got matched with the tag card code, automatically gate open. The opening and closing of gate is done by using stepper motor, which is run at 1A. The current which is received from the microcontroller 300 mA but to run the stepper motor we required only 1A, so to convert this 300 mA into 1A, we are using LC293D IC. Here LCD is used to display the name of the person which is assign to a particular code. Through this process unknown person is not allowed to enter in the hostel. Thus it is a one of the best application of RFID to use as a security purpose in hostel.

IX. RFID BASED HOSTEL SECURITY SYSTEM WITH REAL HARDWARE IMPLEMENTATION

I. After making all above connections, Switch on the Circuits.

Journal of Management Engineering and Information Technology (JMEIT)
Volume -3, Issue- 3, Jun. 2016, ISSN: 2394 - 8124
Website: www.jmeit.com | **E-mail:** editorjmeit@outlook.com|jmeit@outlook.com

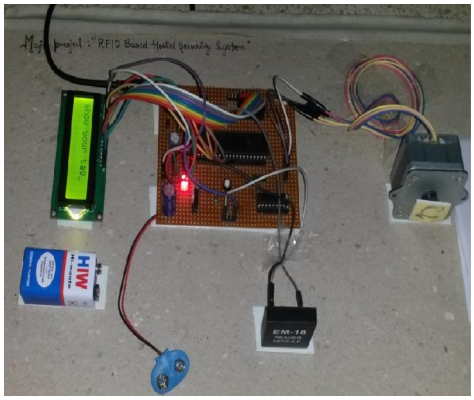

Figure- 6. Showing when the circuit is on

II. On LCD, "SHOW YOUR TAG CARD" IS DISPLAYED.

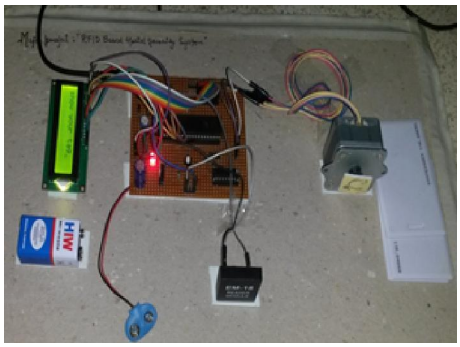

Figure-7.Showing "show your tag card" is displayed on LCD.

III. A Student then sweeps the RFID tag near the RFID Reader.

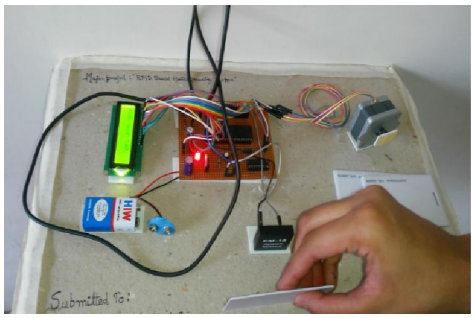

Figure-8. Showing when Student sweeps the RFID tag near the RFID Reader.

IV. Reader then reads the data stored in the tag (Student ID) and transmits it to the microcontroller.

V. Microcontroller compares the tag with the database. Database means that program which is burned in ATMEGA16 IC. If the tag is correctly matched then LCD displays "NAME".

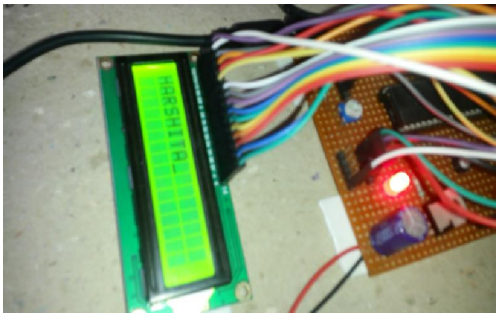

Figure-9. Showing "NAME" on LCD

VI. At the same moment. Door is opened and student permits to enter. After some time (few second) the Door gets closed.

VII. Now place another card that is not present in our database for authentication. Now LCD displays "ERROR".

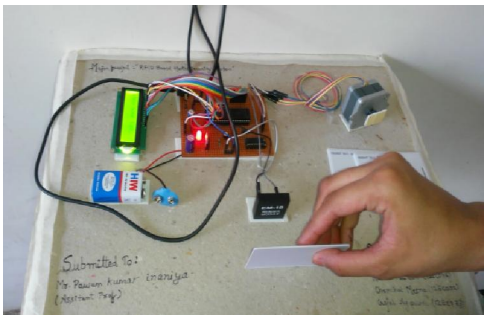

Figure-10.Showing "ERROR" on LCD

IX. SOFTWARE USED

PROTEUS: - Proteus is a Virtual System Modelling and circuit simulation application. The suite combines mixed mode SPICE circuit simulation, animated components and microprocessor models to facilitate co-simulation of complete microcontroller based designs. Proteus also has the ability to simulate the interaction between software running on a microcontroller and any analog or digital electronics connected to it. It simulates Input / Output ports, interrupts, timers, USARTs and all other peripherals present on each supporter processor [4].

KEIL µVision:- The µVision IDE combines project management, run-time environment, build facilities, source code editing, and program debugging in a single powerful environment. µVision is easy-to-use and accelerates your embedded software development. µVision supports multiple screens and allows you to create individual window layouts anywhere on the visual surface. The µ vision debug provides a single environment in which you may test, verify, and optimize your application code. The debugger includes traditional features like simple and complex breakpoints,

watch windows, and execution control and provides full visibility to device peripherals [5].

VIII. CONCLUSION

Through this paper our main aim that is to provide security measurement in hostel**.** As we have seen from the last few years there is gradual increase in student migrant and mostly of them are girls due to which need of hostel increases and for hostel owner first preference is safety of their hostel student and does not allowed any other person to enter in the hostel and it's not possible for single person or warden to keep watch on all student, hence for all these problem there is only one alternative i.e. electronics or another name for this is RFID. RFID provide a best security and also reduces the number of case that are increasing day by day. There are many other application in which RFID is used to provide security.

REFERENCES

[1]. http://www.technovelgy.com/ct/technology-article.asp
[2]. https://en.wikipedia.org/wiki/Radio-frequency_identification
[3].http://www.expedia.co.in/?mdpcid=in.direct.sony.bkmrk..spr2013&

[4] http://proteus.soft112.com/

[5]. http://www2.keil.com/mdk5/uvision/

Author's Details

Vijay Laxmi Kalyani is HOD in the department of ECE in GWEC, Ajmer. She has attended various workshops, conferences, FDP, STC and also published many research papers in various International Journals, National Journals and Conferences, Member-IAENG.

Kavita Patidar is Pursuing B.Tech (IV-Year) in Electronics and Communication, GWECA, Ajmer

Harshita Sharma is Pursuing B.Tech (IV-Year) in Electronics and Communication, GWECA, Ajmer