NITTE | NMAM INSTITUTE OF TECHNOLOGY
EDUCATION TRUST

Course : Microprocessor and Microcotroller Lab.

A Mini Project Report on

RFID BASED ACCESS CONTROL SYSTEM USING 8051

Submitted By

NAME	USN
Nihar Ravi Majalikar	4NM19EC103
Nikhil Anvekar	4NM19EC104
Nikhila	4NM19EC105
Nishan N	4NM19EC106

Under the guidance of

<Mrs. Ramya Shetty>

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

N.M.A.M. INSTITUTE OF TECHNOLOGY, NITTE - 574110

2020 – 2021

ABSTARCT

In this project, we are going to build an **RFID Based Access Control System using 8051 Micro Controller**. The same system can be named like RFID based door lock or RFID based access management system. If you have been to big hospitals or companies, you might have seen how they used RFID based locks to restrict access to certain areas. In hospitals, only hospital staff with approved RFID tags can access Intensive Care Unit and such restricted areas. So let's begin to build the system.

A RFID based Door Lock or Access Control System is based on some simple concepts. We store a set of RFID card data in our system, say 3 or 10 RFID card data. When the person with the right RFID card (compatible to data preloaded in our program/system) come and swipes his RFID tag, access will be granted. When the person with the wrong RFID card (whose data is not loaded in our system) swipes his RFID tag, access will be denied.
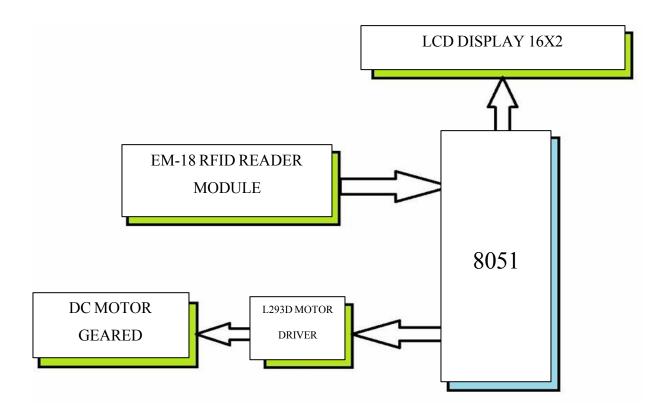
INTRODUCTION

RFID Security Access Control System using 8051 Microcontroller is an RFID Technology based security system. Using this system, authorization of personnel is carried out with an RFID card and only those with access can enter a secured area. The security of any organization is a priority for the authorities. The security concern is for the physical property and also for the intellectual property.
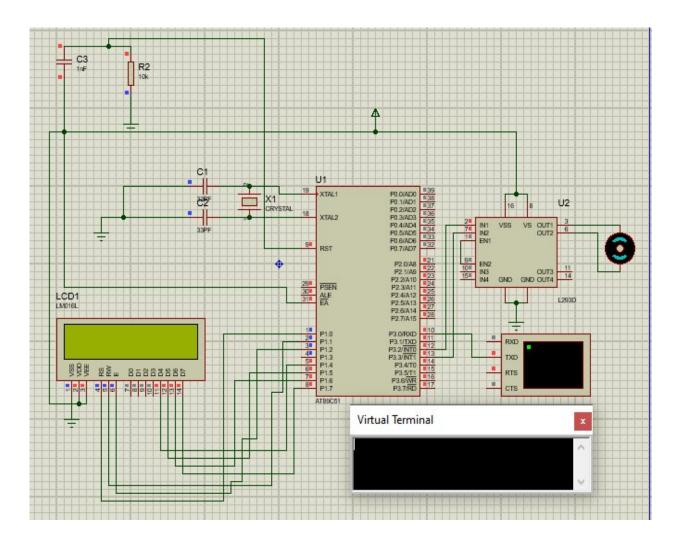
II. OBJECTIVES OF THE PROJECT

a. To read the RFID card numbers using EM18 RFID card reader module

b. To check the authenticity of the card using 8051

c. Opening and closing of a door

d. Displaying a suitable message on the LCD display

III. BLOCK DIAGRAM

```
                                            ┌─────────────────────────┐
                                            │    LCD DISPLAY 16X2      │
                                            └─────────────────────────┘
                                                       ▲
                                                       │
  ┌─────────────────────────┐              ┌─────────────────────────┐
  │   EM-18 RFID READER      │ ───────────▶ │                         │
  │       MODULE             │              │                         │
  └─────────────────────────┘              │         8051            │
                                            │                         │
  ┌──────────────┐   ┌──────────────┐       │                         │
  │  DC MOTOR    │◀──│ L293D MOTOR  │◀───────│                         │
  │  GEARED      │   │   DRIVER     │       └─────────────────────────┘
  └──────────────┘   └──────────────┘
```

EM-18 reader module is used to read the RFID card when waved and sends the code to the 8051-receiver pin. The microcontroller compares it with all the card passwords and displays "ACCESS GRANTED" and "ACCESS DENIED" based on the card if it a pre-registered card or an unregistered card and it opens the door lock using the dc motor and the door can be opened. The microcontroller also greets the owner of the card in the lcd display.

Circuit Diagram

COMPONENTS USED

1. Lcd display

LCD (**Liquid Crystal Display**) is a type of flat **panel display** which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer **monitors** and instrument **panels**.

2. EM 18 Module(RIFD)

The EM-18 RFID Reader module operating at 125kHz is an inexpensive solution for your RFID based application. The Reader module comes with an on-chip antenna and can be powered up with a 5V power supply. Power-up the module and connect the transmit pin of the module to recieve pin of your microcontroller. Show your card within the reading distance and the card number is thrown at the output. Optionally the module can be configured for also a weigand output.

3. RIFD Card

Radio-frequency identification (**RFID**) uses <u>electromagnetic fields</u> to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder; a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to track inventory goods.

4. L293D

L293D IC is a typical **Motor Driver** IC which allows the DC **motor** to drive on any direction. This IC consists of 16-pins which are used to control a set of two DC **motors** instantaneously in any direction. It means, by using a **L293D** IC we can control two DC **motors**. As well, this IC can drive small and quiet big **motors**.

5.DC Motor Geared

Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

6.A T89S52(8051 FAMILY) MICROCONTOLLER

Intel introduced an 8-bit microcontroller called the 8051. It was referred as system on a chip because it had 128 bytes of RAM, 4K byte of on-chip ROM, two timers, one serial port, and 4 ports (8-bit wide), all on a single chip. When it became widely popular, Intel allowed other manufacturers to make and market different flavors of 8051 with its code compatible with 8051. 8052 microcontroller − 8052 has all the standard features of the 8051 microcontroller as well as an extra 128 bytes of RAM and an extra timer. It also has 8K bytes of on-chip program ROM instead of 4K bytes.

IV. Method

   A) To read the RFID card numbers using EM18 RFID card reader module

The EM18 RFID Reader Module has transceiver which generates a radio signal and transmits it through antenna. This signal itself is in the form of energy which is used to activate and power the tag.

When RFID tag comes in range of signal transmitted by the reader, transponder in the tag is hit by this signal. A tag draws power from the electromagnetic field created by reader. Then, the transponder converts that radio signal into the usable power. After getting power, transponder sends all the information it has stored in it, such as unique ID to the RFID reader in the form of RF signal. Then, RFID reader puts this unique ID data in the form of byte on serial Tx (transmit) pin. This data can be used or accessed by microcontroller serially using UART communication.

B)   To check the authenticity of the card using 8051

A code is written to compare the transmitted card number from the EM18 RFID Reader Module with the numbers previously declared in the code, i.e. the cards which have access. The XRL A,… function is used to compare with the stored and received values of the rfid unique code.
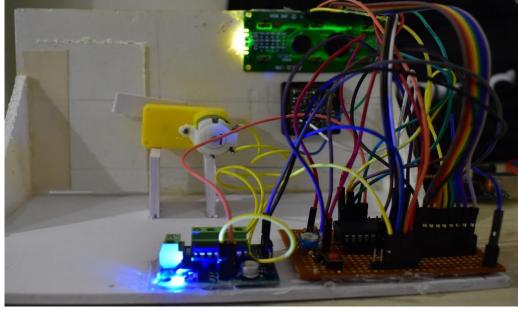
C)   Opening and closing of door

If the rfid unque code on the card swiped on the RFID Reader module matches with any one of the numbers registered, then the motor will rotate acting like movable lock, the motor gets amplified voltage using the l293d motor driver IC, once displaying "Opening Door" and after the motor turns the opposite direction to lock the door "Closing door" .
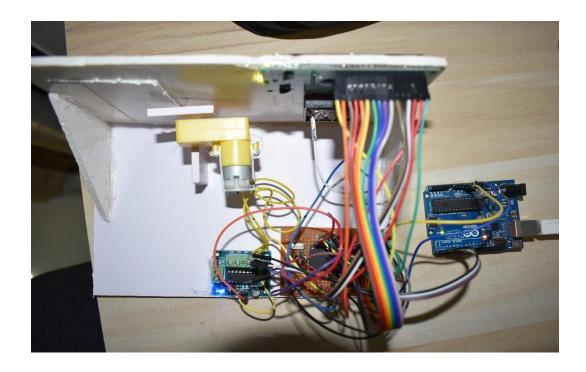
D.)Displaying a suitable message on the LCD display

If any one of the pre-registered cards are matched with the waved card then first it the display will show 'Access granted' and if the non-registered card is waved then 'Access denied' is displayed Else, 'Access denied' message will pop up on the LCD display. The Owner of the card will be greeted through the lcd display 'Welcome (owner's name)'.

V. Result

OUPUT CONDITIONS:

INITIAL CONDITION:

1. When the system is in its initial stage;

2. When a registered card is waved;

3. Based on the card owner the lcd ,displays a greeting to owner;

4 display of opening and closing of door displayed on lcd;

5.When a unregistered card is waved;

FUTURE IMPROVEMENT:

This project has a wide range of application ranging from house to companies for employee record and also to highly redistricted areas and students in college to can use it for attendance.

Code snippet:

```
RS EQU P2.7

RW EQU

P2.6 E  EQU

P2.5 FLG

EQU 40H

SEL EQU

41H


ORG 0000H
```

MOV TMOD,#00100001B

MOV TH1,#253D

MOV SCON,#50H

```
SETB TR1

ACALL

LCD_INIT

MOV DPTR,#TEXT1

ACALL LCD_OUT

ACALL LINE2

MOV DPTR,#TEXT2

ACALL LCD_OUT

CLR P1.0

CLR P1.1



MAIN:ACALL

    LCD_INIT MOV

    DPTR,#TEXT1

    ACALL LCD_OUT

    ACALL LINE2

    MOV

    DPTR,#TEXT2

    ACALL LCD_OUT

    ACALL

    READ_TAG CLR

    REN

    ACALL LINE2

    ACALL

    CHECK_PASSWORD

    ACALL DELAY1

    SETB

    REN
```

```
        SJMP

        MAIN


LCD_INIT: MOV

        DPTR,#INIT_COMMANDS

        SETB SEL

        ACALL LCD_OUT

        CLR SEL
```

```
        RET


LCD_OUT:  CLR
          A

          MOVC

          A,@A+DPTR JZ

          EXIT

          INC DPTR

          JB

          SEL,CMD

          ACALL

          DATA_WRITE

          SJMP LCD_OUT


CMD:    ACALL

          CMD_WRITE SJMP

          LCD_OUT
EXIT:    RET


LINE2:MOV A,#0C0H

     ACALL

     CMD_WRITE RET


LINE1:MOV A,#080H

     ACALL

     CMD_WRITE RET


READ_TAG: MOV R0,#12D

          MOV R1,#160D
```

```
WAIT:JNB

RI,WAIT MOV

A,SBUF

MOV @R1,A

INC R1

CLR RI
```

```
            DJNZ

            R0,WAIT

            RET




CHECK_PASSWORD:     CLR

            FLG MOV

            R2,#7D

                    MOV R7,#1D

            MOV R1,#164D

            MOV DPTR,#PASS1

     REPEAT: CLR A

            MOVC A,@A+DPTR

            XRL A,@R1

            JNZ CHECKNEXT1

            INC R1

            INC DPTR

            DJNZ R2,REPEAT

            ACALL LINE2

            MOV DPTR,#TEXT3

            ACALL LCD_OUT

                    ACALL DELAY1

                    MOV A,R7

                    CJNE A,#1D,VAISHAKH

                    ACALL UJWALA

                    ACALL OPENDOOR

                    ACALL DELAY1

                    ACALL DELAY1

                    ACALL CLOSEDOOR
```

```
        ACALL DELAY1

    RET
```

```
CHECKNEXT1:INC R7

    MOV A,R7

            CJNE

    A,#2D,CHECKNEXT2 MOV R2,#7D

    MOV R1,#164D

    MOV

    DPTR,#PASS2

    SJMP REPEAT


CHECKNEXT2:

            MOV A,R7

            CJNE

    A,#3D,CHECKNEXT MOV R2,#7D

    MOV R1,#164D

    MOV

    DPTR,#PASS3

    SJMP REPEAT


  CHECKNEXT: JB
    FLG,FAIL

    MOV R2,#7D

    MOV R1,#164D

    MOV DPTR,#PASS4

    SETB FLG

    SJMP

REPEAT

FAIL:ACALL LINE2

    MOV
```

```
DPTR,#TEXT4

ACALL LCD_OUT

RET
```

```
UJWALA:ACALL LINE2

    MOV DPTR,#NAME1

        ACALL LCD_OUT

        ACALL DELAY1

        RET


VAISHAKH:CJNE A,#2D,VAMAN

    ACALL LINE2

        MOV

        DPTR,#NAME2

        ACALL LCD_OUT

            ACALL DELAY

                ACALL OPENDOOR

                ACALL DELAY1

                ACALL DELAY1

                ACALL CLOSEDOOR

                ACALL DELAY1

            RET


VAMAN:CJNE A,#3D,VARUN

    ACALL LINE2

        MOV

        DPTR,#NAME3

        ACALL LCD_OUT

            ACALL DELAY

                ACALL OPENDOOR

                ACALL DELAY1

                ACALL DELAY1

                ACALL CLOSEDOOR
```

```
ACALL DELAY1

RET
```

```
VARUN: ACALL LINE2

        MOV

        DPTR,#NAME4

        ACALL LCD_OUT

                ACALL DELAY

                        ACALL OPENDOOR

                        ACALL DELAY1

                        ACALL DELAY1

                        ACALL CLOSEDOOR

                        ACALL DELAY1

                RET


OPENDOOR:SETB

        P1.0 ACALL

        DELAY3 CLR

        P1.1

                ACALL

                DELAY2

                ACALL

                DELAY2

                ACALL

                DELAY2

                ACALL

                DELAY2

                ACALL

                DELAY2 CLR

                P1.0 ACALL

                DELAY3 CLR

                P1.1 ACALL
```

LINE2

MOV

DPTR,#OPEN

ACALL LCD_OUT

ACALL DELAY

RET

CLOSEDOOR:CLR P1.0

ACALL

DELAY3 SETB

P1.1

ACALL

DELAY2

ACALL

DELAY2

ACALL

DELAY2

ACALL

DELAY2

ACALL

DELAY2 CLR

P1.0 ACALL

DELAY3 CLR

P1.1 ACALL

LINE2

MOV

DPTR,#CLOSE

ACALL LCD_OUT

ACALL DELAY

RET

DELAY2:MOV

R4,#0FFH

REP:MOV R5,#0FFH

WAIT1:DJNZ R5,WAIT1

DJNZ R4,REP

RET

DELAY3:MOV

```
R4,#0FFH

    REP1:DJNZ R4,REP1

    RET

DELAY1:MOV R3,#46D

BACK:  MOV TH0,#00000000B

    MOV TL0,#00000000B

    SETB TR0

HERE1: JNB

    TF0,HERE1 CLR

    TR0
```

```
        CLR TF0

        DJNZ

        R3,BACK

        RET

CMD_WRITE: MOV

    P0,A CLR RS

    CLR

    RW

    SETB

    E CLR

    E

    ACALL DELAY

    RET

DATA_WRITE:MOV P0,A

    SETB RS

    CLR

    RW

    SETB

    E CLR

    E

    ACALL DELAY

    RET

DATA_WRITE1:

        ADD A,#30H

    MOV P0,A

    SETB

    RS CLR

    RW

    SETB E
```

CLR E

ACALL DELAY

RET

DELAY: CLR

E CLR RS

SETB RW

```
        MOV P0,#0FFh

        SETB E

        MOV A,P0

        JB

        ACC.7,DELAY

        CLR E

        CLR

        RW

        RET

INIT_COMMANDS:  DB

0CH,01H,06H,83H,3CH,0 TEXT1: DB "MPMC

PROJECT",0

TEXT2: DB " WAVE YOUR CARD",0

TEXT3: DB " ACCESS GRANTED ",0

TEXT4: DB " ACCESS DENIED   ",0


PASS1:              DB

"D2B46A5",0    PASS2:

DB         "D27A877",0

PASS3:              DB

"D28B454",0    PASS4:

DB "934E8A0",0


NAME1: DB "WELCOME UJWALA  ",0

NAME2: DB "WELCOME VAISHAKH

",0 NAME3: DB " WELCOME VAMAN

",0 NAME4: DB " WELCOME VARUN

",0
```

OPEN: DB " OPENING DOOR

",0 CLOSE: DB " CLOSING

DOOR ",0 END