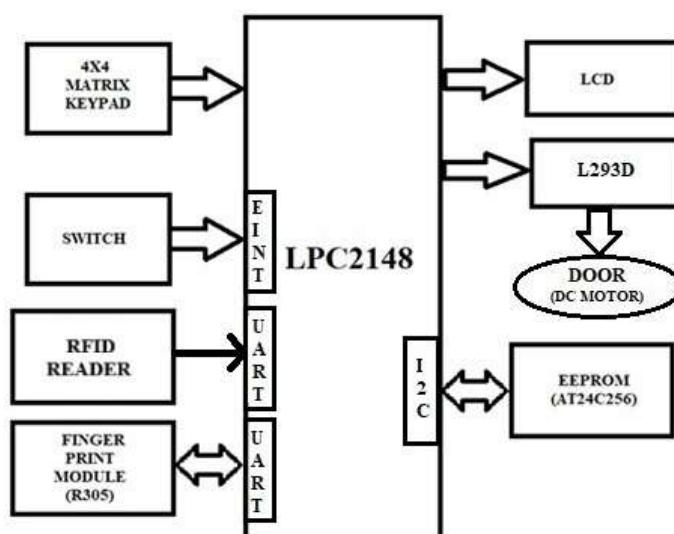


MULTI-LEVEL SECURITY ACCESS SYSTEM

AIM:

The primary objective of this project is to ensure high-level security for valuable devices by implementing a three-tier security system. The system is designed to authenticate users through multiple verification methods, thereby restricting unauthorized access. By incorporating three levels of security, it enhances protection against potential breaches and ensures that only authorized personnel can access sensitive or valuable equipment.

BLOCK DIAGRAM:



REQUIREMENTS:

HARDWARE REQUIREMENTS:

- **LPC 2148**
- **RFID READER**
- **RFID CARDS**
- **R305 (FINGERPRINT MODULE)**
- **LCD**
- **EEPROM (AT24C256)**
- **SWITCH**
- **4X4 KEYPAD**
- **L293D**
- **DC MOTOR**
- **USB-TO-UART CONVERTER**

SOFTWARE REQUIREMENTS:

- EMBEDDED C – PROGRAMMING
- KEIL-C COMPILER
- FLASH MAGIC

Steps to be followed to complete your project:

- Create New Folder in your server save that folder with your project name
- Copy what you done files like lcd.c, lcd.h, delay.c, delay.h, uart.c, uart.h, keypad.c, keypad.h, i2c.c and i2c.h into project folder.
- Individually can check each and every module.
- First check lcd to display character constant, string constant and integer constant.
- Next check keypad peripheral by displaying key values on LCD.
- Next write n bytes into EEPROM and read that n number of bytes from EEPROM and display on LCD.

Note: Use BYTE WRITE and BYTE READ functions or PAGE WRITE and PAGE READ functions

- Next check UART peripheral by transmitting character constant, string constant and receive string constant using hyper terminal. (**Note: must use UART interrupts**)
- Connect RFID READER D0 pin to USB to UART converter and test the working condition using PC interface.
- Then write logic for reading the card number using UART0 interrupt and display it on LCD.
- Check FINGER PRINT Module with the help of software which is available in LMS card under REFERENCE DATA folder. Connect finger print module to USB to UART converter and test the working condition.
- Then download the FINGER PRINT module code from LMS and test that code with FINGER PRINT module. Use R305 datasheet to analyze the fingerprint code.
- If above steps are completed create new file with projectmain.c, add all peripheral definition files, and write below steps in projectmain.c file
- In External Interrupt0 ISR, display Menu 1) Edit password 2) Edit Fingerprint on LCD and select that menu with keypad functions.
- If your pressing 1 button call Edit Password function.
- Edit Password function working: first asking for user ID card. After valid user ID card is placed then asking for current password. If user entered the current password correctly, then it is asking for new password. After entering the new password again asking for confirm new password. If new password and confirm password both are same then new password has to be

saved in user equivalent specified memory locations of EEPROM otherwise no changes in current password. That means old password only treated as updated password. If password modification is succeeded, new password is treated as updated password.

- If user is selected then option 2, call Edit fingerprint function.
- Edit fingerprint function responsibility is to ENROLL and DELETE the specified fingerprints from the finger print module. Based on the user selection, need to do the required operation. All required functions are available in fingerprint working code in LMS.

➤ **ENROLL PROCESS:**

To ENROLL the finger print:

1. Detecting finger and store the detected finger image in ImageBuffer (Collect finger image).
2. Generate character file from the original finger image in ImageBuffer and store the file in CharBuffer1 or CharBuffer2 (Generate character file from image).
3. Store the template of specified buffer (Buffer1/Buffer2) at the designated location of Flash library (Store template).

Note: Refer the data sheet for each command and Acknowledge packet format.

- And inside main initialize all peripherals
- Initially application program needs to wait for the user ID card. Once the RFID card is placed in front of RFID reader then reader is sending the card number through serial communication with the help of 9600 baud rate.
- After reading the card number, controller is checking with the predefined card numbers. If user ID card is valid and recognized the user, then first level of security done. Then for second level security, need to enter the security password entry from the user. User has to enter the password from the keypad. (Enter Password by using keypad function. Enter Key values store into one array; make it as a string constant)
- Read password from EEPROM and store into one array; make it as a string constant.
- Now compare both string constants, if condition is true then it will enter into next level of security. i.e. fingerprint verification.
- Now call fingerprint search process function.

SEARCH PROCESS

To SEARCH fingerprint in the flash library:

1. Detecting finger and store the detected finger image in ImageBuffer (Collect finger image).

2. Generate character file from the original finger image in ImageBuffer and store the file in CharBuffer1 or CharBuffer2 (Generate character file from image).

3. Search the whole finger library for the template that matches the one in CharBuffer1 or CharBuffer2(search finger library).

- If fingerprint is matched with specified ID, then third level security also passed successfully.
- If three security levels are passed, then security door will open (DC motor will rotate clockwise direction) for some time then close (DC motor will rotate anti-clockwise direction) the security door.
- Else it should display failure message on LCD and need to wait for the user ID entry.
- If you're getting this output then your project is completed.

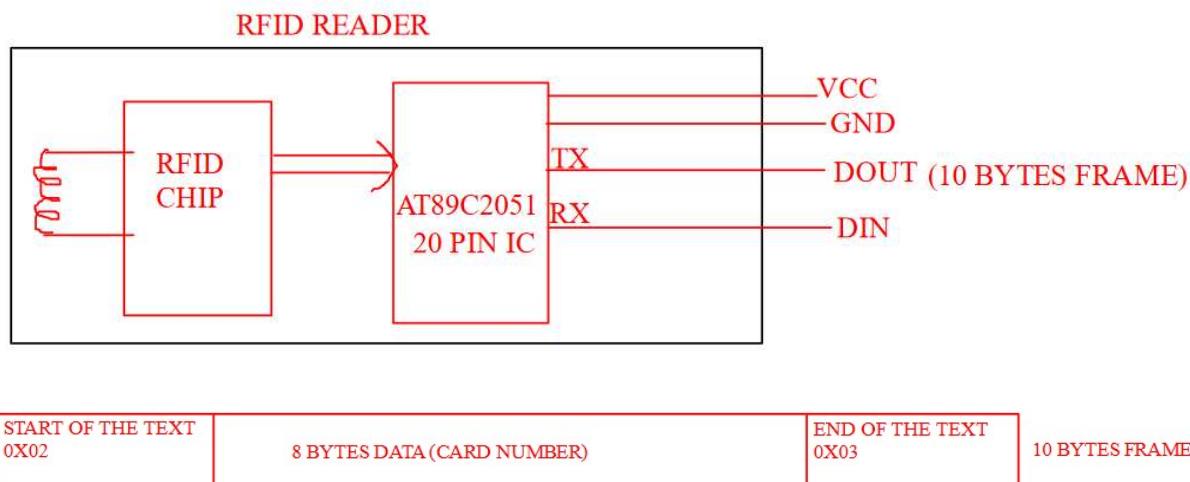
Note: All the necessary test cases should be included to ensure support for real-time use cases.

For example, when a valid RFID card is detected, the system should wait for the user to enter the password. If the user fails to enter the password within the specified time interval, the process should automatically terminate and restart from the beginning.

*****ALL THE BEST*****

RFID READER OVERVIEW AND DATA COMMUNICATION:

RFID Reader will send the 10 bytes of data through UART, once card is placed nearer to the RFID Reader. Once check the below images to get some idea on RFID Reader block diagram. Refer the supported data sheets to get some more knowledge.



For example, card number is 12345678, then output of the RFID Reader is
0x02 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x03 (hex format)