



# NUST

NATIONAL UNIVERSITY  
OF SCIENCES & TECHNOLOGY

SCHOOL OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES (SECS)

**Section:** *BEE 12-B*

**Subject:** *INSTRUMENTATION & MEASUREMENTS (EE383)*

## **TITLE OF THE PROJECT**

“Smart Building Entry System”

**Group members name with CMS/ Registration Numbers**

<u>S.NO</u>	<u>NAME</u>	<u>CMS ID</u>
1	QAZI HAMID ULLAH	340346
2	AFIF ARIF SIDDIQI	344504
3	M.WALEED RAZZAQ BAJWA	348952
4	LARAIB NADEEM	345867

## **Table Of Contents**

Acknowledgements-----	(3)
Abstract-----	(3)
Why we Need it? -----	(4)
Introduction -----	(4)
Problem Statement-----	(5)
Block Diagram-----	(5)
Methodology -----	(6)
Fingerprint sensor-----	(7)
RFID-----	(7)
Counter-----	(8)
Results and Discussions-----	(8)
Recommended Future Work-----	(8)
Applications of Project in other Fields-----	(8)
Conclusion-----	(9)
Contribution from each member-----	(9)
References-----	(9)

## **Acknowledgements**

*We would like to thank our lecturer, Dr. Muhammad Mustafa Tahseen, and the laboratory in-charge, Mr. Ali Khalid, by whom this Project is made possible. So, we Thanks for their assistance with this end semester project.*

*We also acknowledge Lab attendants of the School of Electrical Engineering and Computer Sciences' department for equipping us with the resources and facilities that we needed to complete this work. We're also appreciative to all our individuals who supported us with this endeavor in every way they could.*

## **Abstract**

*This project “Smart building entrance system” is a system designed to ensure the safety of the building as it makes sure no person other than the members registered in this system can enter in the building. So according to this system a person can prove his identity in either of the two ways either he can scan his RFID card or can use finger-print sensor. So basically, if a person uses a card to enter, then his data should be matched with the data registered and same is the case with finger-print sensor, only if his fingerprint or card matches then he would be allowed to enter in the building. Apart from this there will be a counter at the entrance that will count for each member that enters and will hold up the total number of people entered in the building.*

## **Why we Need it?**

*This project can be extended to several other areas. Now-a-days security and privacy is one of the most important and sensitive part of our lives. This project can be used in the entrance of areas where only authorized persons can enter. Moreover, it can be extended to automatic attendance system in schools, offices and other working fields.*

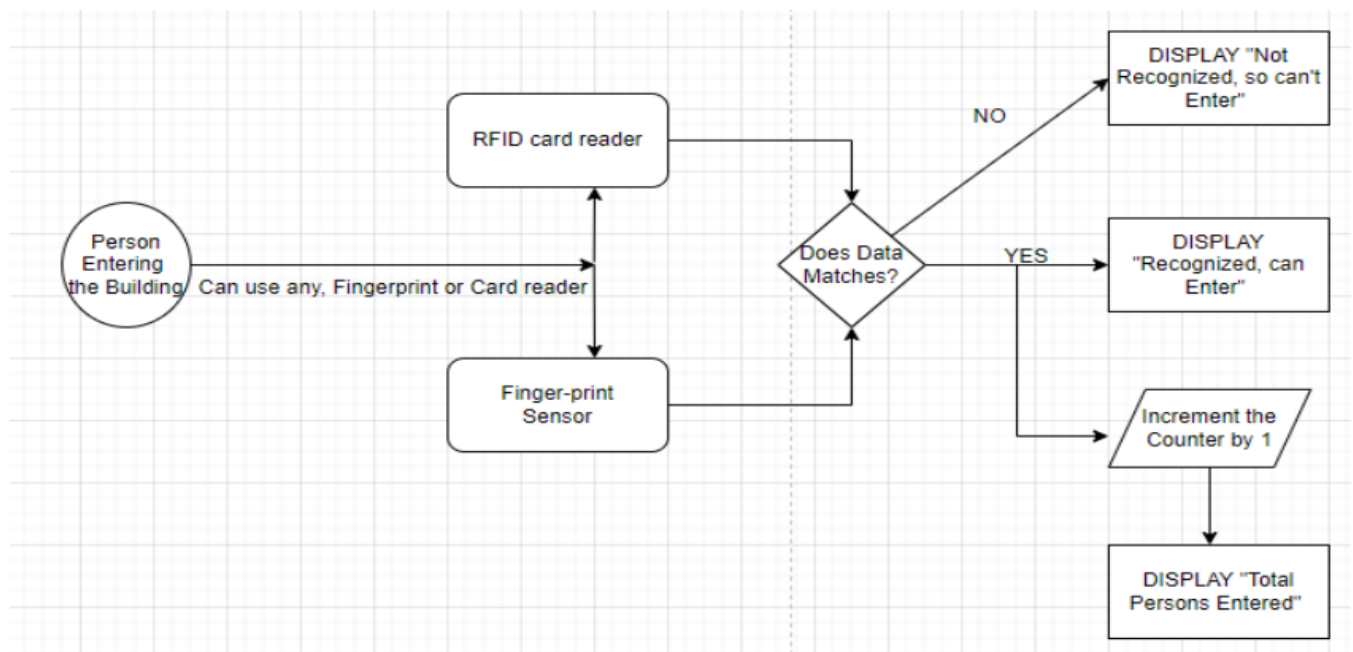
## **Equipment's used**

- ❖ RFID Reader
- ❖ Fingerprint Sensor
- ❖ O-LCD Screen
- ❖ Arduino IDE
- ❖ Arduino microcontroller
- ❖ Potentiometer

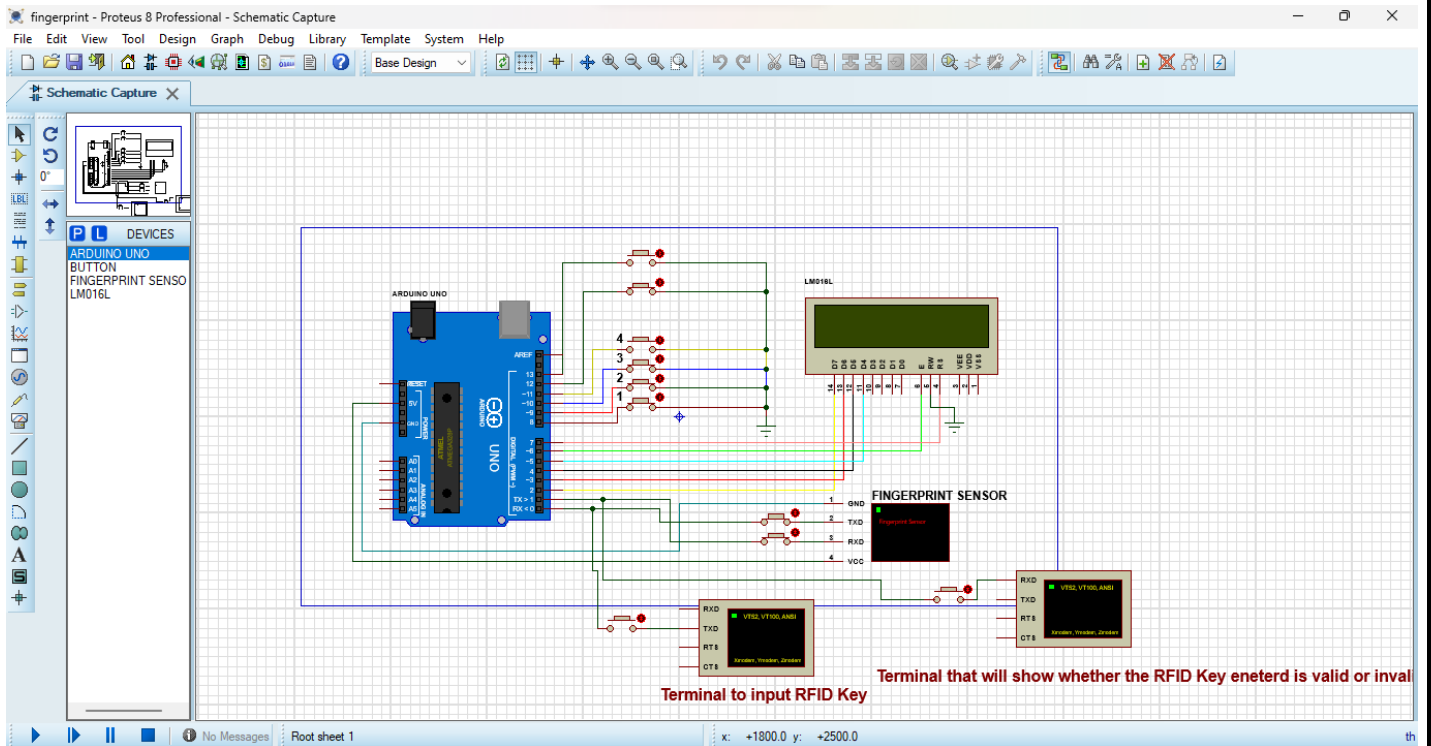
## INTRODUCTION

Access control is the process of verifying a user's claimed identity and giving or denying the access. The proposed project is a secure access control system to control the entry of various persons through a door or a passage using RFID technology and fingerprint sensor. At the very simplest level, Radio Frequency Identification (RFID) technologies allow the transmission of a unique serial number wirelessly, using radio waves. The two key parts of the system that are needed to do this are the RFID 'tag' and the 'reader'; attaching an RFID tag to a physical object allows the object to be 'seen' and monitored by existing computer networks. This project will use ID card as RFID tag and a RFID reader. This RFID system will be integrated with a software. A Fingerprint scanner is a type of electronic security system that uses fingerprint or biometrics as a key or a password to unlock gadgets, doors, confidential files, etc. The two main applications in fingerprinting are identification and verification. Every human being has a practically unique fingerprint that cannot be altered, which is why they are successfully used in identifying individuals. This project will use fingerprint sensor to detect the fingerprint and match it with those saved in the system. Then there will be a counter which will keep record of how many persons have entered in the building.

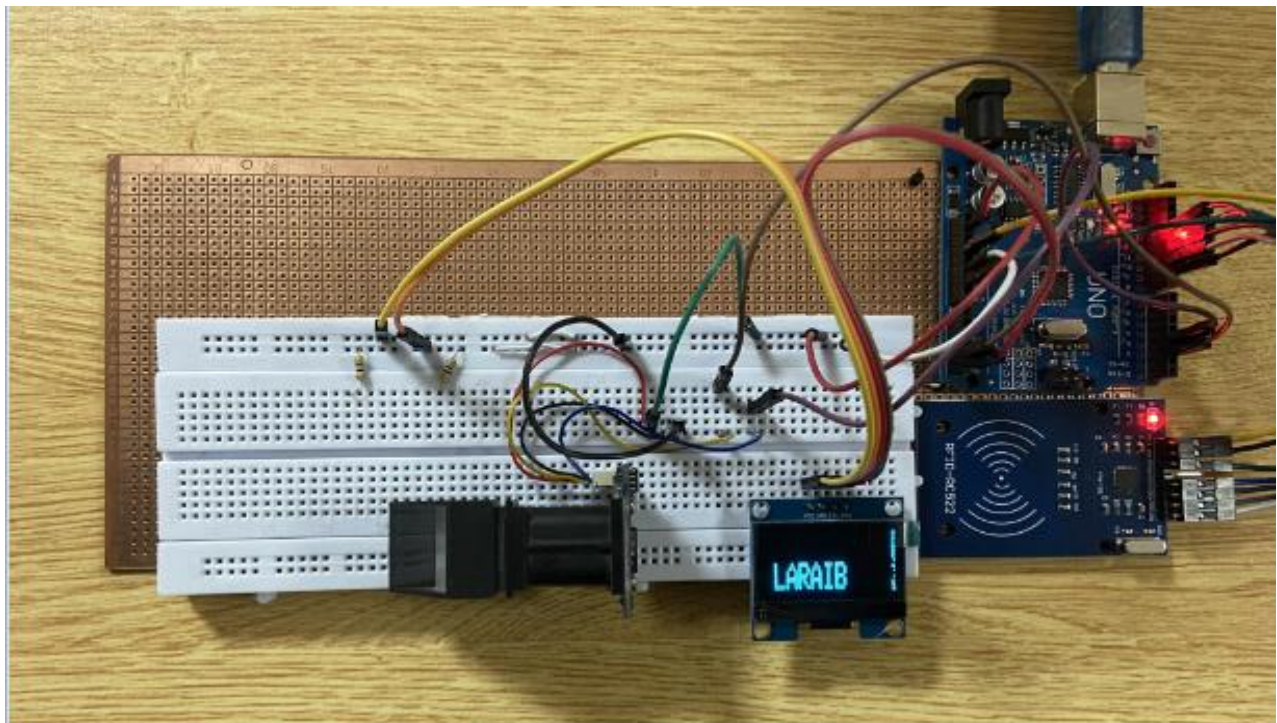
## FLOW CHART



## SIMULATION



## HARDWARE PROTOTYPE



## METHODOLOGY

The main component of this Project includes Fingerprint sensor, RFID card and Counter and OLED display. Through fingerprint sensor, it can scan the Finger of the persons and if the data of the person is already saved then he/she is allowed to enter the building otherwise he/she refused to enter. Also, if some person is unable to scan the finger due to any reason, then there is back up for entrance is the use of RFID card. This Project can scan the RFID card whose data is already saved. After the entrance, this project is also capable of counting the audience as counter is used and all the results can be saw via OLED display.

### ❖ Fingerprint Sensor

For this Project, fingerprint sensor of R305 module is used. This sensor has a built-in chip in which data can be stored. So, we scan our finger in front of Sensor and with the help of data, which is stored in the chip, identification of person can be noticed via OLED display.



### ❖ RFID

The RFID is Radio Frequency Identification which use radio waves for the detection. The RFID reader is a network-connected device that can be portable or permanently attached. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data. Actually, the RFID is a form of wireless communication that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person. For this Project we save the stored data in the **Arduino** for this RFID card. So, whenever user scans the RFID card then he/she is allowed to enter. Also, when its key chain is detected through the scanner then O-LED display show the negative result and denies the entrance.



### ❖ **Counter**

When the user is verified by either fingerprint sensor or by RFID scanner then the person is allowed to enter the building. Furthermore, counter is also used in this project which shows the number of persons entered in the building which will be display on OLED.

## **RESULTS AND DISCUSSION**

When we run our Project, it shows that saved fingerprints of our group members are scanned via fingerprint sensor and O-LED screen shows the “NAMES” of our group members and when non-member person scans his finger then O-LED screen show the “Access Denied” message. For those members, who are unable to scan their fingers due to any reason then there is option to Enter via RFID card. When RFID card was detected then permission was granted and when its key chain was detected then permission was denied. The number of persons entered the building can also be noted as counter was used, and its result can be seen via O-LED display.

## **FUTURE WORK**

We want to recommend to upcoming students that Firstly they should design the block diagram which will become convenient for the Hardware implementation. Also, they must check the equipment. Sometimes, we completed the circuit, we came to know that certain IC or Breadboard or other equipment is a faulty product then all our hard work becomes ruined.

We also recommend a work remained un-done that which specific person has entered in the building. Also, all the information about any person can be achieve at any time.

## **APPLICATIONS OF PROJECT IN OTHER FIELDS**

This Smart Building Entry System can be used at different locations. At Schools, it can play a very vital role in marking the attendance and specific students of departments can only enter the department. Similarly, this system can be used in different offices and plays the same role. This System can also be used at different Bus Stations and Train stations to check the capacity of busses and trains. Also, this system has ability to automatically authorized the persons so it can be used at different locations like Nadra, Airports etc.

## **CONCLUSION**

As we know simplicity is not quite simple. So, our project which looks like it is just to identify the person by scan RFID card or can use the fingerprint sensor and giving results has a lot of complexities to achieve all these results which are discussed above.

So, by making that we took an attempt to solve a real-life problem which is basic requirement of this course learning. It's a just a first attempt to that approach which is enhance-able according to new approaches like we discussed in recommended future work.

At conclusively saying that this project is not a work for my team at all we just enjoyed making this device which is very useful in daily life.

### **Contribution from each member:**

<b><u>Name</u></b>	<b><u>Contribution</u></b>
<b>Qazi Hamid Ullah</b>	Worked on Arduino Code and Proteus.
<b>Afif Arif</b>	Worked on Arduino Code and Proteus.
<b>Laraib Nadeem</b>	Implement the Project on Hardware.
<b>Muhammad Waleed Razzaq</b>	Implement the Project on Hardware.

## **References**

- ❖ <https://www.instructables.com/Electric-Door-Lock-With-Fingerprint-Scanner-and-RF/>
- ❖ <https://how2electronics.com/fingerprint-biometric-attendance-system-arduino/>



## **DEDICATION**

*We respectfully dedicate this effort to our beloved Lab instructor, Mr. Ali Khalid, for his unwavering advice and support during Instrumentation and Measurement. This is also dedicated to our Instructors, friends and classmates. Above all, we devote this to The Almighty, to Whom all wisdom and understanding belong.*

***We dedicate this Project to:***

***‘Mr. Ali Khalid’***

-----**THANK YOU!**-----

