GUJARAT TECHNOLOGICAL UNIVERSITY

Chandkheda, Ahmedabad

Affiliated

Gujarat Power Engineering and Research Institute

Mevad, Mehsana

A Project

Report On

RFID Based Entry Management System

Under subject of

DESIGN ENGINEERING - II

B. E. II, Semester - IV

(Computer Engineering Branch)

Submitted by:

Group Members:

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Prof. Harshad Chaudhary

(Faculty Guide)

Prof. Hasmukh Patel

(Head of Department)

Academic Year

(2014-2015)

Acknowledgement

We have taken Sincere Efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organization. We would like to extend our sincere thanks to all of them.

We are Highly indebted to **Gujarat Power Engineering & Research Institute** for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project and the Guidance from the Faculty Of computer Department **Prof. Harshad Chaudhary** and Our Head Of Department (H.O.D.) **Prof. Hasmukh Patel** who constantly Supported Us through all the Guidance related to Project of RFID Based Entry Management System.

Without Our Team spirit and contribution this project would not be possible.
We would like to express our special gratitude and thanks to External Examiner for giving me such attention and time.

Our Thanks and appreciations also goes to our colleague in developing the project and people who have willingly helped us out with their abilities.

GROUP INTRODUCTION:

TEAM NAME: - "EAGLE FIVES".

1. **PARTH N. PATEL**

   Parth is a computer Engineering Student of GPERI. His Interest is in Computer Tweaks and Working of Computer. He loves to code. He is Enthusiastic about Web Designing and Development. He is running a Website "DgComp.in". His Hobbies are to play table-tennis and getting Knowledge about Technologies. He has done many Projects like, Home and Industry Automation, Touch Table using I-R sensing Technology.

2. **MONISH SONI**

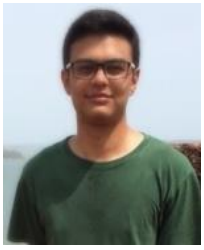
   Monish is A Computer Geek and simple guy Loves Around to be Nature and Be always Trying to Connect the Dots of Humanity With the Technology at this Cutting Edge of Revolution. He loves to Play Football and Cycling. His Specific Fields of Interest in Computer Science is Networking, Hardware and Multimedia Animation.

3. **SURAJ SHUKLA**

   Suraj is Computer Student of GPERI. His Hobbies are Swimming and Listening Songs. His specific Related Interest in computer is to code. He had Work on several Projects on Coding from the School and Contests. He also loves to work on embedded system and related to electrical system designing.

4. **VANDAN SHAH**

   Vandan Is a Code Aspiring Student of Computer Department Who Loves to Create New Things and Built the Innovative things .He loves to Play Badminton and also Play Cricket sometimes. Vandan loves doing maths and computer related software testing.



5. **SAMARTH PATEL**

   Samarth Is Computer Student of GPERI Who loves to Organize and Management the Computer Things and Play Hand fully with the Stuffs and Latest Technology Related Current Affairs. His Favorite Sports are Football and cricket. He wants to be a professional Engineer of a Big Software Company.

- **PROF. HARSHAD CHAUDHARY(**GUIDE**):-**

  He is Our Professor of Computer Department at GPERI.He is Very helpful and Kindly Nature of Person who is Enthusiastically Believing in the Technology and Computer Related Innovation and New creative Ideas. He is Person who loves to Code and Made and Effective Contribution towards a Project for making Automatic Rod bending Machine.

Index:

RFID Based Entry Management System (VISION):

Abstract

WHY WE DECIDE TO DO THIS PROJECT?

- We the Students of Computer Department have something ambitious from the Beginning to do In the Field of Computer regarding some Innovative or Creative Idea which could be helpful in making the Future Bright and be helpful For the Other Peoples of the Society Out There.
- As the fast access to the information is the main issue in the field of computer engineering we was try to do the same with the recent technology.
- We get to know about the technology called RFID (Radio Frequency identification) which can provide the unique identification to the person having tags and could access the system resources without involving of the hard copy register maintenance. We could also merge some other technology into the existing once and can build some more reliable, efficient, easy to use, and more powerful system in near future that's why we have decided to do so.

WHY IS THIS RESEARCH IMPORTANT?

- This research might be proven quite useful for the different private and government sectors like, educational institute, library, gamming center, cyber cafes, government information Centre, etc.
- This all sector mainly include the public interference and might be use full for making the bright future of the society that why this research is important.

WHY SHOULD SOMEONE READE THIS ENTIRE REPORT?

- This report includes the Overview of Our RFID Based Entry System. We are helping organisations and Individual to provide easy access for their Systems and implement better and more cost-effective solutions.
- It Also Include about the working of RFID Based Entry System which is helpful for maintaining entry log and browsing history of individual persons and also will reduce the man power for log register for making entry of the individuals.

AIM:-

To make an **entry system** which **uniquely identify** the person**, assign pc automatically** in the laboratories, **maintain the log** and **browsing history** of individual person which **prevent unauthorized account access** and require **less man power**.

OBJECTIVES:-

1. Error free tag identifier detection
2. Easy scalability to incorporate more records
3. Integrity and security in data storage
4. Easy Log Maintenance.
5. Avoid unauthorized access login.
6. Less supervision required.

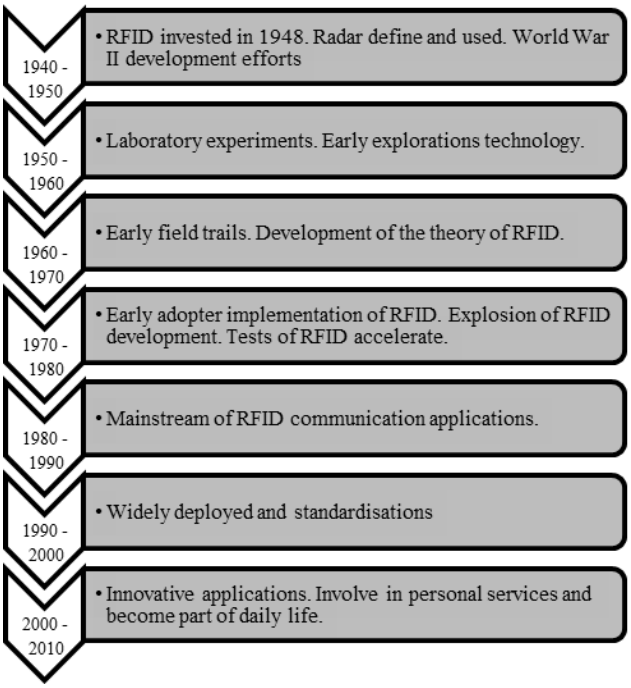
Introduction to RFID:

Radio-frequency identification (**RFID**) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects.

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.

RFID comes under Automatic identification technology which uses radio-frequency electromagnetic fields to identify objects carrying tags when they come close to a reader. RFID uses several radio frequencies and many types of tag exist with different communication methods and power supply sources.
RFID tags generally feature an electronic chip with an antenna in order to pass information onto the interrogator (also known as a base station or more generally, reader). The assembly is called an inlay and is then packaged to be able to withstand the conditions in which it will operate. This finished product is known as a tag (transponder).
The information contained within an RFID tag's electronic chip depends on its application. It may be a unique identifier (UII, Unique Item Identifier or EPC code, Electronic Product Code, etc.). Once this identifier has been written into the electronic circuit, it can no longer be modified, only read. (This principle is called WORM-Write Once Read Multiple). Some electronic chips have another memory in which users can write, modify and erase their own data. These memories vary in size from a few bits to tens of kilobits.

Evolution of RFID Technology



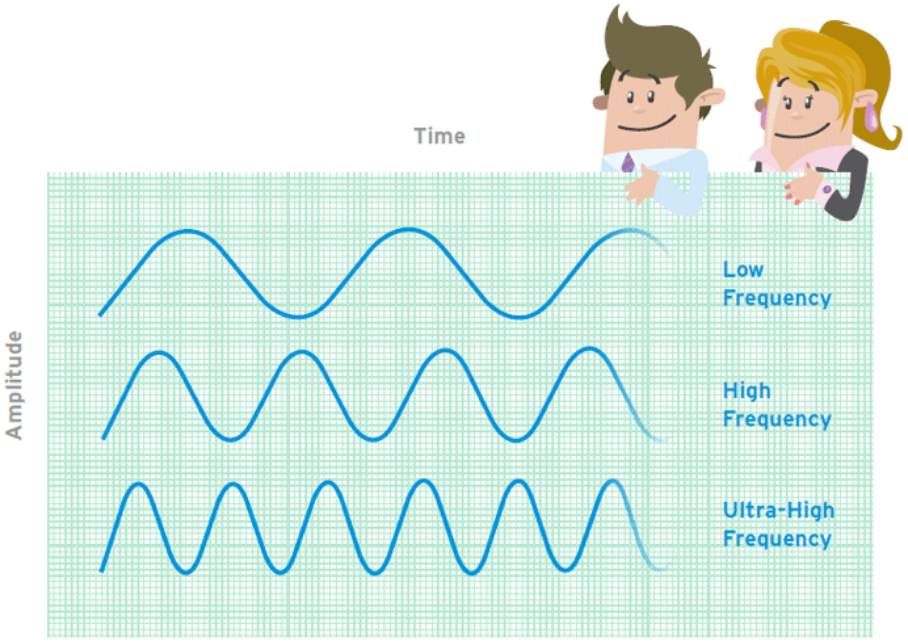
In 1945, Léon Theremin invented an espionage tool for the Soviet Union which retransmitted incident radio waves with audio information. Sound waves vibrated a diaphragm which slightly altered the shape of the resonator, which modulated the identification tag, it is considered to be a predecessor of RFID, because it was likewise passive, being energized and activated by waves from an outside source.

Mario Cardullo's device, patented on January 23, 1973, was the first true ancestor of modern RFID, as it was a passive radio transponder with memory. The initial device was passive, powered by the interrogating signal, and was demonstrated in 1971 to the New York Port Authority and other potential users and consisted of a transponder with 16 bit memory for use as a toll device. The basic Cardullo patent covers the use of RF, sound and light as transmission media. The portable system operated at 915 MHz and used 12-bit tags. This technique is used by the majority of today's UHFID and microwave RFID tags. The first patent to be associated with the abbreviation RFID was granted to Charles Walton in 1983.

Types of RFID Tags & Receiver (Reader):

1. RFID Tags(A transponder):

RFID systems can be broken down by the frequency band within which they operate: They are also two broad categories of RFID systems-Passive and active.



	LF	HF	UHF	VUHF
Frequency Range	125 KHz – 134 KHz	13.56 MHz	850 MHz, 930 MHz	2.45 GHz – 5.8 GHz
Distance	< 1 ft.	1-3 ft.	3-25 ft.	5-90 ft.
Standards	ISO 11784 ISO 11785 ISO 14224	ISO 14443 ISO 15693 IS0 18000-3	ISO 18000-6 EPC Gen2	ISO 18000-4 IEEE 802.11 IEEE 802.15.4

TYPES

Thus We Have Categorized RFID Tags in Mainly Three Types:-

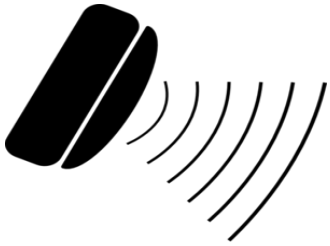
1. Active Tags

2. Passive Tags

3. Semi-Passive Tags (Battery-Assisted Passive Tags)

	Active RFID	Passive RFID	Battery-Assisted Passive (BAP)
Tag Power Source	Internal to tag	Energy transfer from the reader via RF	Tag uses internal power source to power on, and energy transferred from the reader via RF to backscatter
Tag Battery	Yes	No	Yes
Availability of Tag Power	Continuous	Only within field of reader	Only within field of reader
Required Signal Strength from Reader to Tag	Very Low	Very high (must power the tag)	Moderate (does not need to power tag, but must power backscatter)
Available Signal Strength from Tag to Reader	High	Very Low	Moderate
Communication Range	Long Range (100m or more)	Short range (up to 10m)	Moderate range (up to 100m)
Sensor Capability	Ability to continuously monitor and record sensor input	Ability to read and transfer sensor values only when tag is powered by reader	Ability to read and transfer sensor values only when tag receives RF signal from reader

2. RFID Antennas (Reader) :

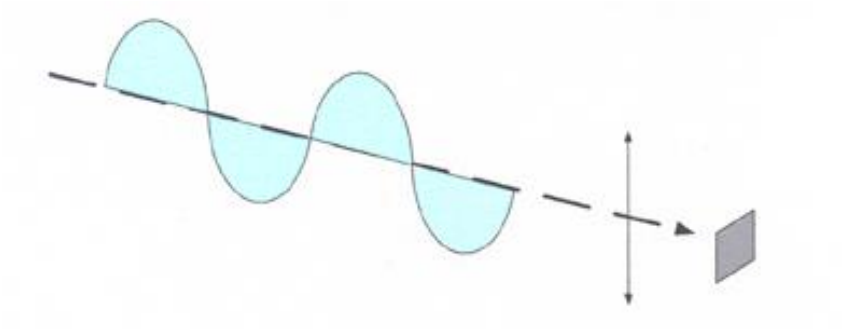


The RFID reader antenna transmits a wave that has both electrical and magnetic properties and is known as an electromagnetic wave.

There are 3 different types of RFID antennas:

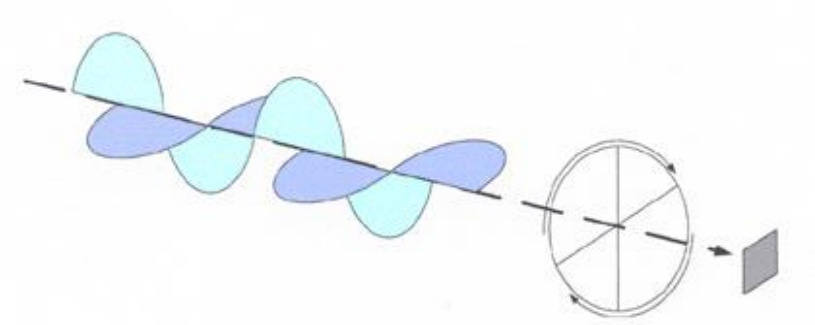
A. Linear Polarization (dipole antennas)

- The electromagnetic wave propagates entirely in one plane (Vertical or Horizontal) in the direction of the signal propagation. This is the best wave propagation when the tag orientation is known and fixed. The RFID antenna and RFID tag should be matched in polarization to obtain the best read rates.



B. Circular Polarization (helix, crossed dipoles and patch)

- The electromagnetic wave propagates in two planes creating a circular effect (like a corkscrew) making one complete revolution in a single wavelength timeframe. Since the RFID antenna continuously emits a wavelength the rotational field will eventually cover any tag that is in its path. This is best to use when tag orientation is unknown, but you lose at least 3dB when compared to a linear polarized antenna. Circular polarization can be right or left handed hence the RHCP and LHCP options for circular polarized antenna.



C. Monostatic Circular or Bistatic Circular

- Monostatic is the most common RFID antenna and uses a single common port to transmit and receive signals they can be 1, 2 or 4 port readers. Sometimes there is also an LBT (Listen Before Talk) port making it a 5 port reader. On the monostatic readers the port transmits first and then receives signals on the same port.
- Bistatic uses 2 RFID antennas in the same physical housing and uses one port to transmit and the other port to receive usually have 8 ports - 4 transmit and 4 receive so that each port is always active either transmitting or receiving signals.

RFID Technology Based Applications:

-Library Management.

-Car Parking System.

-Attendance Management.

-Home Automation.

-Toll Booth System.

-Exam Hall Attendance Management.

-Student Attendance Management System.

-Many countries have started using RFID chips in passports.

-Tags in clothing, Sealing for containers (for the shipping industry).

-Identifying animals, used for tracking pets.

-Contactless identity cards.

-Transponder timing of sporting events.

-Security and access control system.

APPLICATIONS

RFID Components:

1. **RFID Tags (A transponder):**

   We have Used Here the Passive RFID Tag. Passive tags have no battery. Instead, they draw power from the reader, which sends out electromagnetic waves that induce a current in the tag's antenna. Passive RF tags obtain operating power generated from the RF reader. They are smaller and lighter than active tags but have a shorter communication range and require a high powered reader. Passive tags are generally read-only and as such, once it is programmed with data, that data cannot be modified.

2. **RFID Antennas (Reader) :**

   The antenna is medium through which the tag and reader communicate with each other. It antenna can activate a passive tag and transfer data by emitting wireless impulses that has electromagnetic properties. The reader is the most fundamental part of the RFID system. It reads raw data from the tag and transmits it to the Middleware for further processing. The reader attempts to interrogate the tags at varying frequencies. The reader communicates by transmitting a beam of impulses, which encapsulate commands to the tag and listens for the tag's response. The reader also contains built in anti-collision processes, which allows the reader to read multiple tags simultaneously. The reader is connected to the computer for data processing via a USB cable or over a wireless connection.

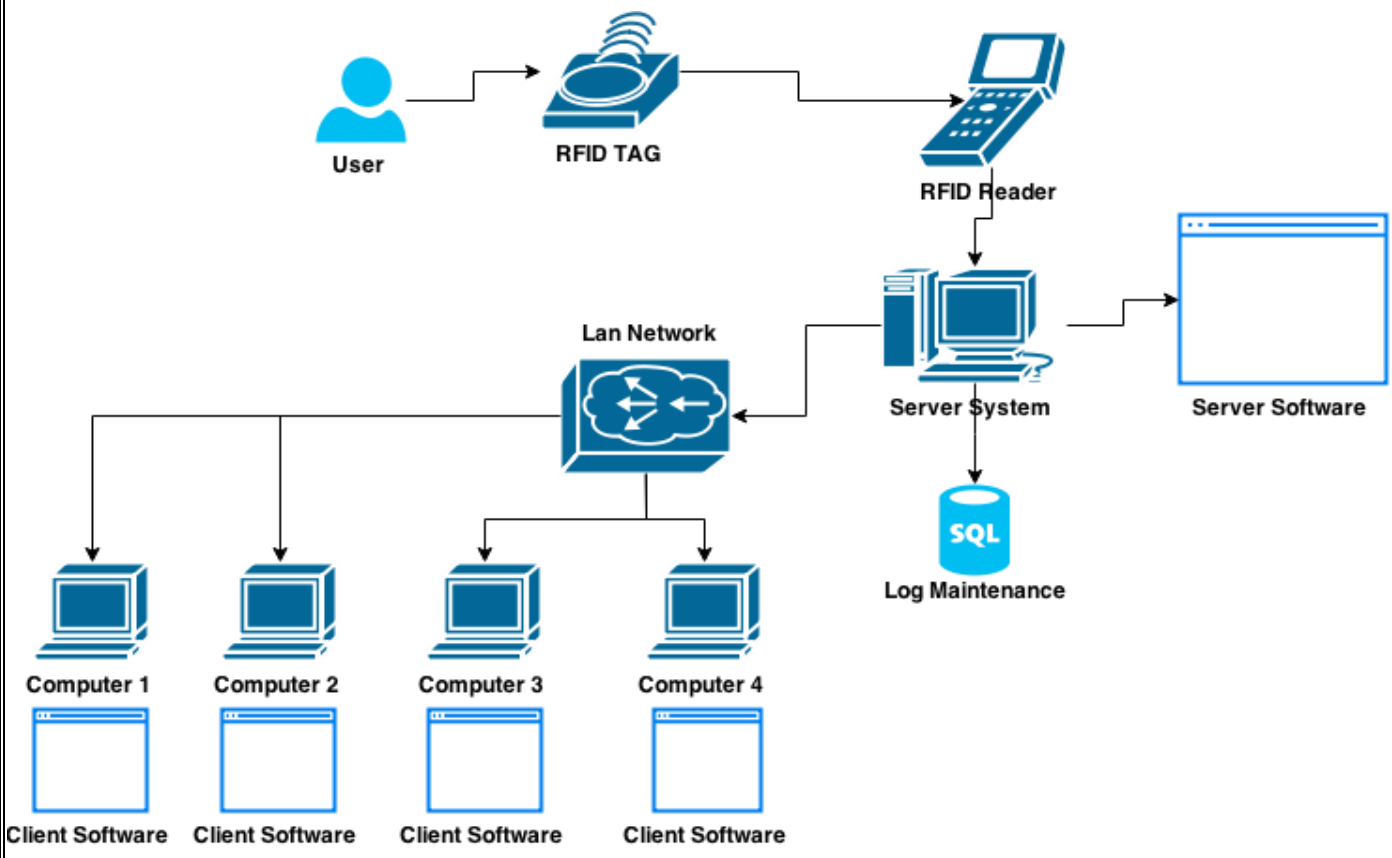
3. **Middleware :**

   The middleware is an interface required to manage the flow of data from the reader and to transmit it efficiently to the backend database management systems. The middleware Monitors the number of tags present in the system and extracts relevant information from the readers.

4. **Backend Database :**

   The backend database primarily deals with the storage of relevant information recorded by the reader and communicated by the middleware. For example, the middleware in an automated security control system will store all tag readings taken by the reader in the database. This helps create log entries for the system.

RFID System Flow Diagram:



Working of System:

- As we can see from the above flow diagram, our system is mainly implemented at any computer laboratory or some places where we have to manage the sitting area of computers.
- System mainly include that, we have to give a RFID Tag to each student/person at the institute/firm.
- When someone came at the laboratory for using computer system, he/she has to swipe his/her RFID card at the server system places at the gate of the laboratory.
- Now, System will automatically detected that card and give proper output through server software.
- Output of the system will be the Computer Number where we have to sit.
- Now, client software will be automatically configured or set to the person's unique code, he/she has to give his private password for login to the system.
- At the time the person get logged in Client System note down the exact time and date of login.
- Now onward system will keep the log of activity.

WORKING

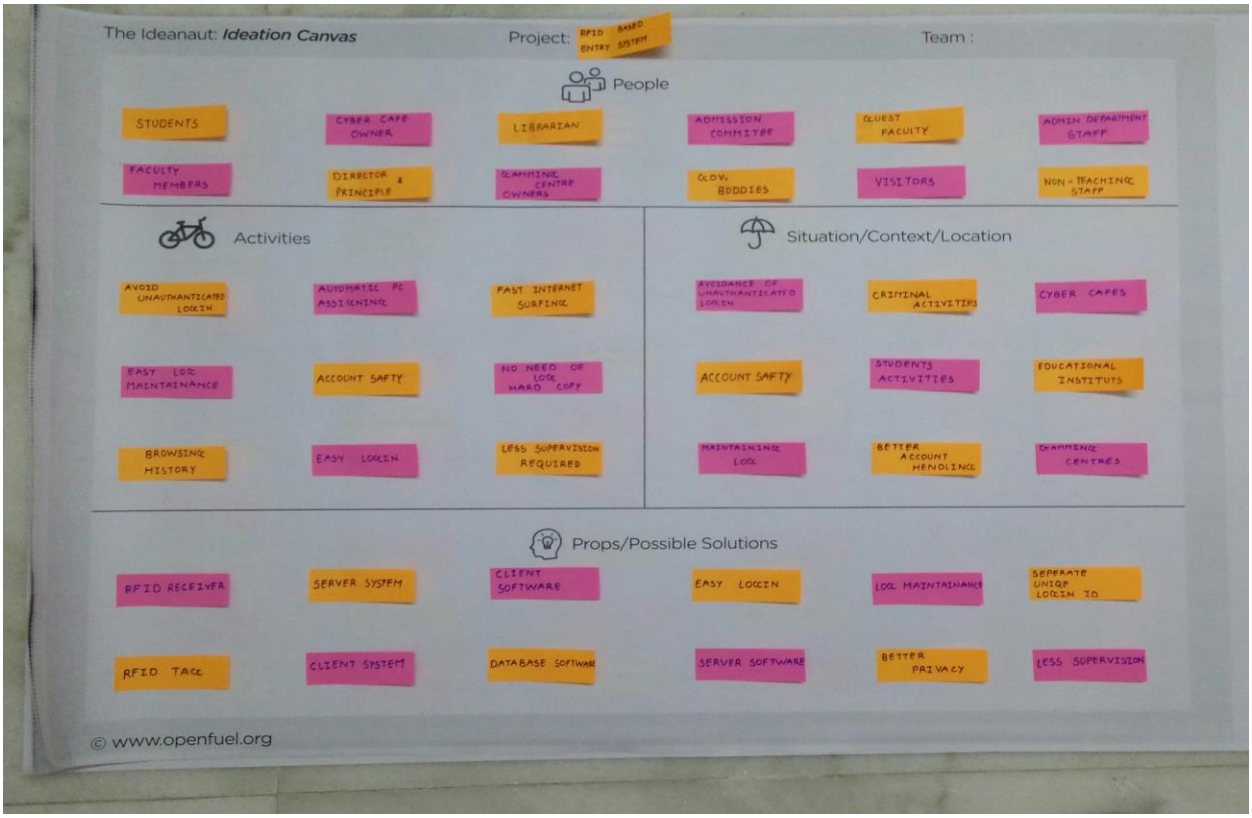
Conclusion and Future Work:-

- So As per this prototype and the working flow of the system we can create a basic entry management system for the Computer laboratory.
- In near future we are going to implement this prototype on the institute computer laboratory.
- After successful attempt of that we are going to implement so more new feature on that system.
- Feature like, SMS/Email alert.
- We will wide our definition of the project form rather than just focusing on the computer system entry management, we will do different project like library management, toll both management, etc.
- We will develop our own software for the system which will include all the feature as per the requirement of the firm.

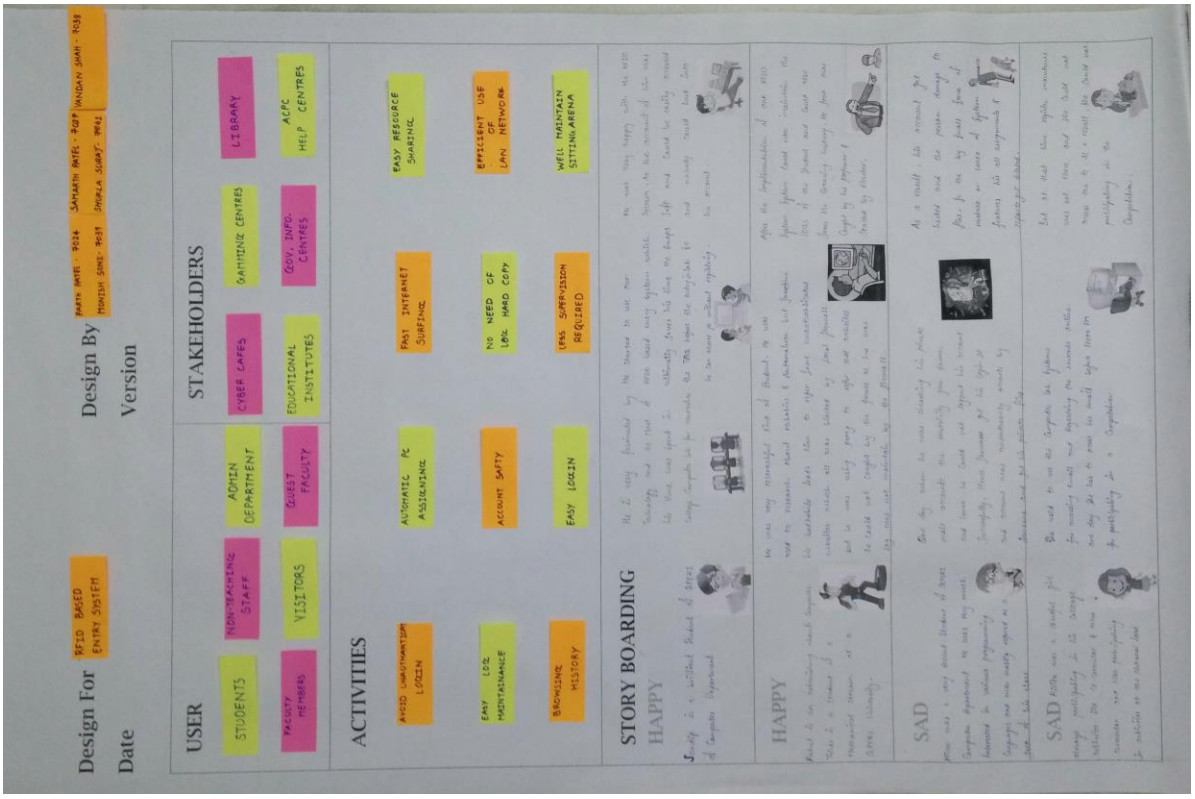
FUTURE WORK

Full canvas Images:

Ideation canvas:

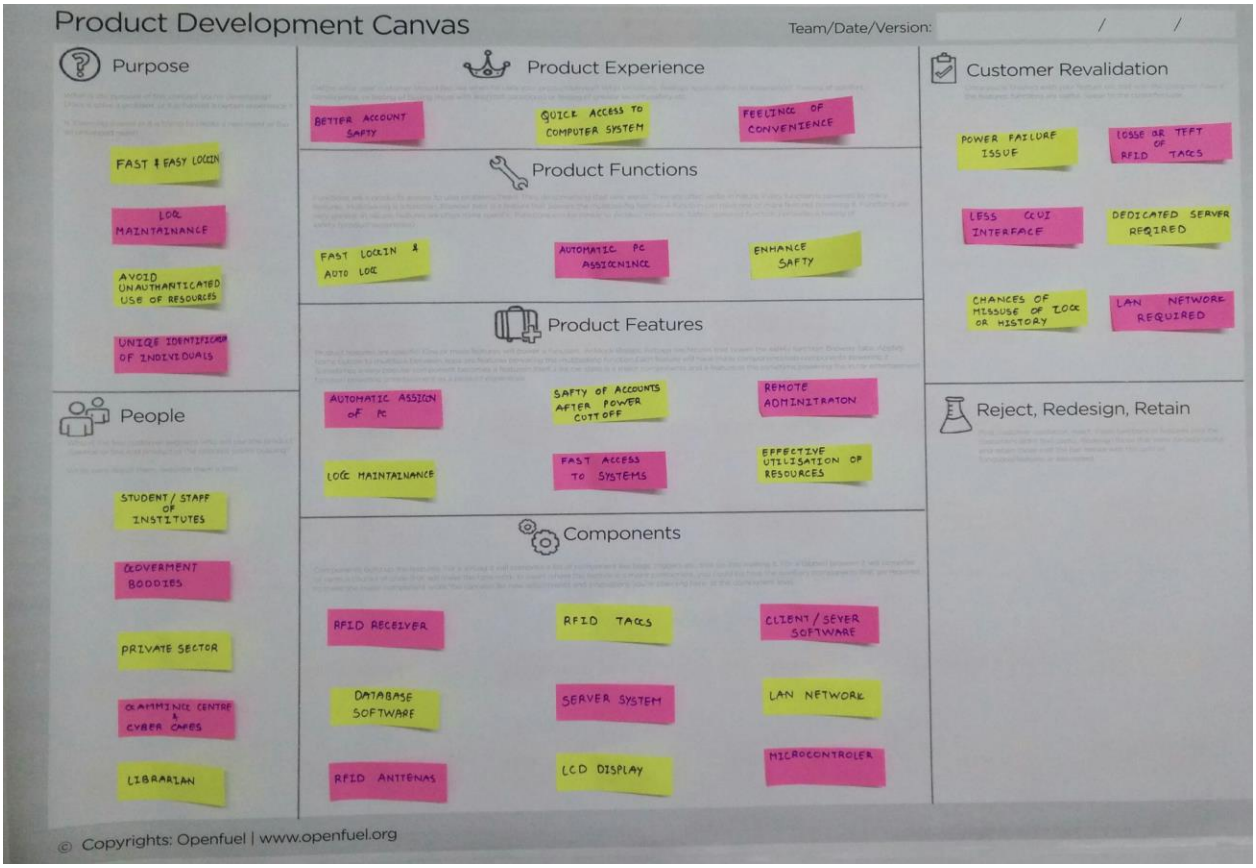


Story Boarding canvas:

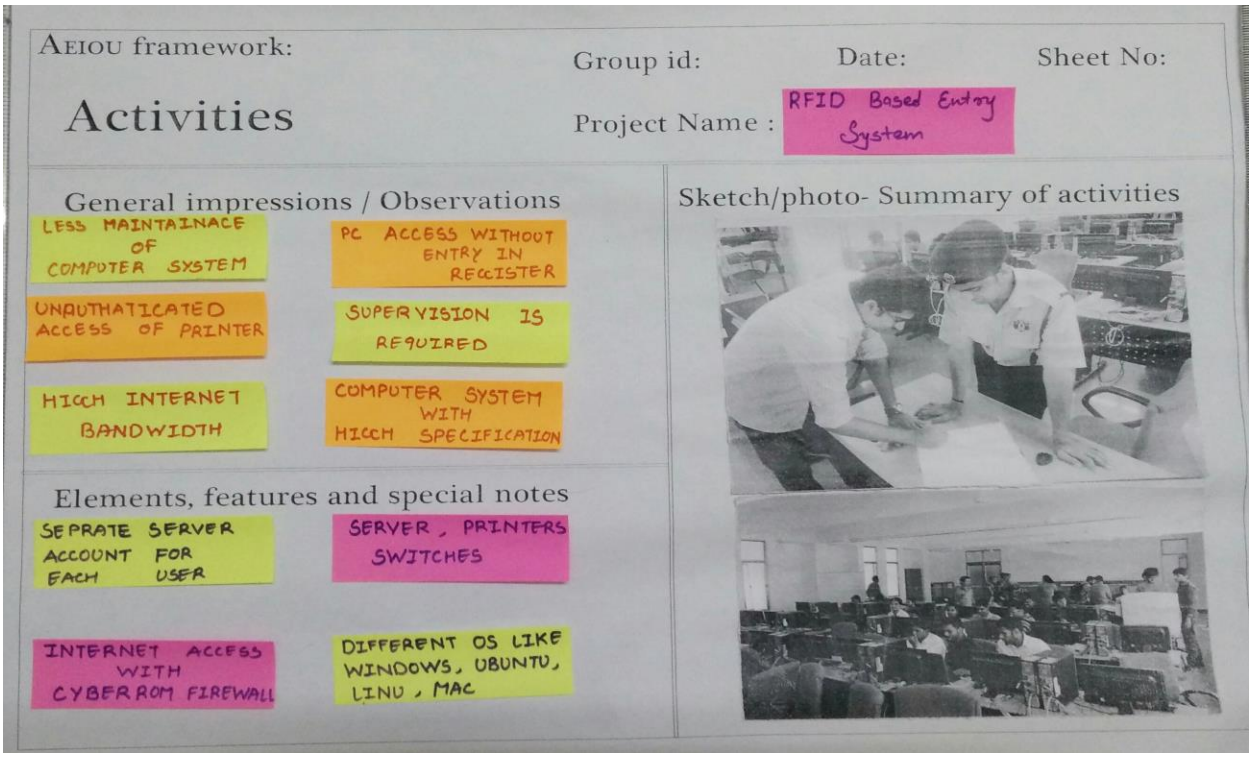


CANVAS IMAGES

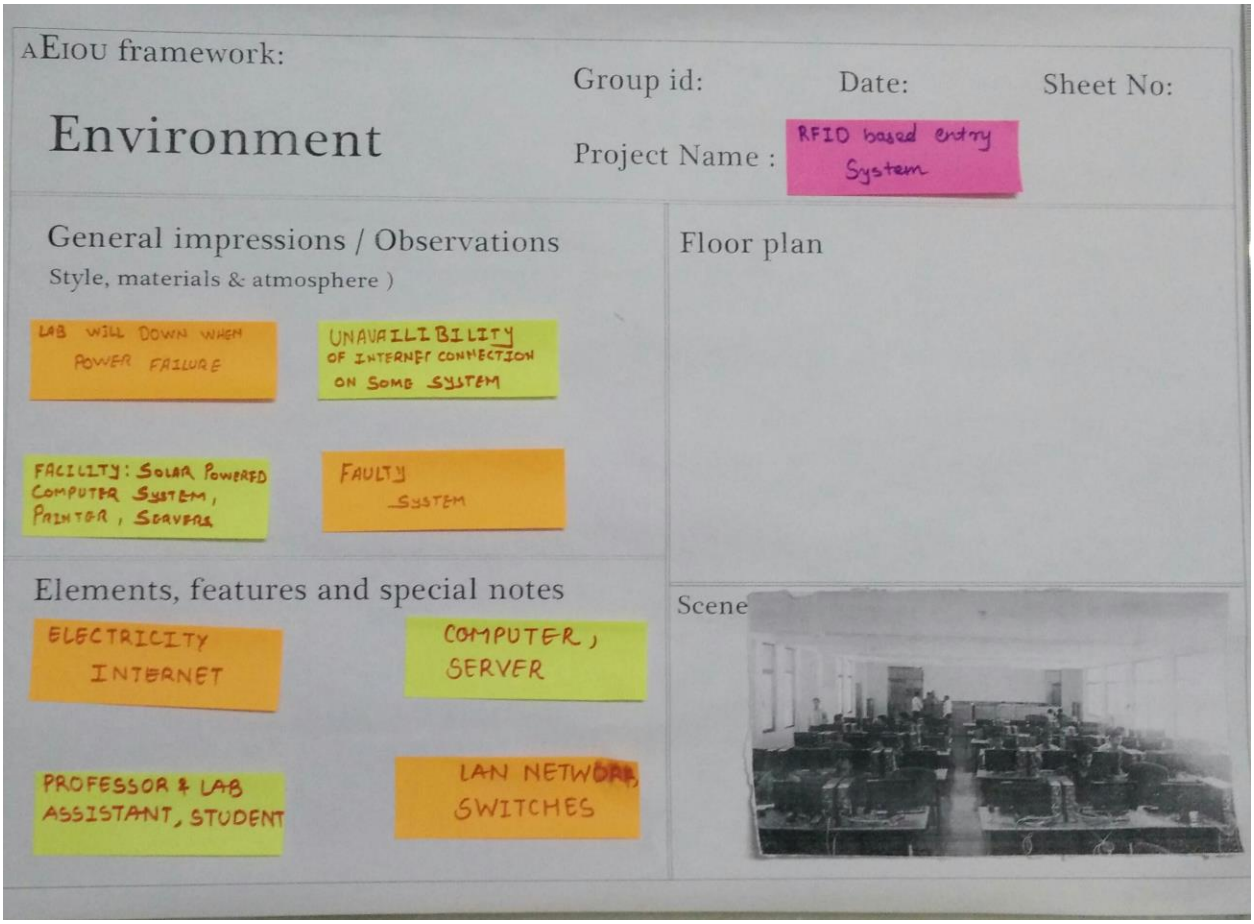
Product development canvas:-



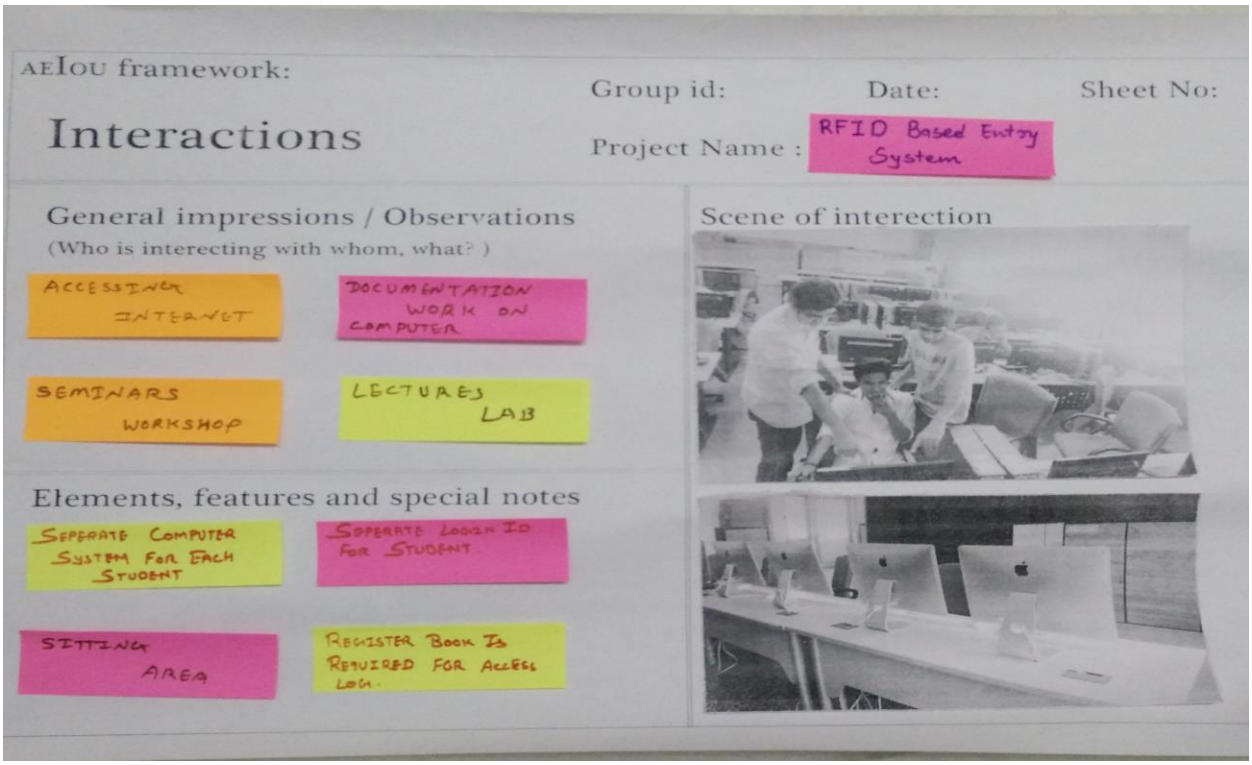
Activity canvas:-



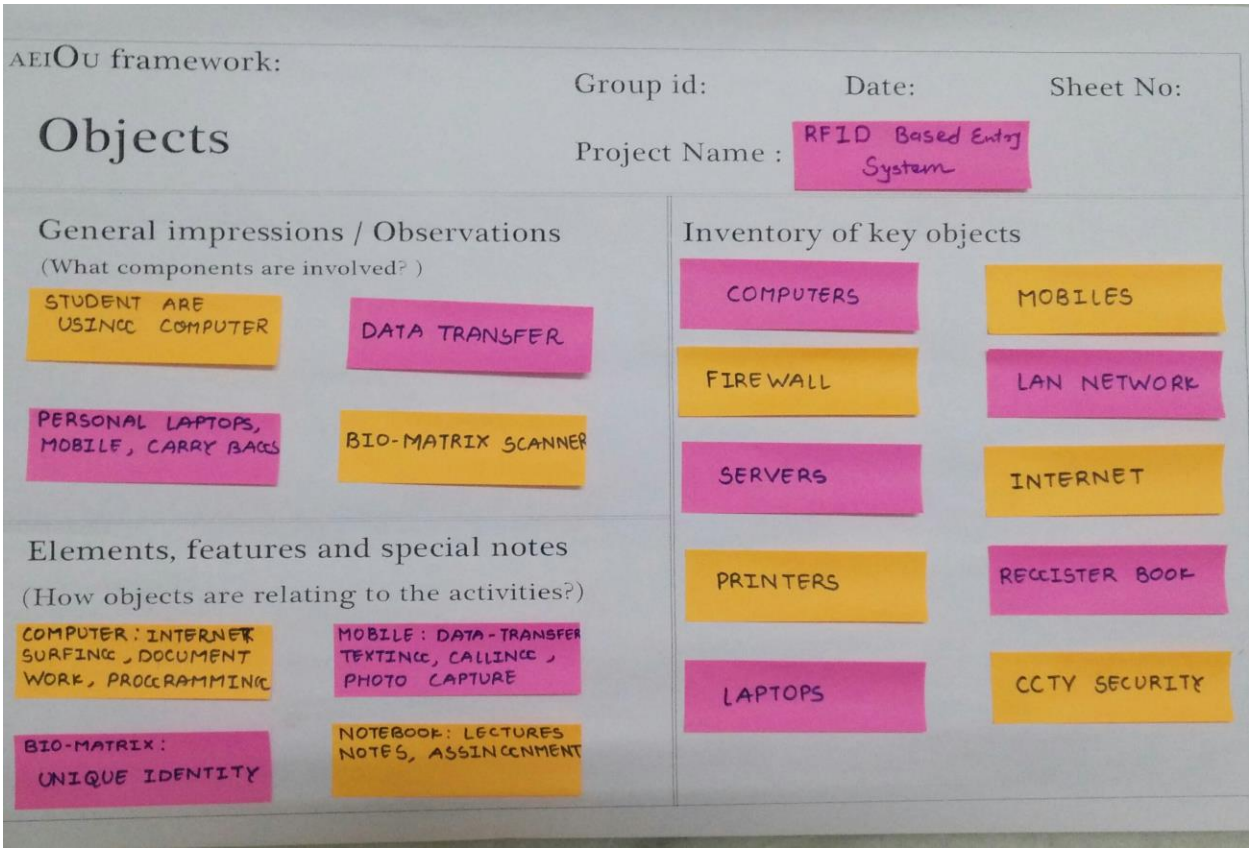
Environment canvas:-



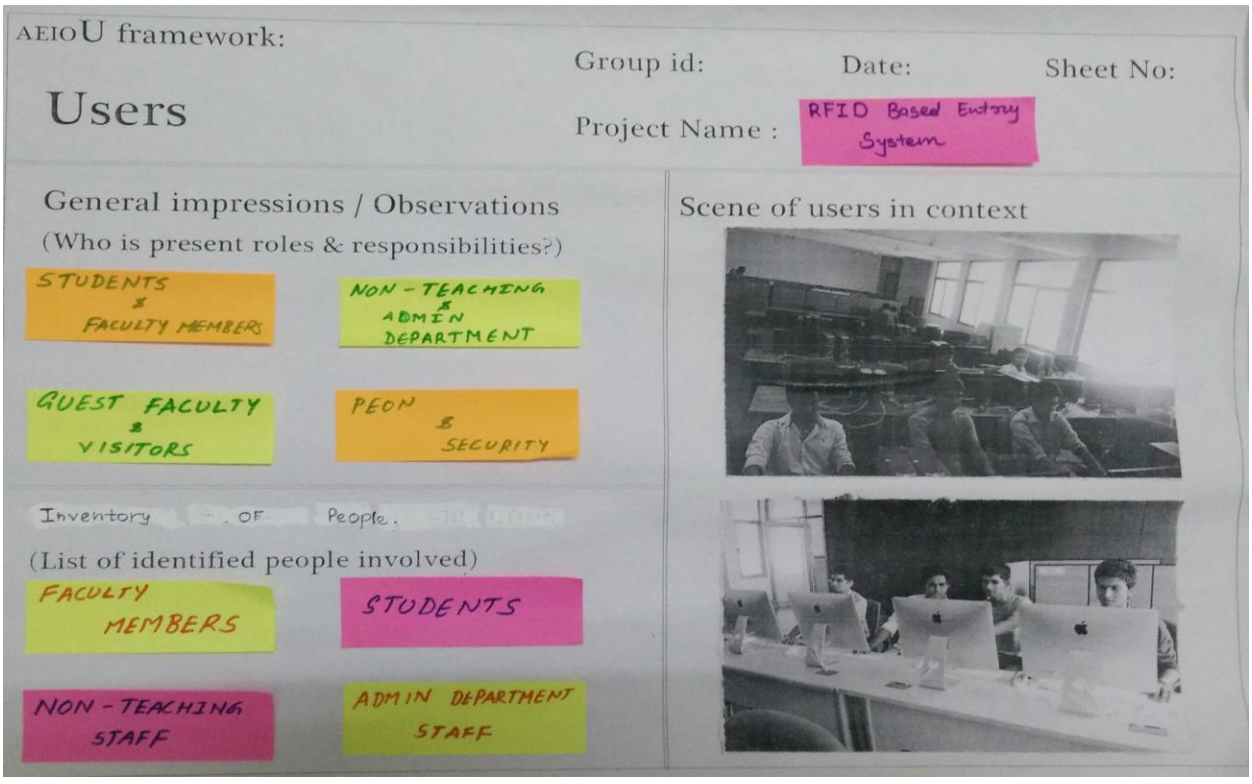
Interaction canvas:-



Object canvas:-



User Canvas:-



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