Chapter 1 Introduction

1.1 Problem Summary and Motivation

In today's world security is one of biggest aspect people look forward to whether it's their family members protection or their precious valuables protection. After having so many elementary solutions to the security problems,(like Intrusion Alarm, Hold-n-panic Alarm, CCTV etc.) there are lot of robbery reports been filed daily. To improve the situations we have come up with new idea to protect your valuables.

Introduction

"Obscure Lock" is designed and developed for the betterment of jewelry showrooms. This system provides virtual lock mechanism which can be used in locker/block/safe of showroom with augmented reality mechanism. Another feature is weight sensing facility with which we can calculate the weight inside the locker by IOT mechanism.

1.2 Aim and Main Objectives of the Project

We aim to create a system which is more safer than the existing systems. That led the emporium to become a better and safer place that ensures complete safety of their valuables.

We have come up with solution "OBSCURE LOCK"

The main objectives of this systems are as follow:

- **Obscure**: The system is invisible to the surroundings. There are some particular users been defined by the owners of the emporium to whom this is visible through there gadgets .
- **User Authentication**: Every individual who is a part of the system is provided with a user substantiation password which is noticeable only when user keep their mobile phones facing the walls.
- **Scanning**: When a particular individual whose is a responsible handler of the system keeps there mobile facing the walls a scanning takes place to examine the wall is under the surveillance of our system.
- **Weighing Technology**: Once a user tries to keep something or take out anything from the safe weight of the safe is calculated and recorded each time.

Assumption and Dependencies

The assumption made to execute the core idea are:

- The staff members will have a smart phone
- The showroom/area where the locker is kept is having a Wi-Fi connection.

Multiple Locking Mechanism

- Each safe has a separate lock mechanism system where each lock system is given a unique locker id and the system will analyse the locker id accordingly.
- The locker id respective to the locker will be consulted in the database and the pin in regards with that locker will be used to open that locker.
- Each safe is absolutely independent of the other accept the fact that they are assigned a locker.

Chapter 2 Literature survey and proposed solution

2.1 Literature Survey

We find out the literature for the virtual lock related android application and study that literature for reference. We studied about the various virtual reality mechanism , IOT and blockchain and use patent for reference.

The existing systems and technologies provide smart door or wireless door mechanism. We studies these existing technologies to get knowledge and came up with a different idea of the obscure lock.

Virtual reality is used in creating the lock mechanism whereas IOT is used for weight sensing.

2.2 Problem Description

- In today's world security is one of biggest aspect people look forward to whether it's their family members protection or their precious valuables protection.
- After having so many elementary solutions to the security problems,(like Intrusion Alarm, Hold-n-panic Alarm, CCTV etc.) there are lot of robbery reports been filed daily.

HISTORY OF SECURITY SYSTEM

- Lock and Key (mid 1800's by Linus Rale)
- Electric locks (1976 by Tor Sornes)

CURRENT SCENARIO

- Intrusion Alarms
- Hold up/Panic Alarm
- Video Surveillance and Recording System
- Access Control System
- Door Sensors.

2.3 Proposed Solution

The “Obscure Lock ” is an augmented reality-based application which helps emporium possessor to embed the best of security to their stores with a virtual lock mechanism. Thus this system will provide an invisible virtual lock mechanism which will be more secured as compared the current security system.

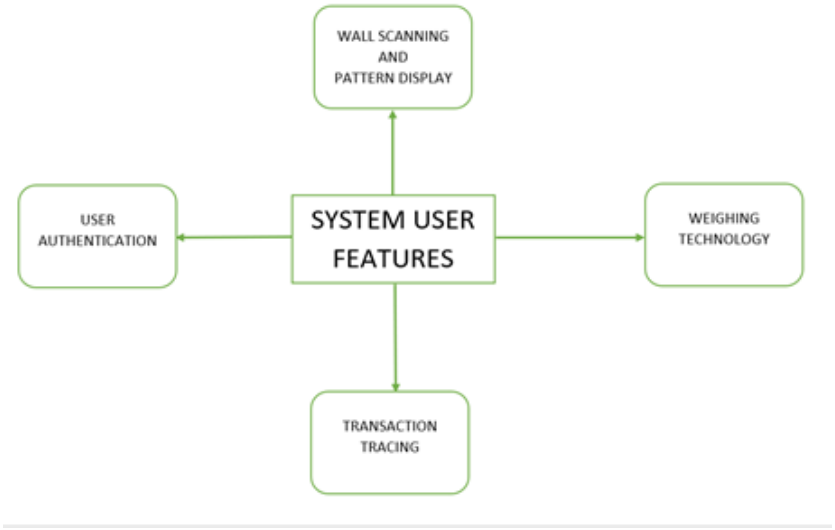

Figure 1: Modules

3.1 Requirement Analysis Model

All diagrams in requirement analysis part are draw using Unified Modelling Language (UML) constructs.

3.1.1 Types of Actors

The actors associated with the Obscure Lock system are classified mainly into multiple categories:

- Staff Member
- Mobile Device
- Locker
- Owner

USE-CASE diagram:

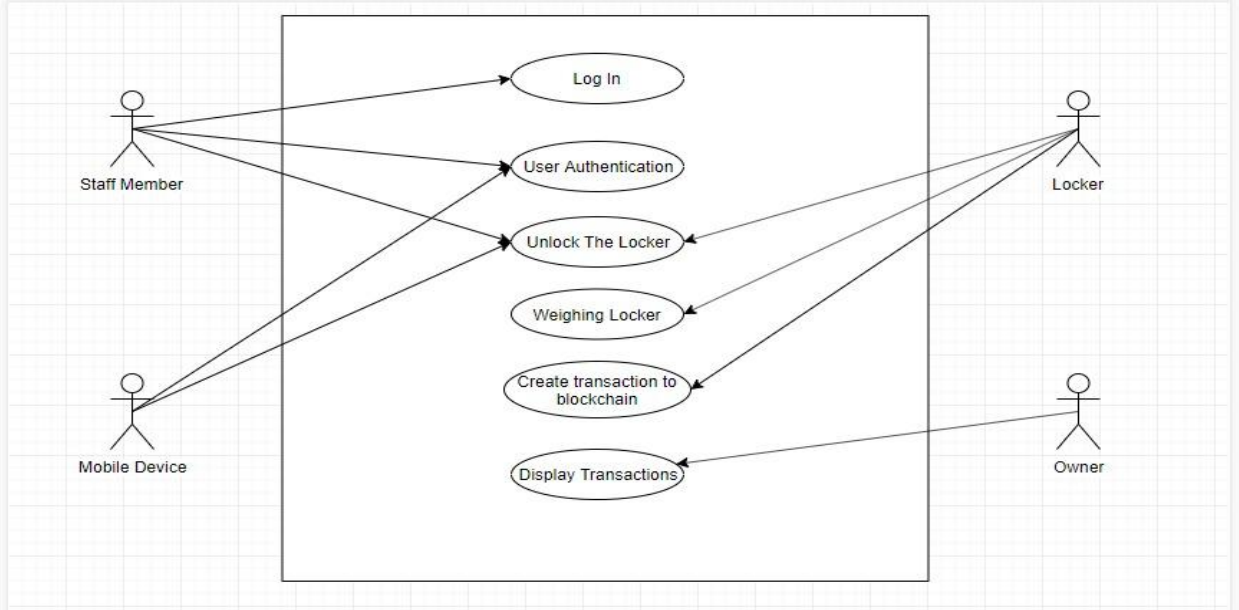

Figure 2: USE-CASE diagram

Class diagram:

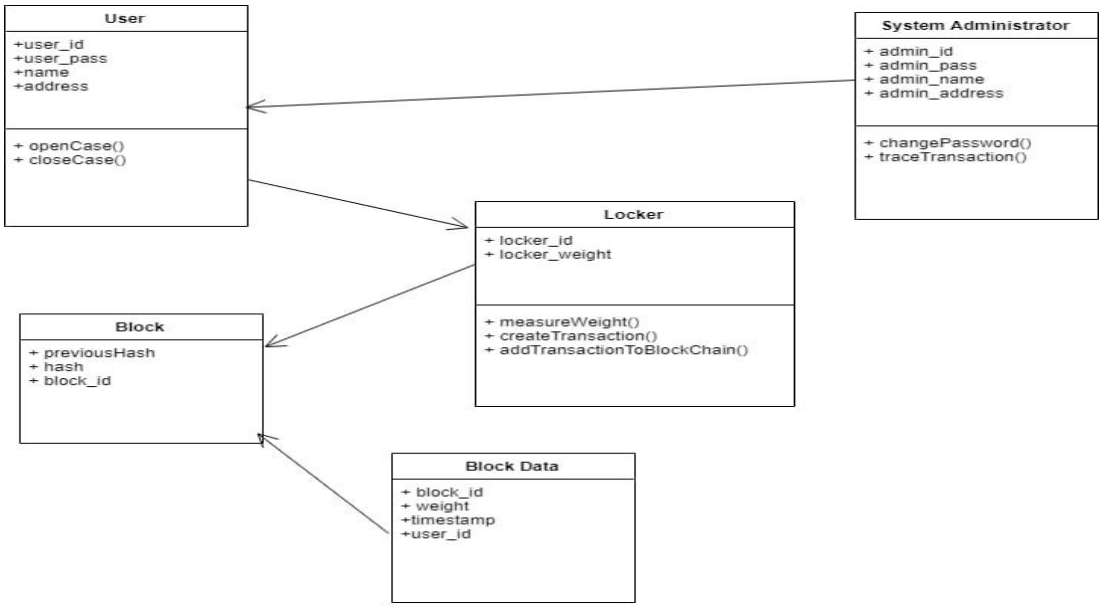

Figure 3: Class Diagram

Activity Diagram:

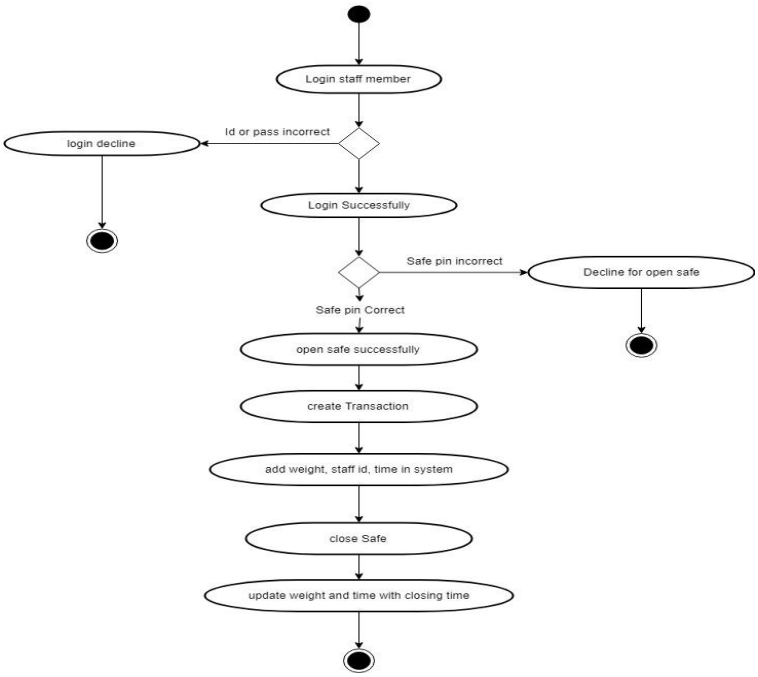

Figure 4: Activity Diagram

Sequence Diagram:

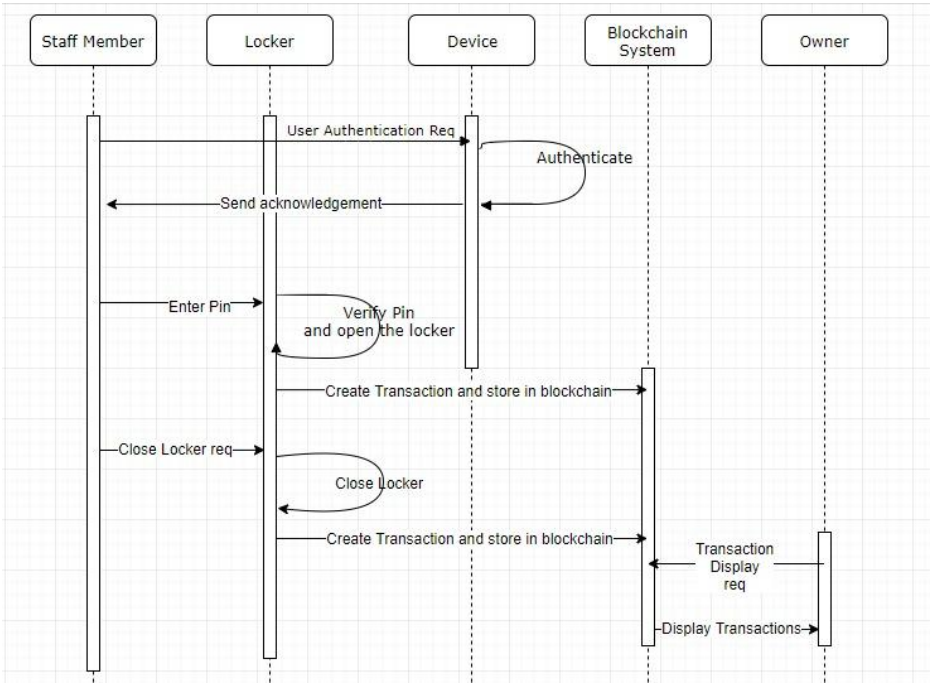

Figure 5: Sequence Diagram

Chapter 4 Materials and methods used

4.1 Technologies and Material used

4.1.1 Technologies used

Operating Environment

Particulars	Client System	Server System
Operating System	Android IOS	Platform independent(Web based)

Software Required

- Front end software's

Languages	**Description**
Vuforia	For Augmented Reality
Ethereum IDE	Blockchain

- Back end software's

Software Parts	**Description**
Operating System	Windows/Linux
Database	Firebase

Hardware Required

- Servo Motor
- Weight sensor(HX711)
- Load cell(1 kg)
- LOCK

    - Electric solenoid lock
    - Fire Walt 1mpr relay
- Node MCU(ESP 8266)
- Jumper wires

PRE-DESIGN CALCULATIONS

Ergonomics

- Physical (Hardware Requires):
  (System) system requirements are several sensors, lock and a motor.
  (Users) They just require a smart phone.
- Cognitive : Basic knowledge of operating a smartphone will be required.

Design Cost

- Hardware cost

  Servo Motor : 140/-

  Weight Sensor(HX711) : 150/-

  Load cell (1 kg) : 285/-

  Lock: Electric solenoid lock : 481/-

  1 channel 5V 1A relay : 75/-

  12V 1A power adapter : 125/-

  Node MCU(ESP 8266) : 300/-

  Jumper wires and bread board : 160/-

  Total cost : 1716/-

Safety

- As this system is itself a security system so the security of system is really important.
- We are going to transfer data using AES encryption and going to store pins using hash values.

Performance

- When all the components will be working properly at that time the product will be giving its best performance. The performance of the product can only be compromised if any component isn't working.

5.1 AEIOU SUMMARY CANVAS:

AEIOU summary framework is used to summarize and observation of the entire AEIOU framework in the single sheet. It helps us in designing next canvas.

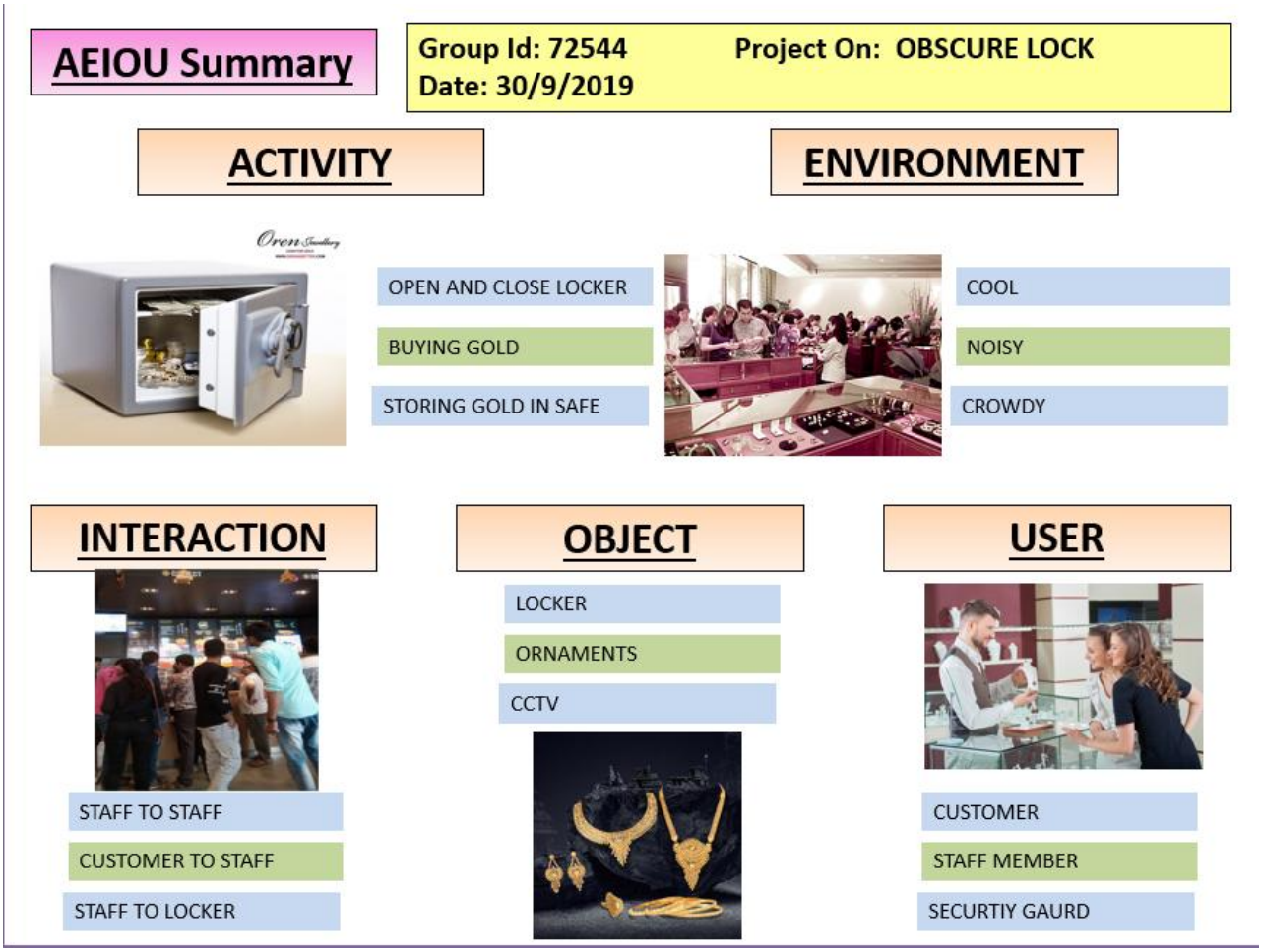

Figure 6: AEIOU Summary Canvas

5.2 EMPATHY MAPPING CANVAS:

An Empathy Mapping canvas is used to help in the discussion about the needs a user has. This canvas helps to focus on the different user's emotional. An empathy canvas involves user, stakeholders, activities and story boarding. Empathy mapping involves of two parts:

1) The feelings, thoughts, or attitudes of another through which we can know the intellectual identification of one person.
2) Feelings, thoughts, or attitudes by vicarious experiencing of those.

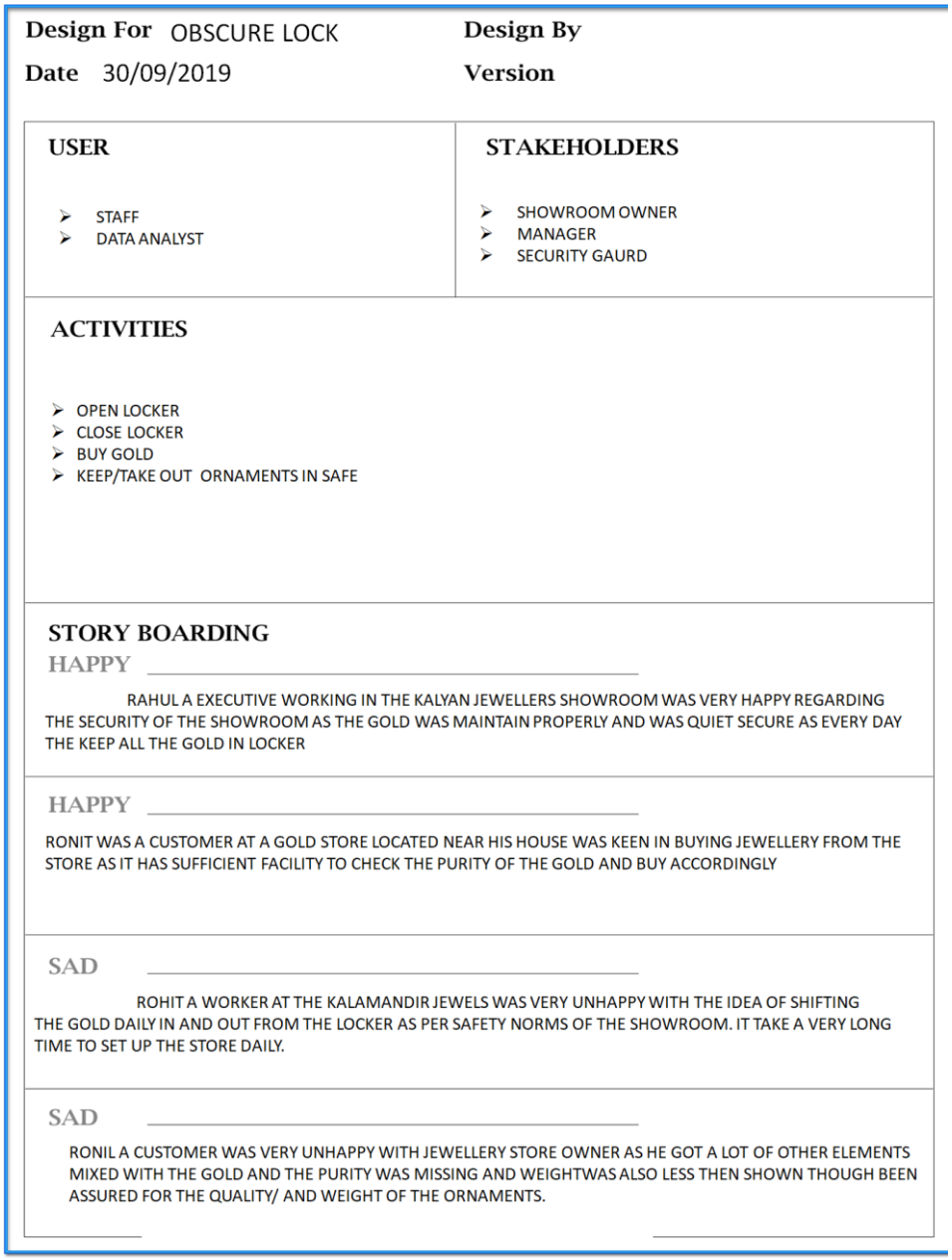

Figure 7: Empathy Mapping Canvas

5.3 IDEATION CANVAS:

Ideas can be scratched into any limits or dimensions in an ideation canvas which is a rough white board. Ideation session is not helpful for finding solutions to the defined and given problem. But it is used to give overview of the best possible problem. The overall agenda of ideation canvas is to build the various points of the ideas and using the canvas, we have to discover new possibilities.

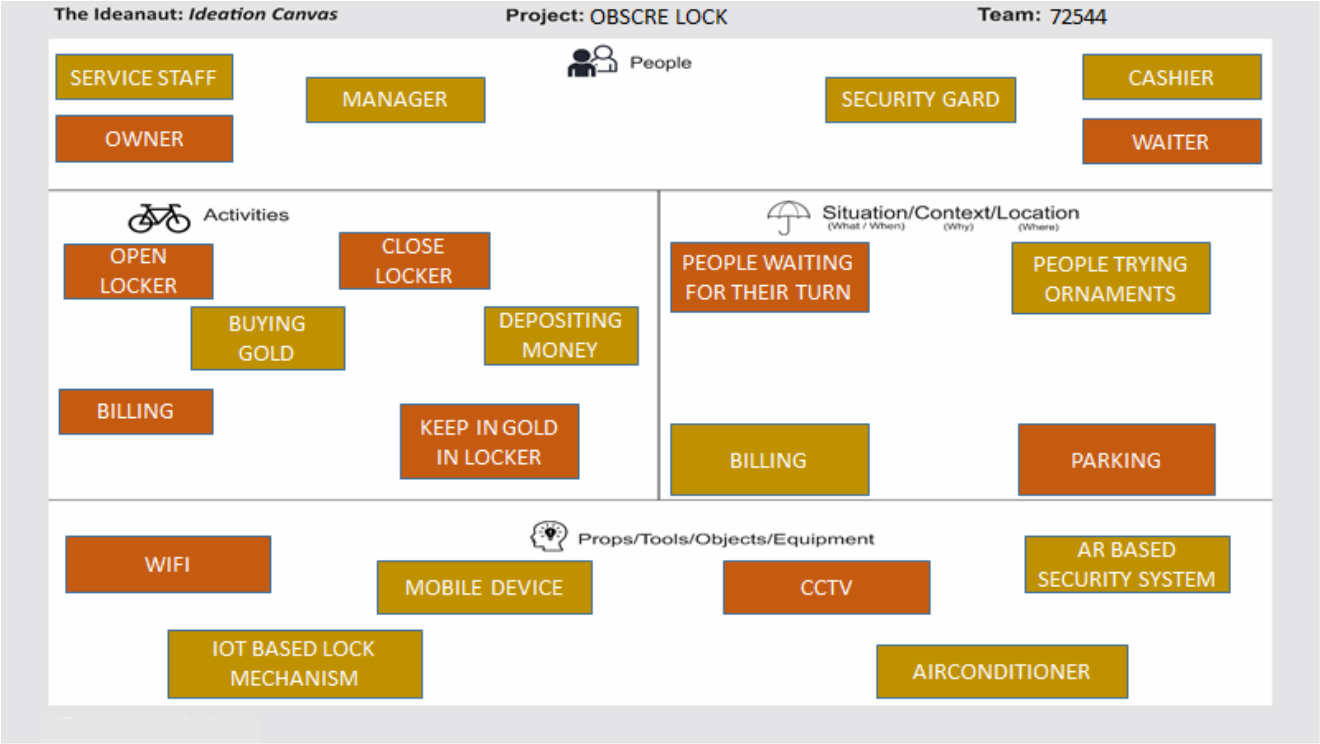

Figure 8: Ideation Canvas

5.4 PRODUCT DEVELOPMENT CANVAS

This canvas, Product Development Canvas, as the name suggests, shows the progress and the basic functioning of our project system.

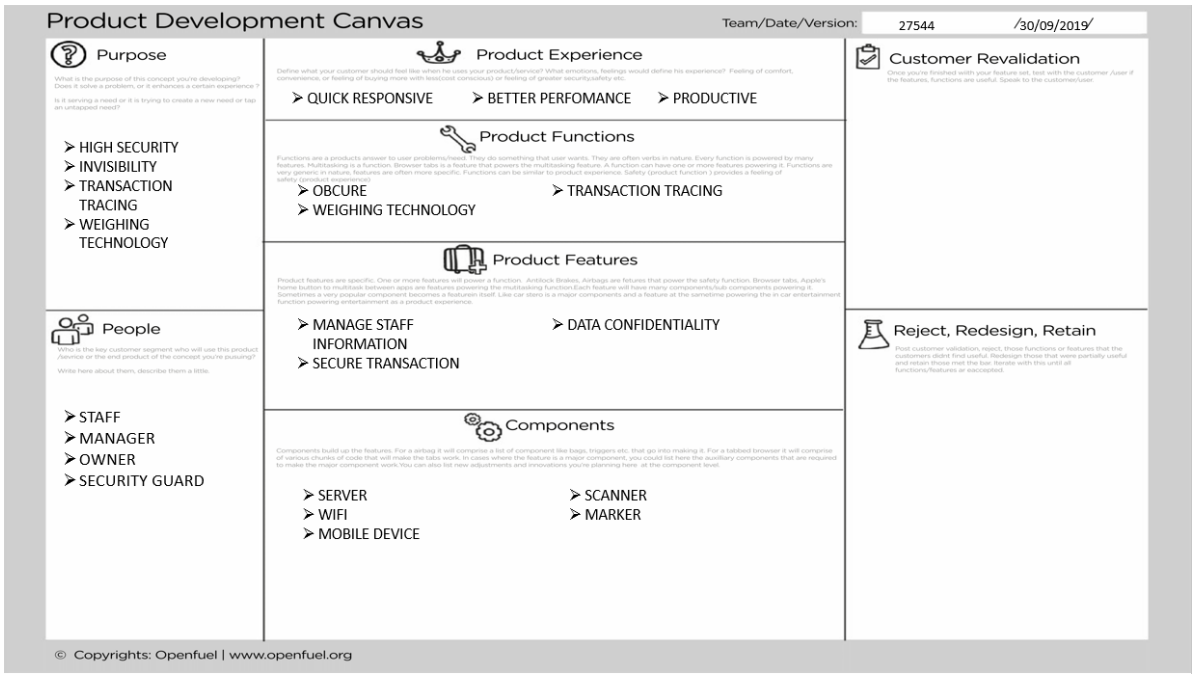

Figure 9: Product Development Canvas

5.5 DATABASE INTERACTION:

Figure 10: Mobile device and Database

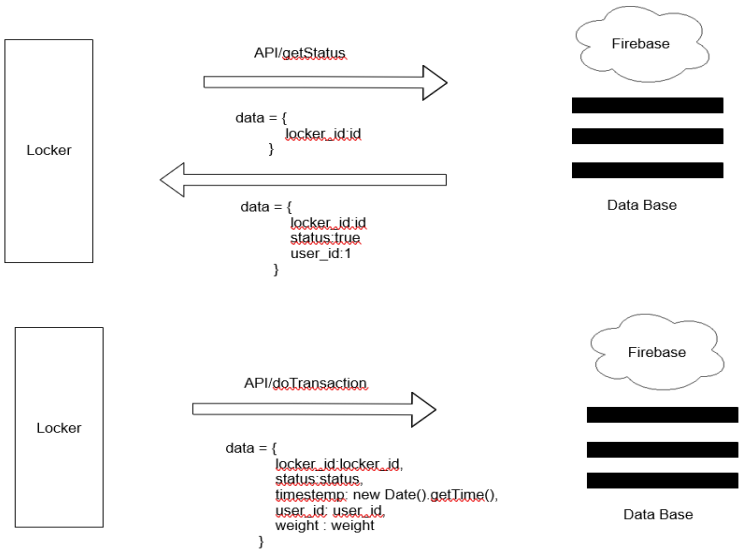

Figure 11: Locker and Database

Chapter 6 Gantt Chart

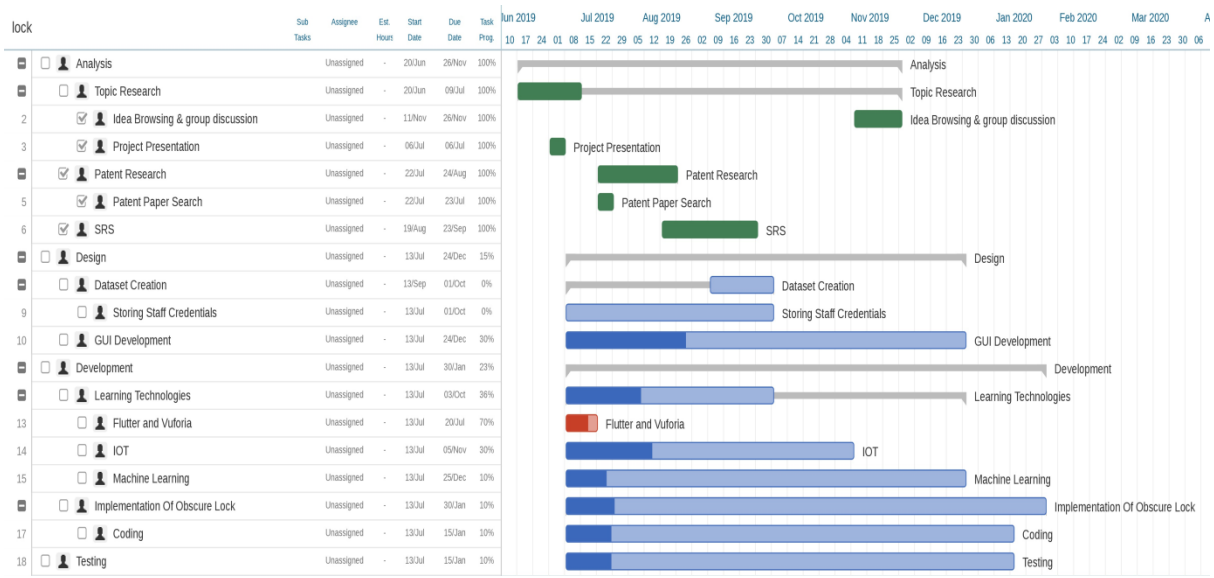

Figure 12: Gantt Chart

Chapter 7 Outcome

7.1 IMPLEMENTATION

Working

- Face your mobile to the marker on the locker, the mobile camera will project to the marker and will check which locker id is corresponding to that locker and marker in the database.
- If the pin corresponding to the locker is correct then the locker will open inside the locker.
- Once the lock is open then the servo motor connected to the lock will rotate to 90 degree which will open the door of the locker.
- If you pick out or keep something from/in the locker the weight of the locker will be calculated and store in the database include the persons details who has opened the door.
- Once everything is done and you are about to close the locker with your phone the servo motor will again rotate its direction which will led to close the door of the locker.
- After door is completely closed the lock will again come out and the door will protect with lock again.

Efficient users

- Data Analyst: These people are the one who operates the database of the system within the emporium.
- Showroom Executives: They handle the safe directly by their mobile phones which helps them open and close the safe.

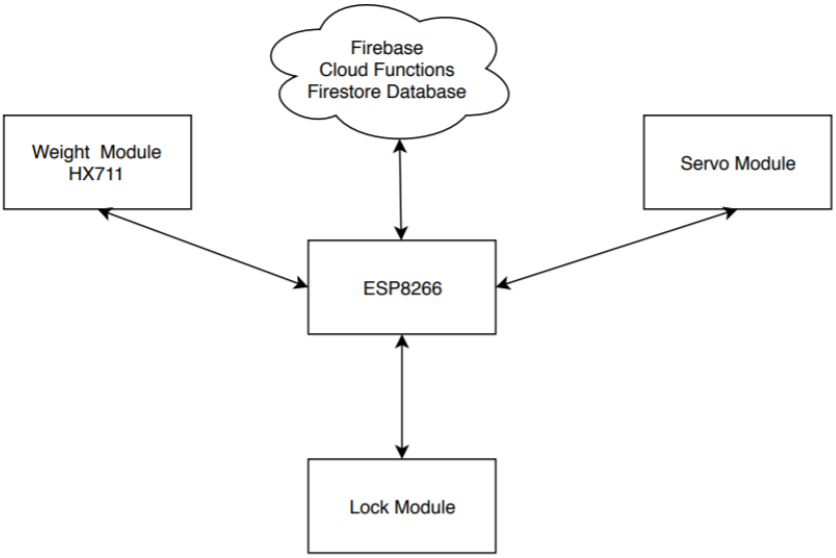

Figure 13: Application Snapshot

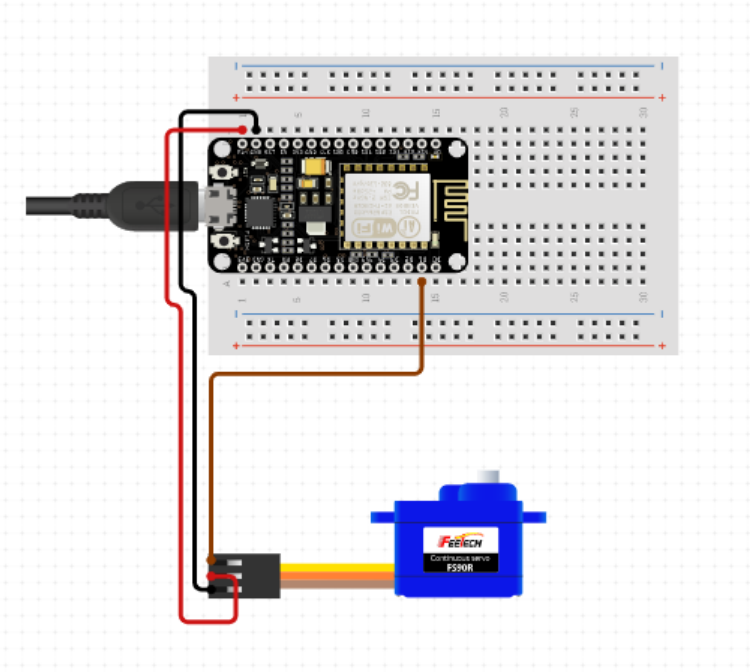

Figure 14: Servo Motor

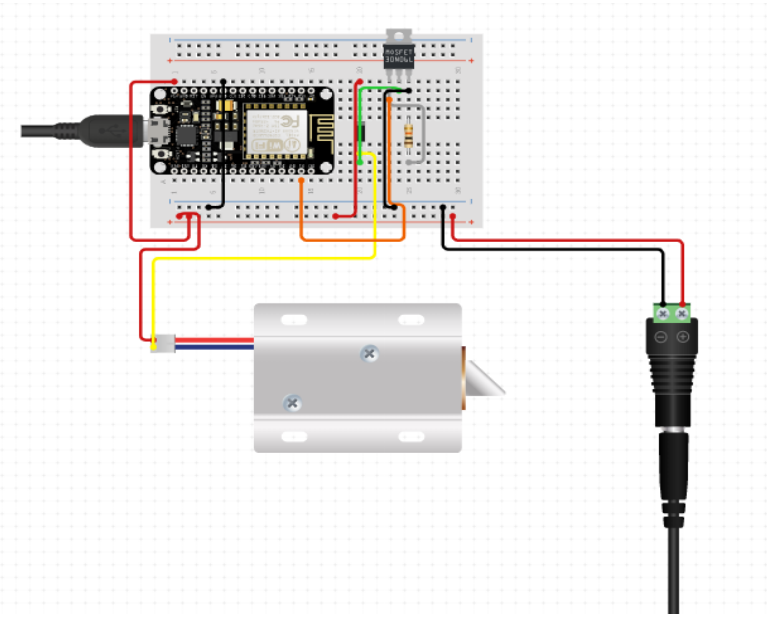

Figure 15: Lock Mechanism

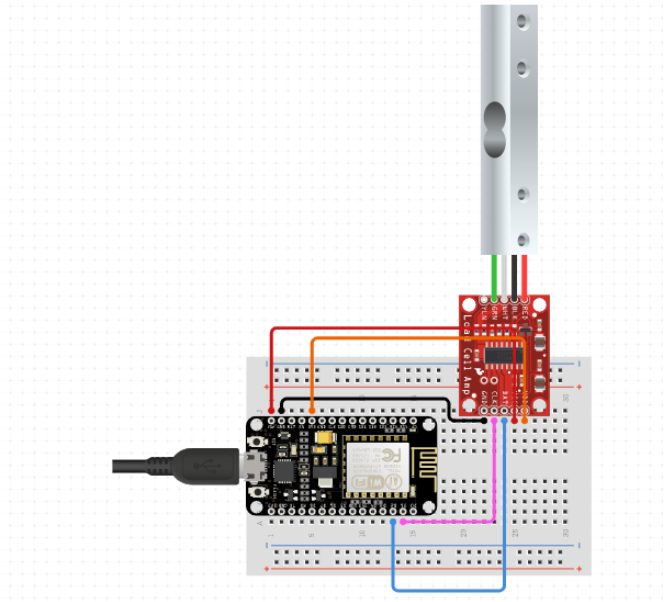

Figure 16: Load Cell

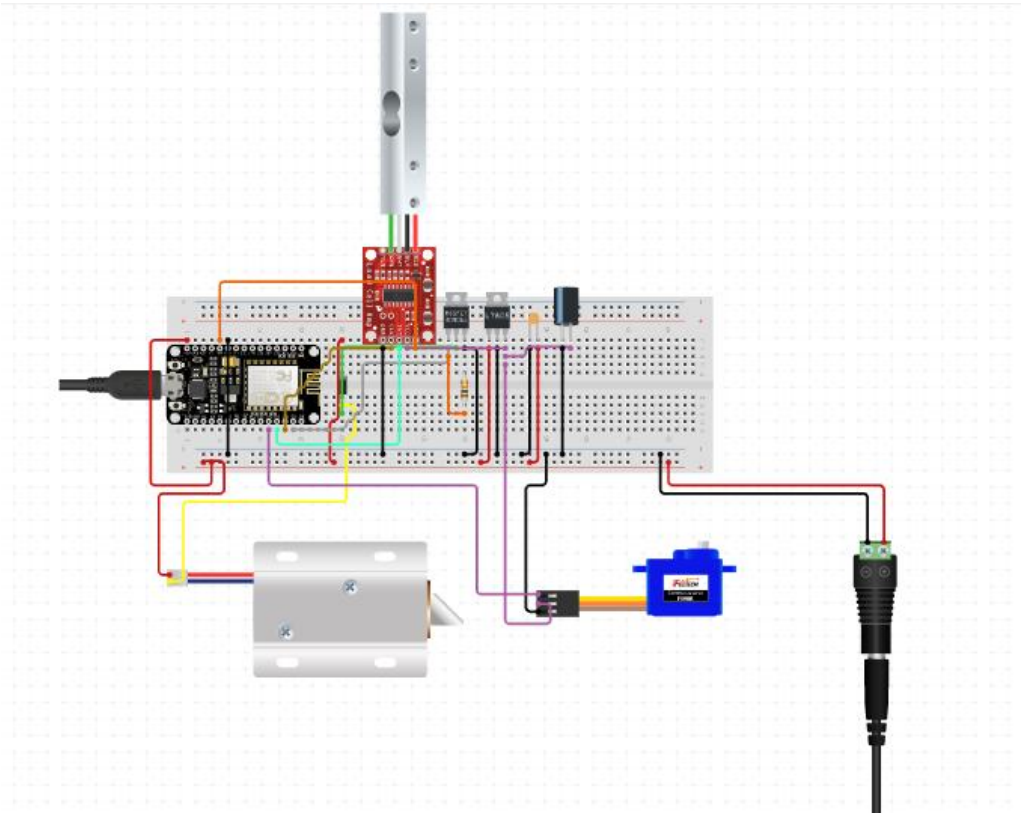

Figure 17: Complete Circuit

7.2 Output

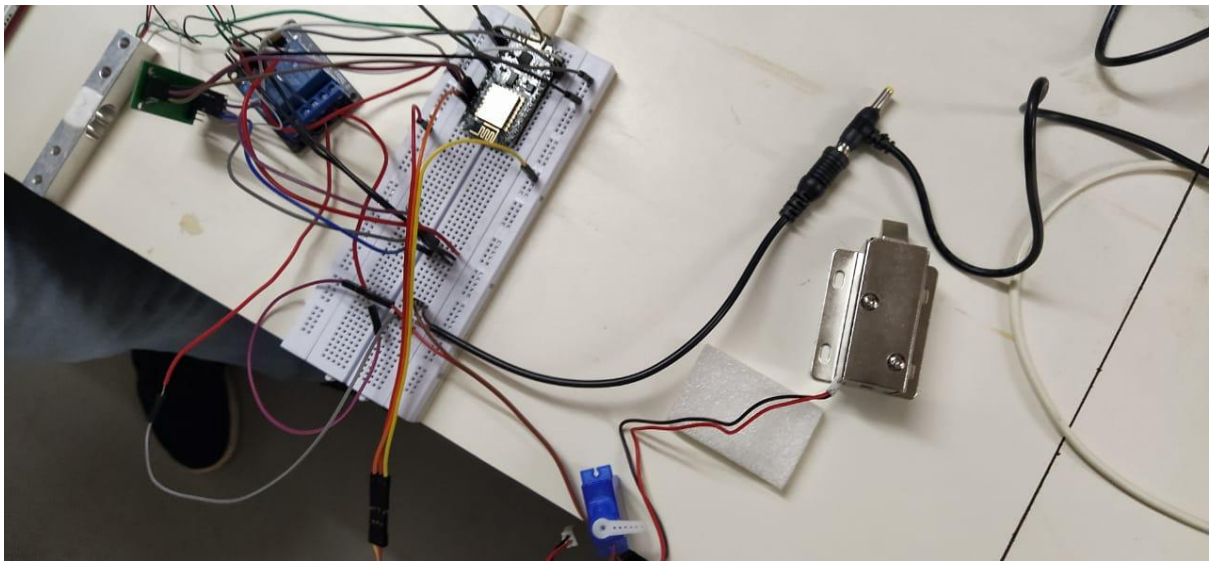

Figure 18: Outcome 1

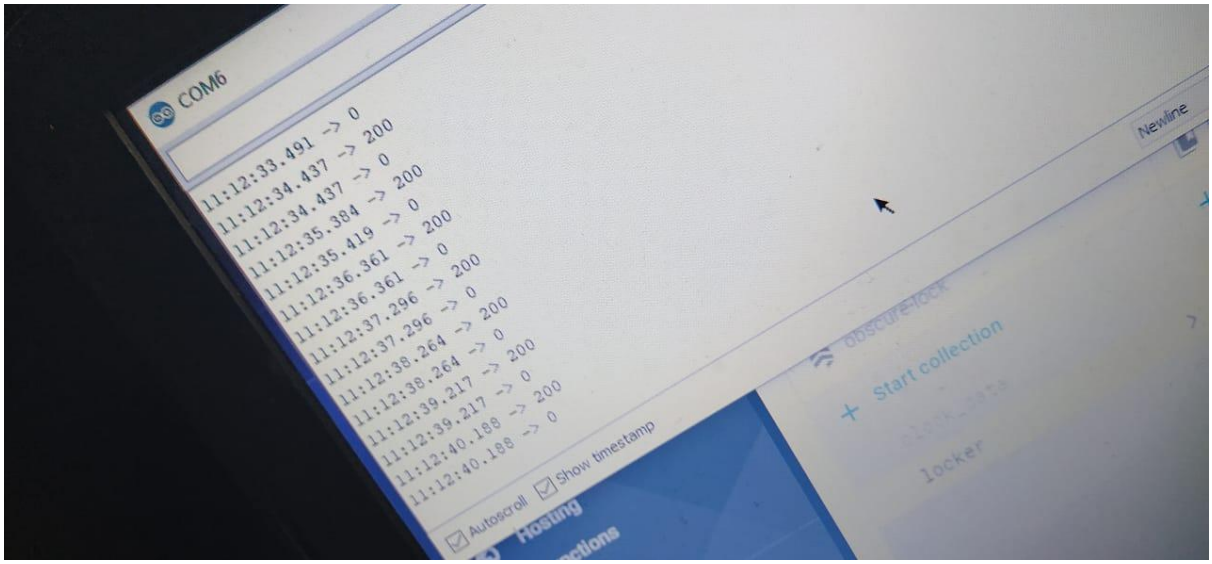

Figure 19: Outcome 2

Chapter 8 Conclusion

The main objective behind this innovations was to take care of your valuables and provide your with even safer environment.

In today's world, there is nobody trustworthy so keep yourself away from any awful incident we have brought a much safer and healthier environment for your valuables this will help you keep an eye on the staff members of your emporium keeping a track of their activities regarding the safes and the gold they have taken out.

Chapter 9 REFERENCES

1) https://instagantt.com/
2) https://www.hackster.io/projects/tags/internet+of+things
3) https://www.connectbit.com/blockchain-applications/
4) https://www.youtube.com/watch?v=W48_2ebuvv8
5) https://www.youtube.com/watch?v=u8njnXc7ziY&t=15s%E2%80%8B
6) https://www.hackster.io/search?q=iot%20automated%20door%20open&i=projects
7) https://www.wipotec-wt.com/en/weigh-cells/multitrack-mtc/mtc-aw-fs/

1. Project Progress Review

PPR 1

PPR Details

Periodic Progess Report : First PPR

Project : Obscure Lock

Status : Reviewed

1. What Progress you have made in the Project ?

?We have implemented the lock mechanism and marker scanning by AR and the automated door mechanism by IOT.

2. What challenge you have faced ?

We faced challenge in our weighing feature in which there was an issue regarding the precision of weight.

3. What support you need ?

Mentorship for blockchain technology.

4. Which literature you have referred ?

We referred to youtube videos and tutorials to learn Unity

Document : Download

PPR 2

PPR Details

Periodic Progess Report : Second PPR

Project : Obscure Lock

Status : Reviewed

1. What Progress you have made in the Project ?

We learned how to work with Arduino and implemented the automated door mechanism.

2. What challenge you have faced ?

When implementing multiple this concept on multiple lockers managing them becomes difficult.

3. What support you need ?

Guidance on efficient solution for managing multiple locks.?

4. Which literature you have referred ?

Referred to google patents.

Document : Download

PPR 3

PPR Details

Periodic Progess Report : Third PPR

Project : Obscure Lock

Status : Reviewed

1. What Progress you have made in the Project ?

Patent search about such invisible lock mechanism , analysed augmented reality merits and demerits.

2. What challenge you have faced ?

We always need a data analyst to keep a record of the activities going on.

3. What support you need ?

Mentorship for Augmented reality .

4. Which literature you have referred ?

Referred to online study material and tutorials to learn AR.

Document : Download

PPR 4

PPR Details

Periodic Progess Report : Forth PPR

Project : Obscure Lock

Status : Reviewed

1. What Progress you have made in the Project ?

We started to learn about Unity and designed scanning of marker.

2. What challenge you have faced ?

We need to design unique scanning of each marker for individual lock.

3. What support you need ?

Managing the database.

4. Which literature you have referred ?

Learnt about various concepts of Augmented reality .

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GUJARAT TECHNICAL UNIVERSITY SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY (Faculty of Computer Engineering, Computer Department) A Project Report On OBSCURE LOCK Under the course of B. E. III, Semester VII (Computer Engineering) Submitted by: Sr. Name of student Enrolment No. 1 DARSHIT AKBARI 160420107002 2 KEVAL NAVADIYA 160420107031 3 PARTH ROY 160420107046 4

DHRUVI SHAH 160420107050 5 SHREYA BOHRA 160420107054

---------- Prof. Bhavesh Patel (Faculty Guide) ----------

Prof. (Dr.) Pariza kmboz (Head of the Department Page | 2 INDEX Sr. No. Topic Name Page No.

1 Introduction 4 2 Aim and objective 4 3 Brief literature review Description Features Patent search Assumptions and Dependencies Constraints Multiple lock me chanism Working Efficient users 5 4 Materials and Methods Operating environment Software required Hardware required 7 5 Prototype Model UML Use-case model Activity diagram Class diagram Sequence diagram 8 6 Ghant chart 10 7 Methodology of design driven innovation AEIOU Summary sheet Empathy canvas Ideation canvas

PDC 11 8 Outcomes 14 9 Conclusion 14 10 References 15 Page | 3 INTRODUCTION • I toaso srity oe o btpt ppooa to wethseiraly mb pteco oeir pioslub protection.

• After having so many elementary solutions to the security problems,(like Intrusion Alarm, Hold-n-panic Alarm, CCTV etc.) there are lot of robbery reports been filed daily. • To improve the situations we have come up with new idea to protect your valuables. AIMS AND OBJECTIVE • We aim to create a system which is more safer than the existing systems.
That leds the emporium to become a better and safer place that ensures complete safety of their valuables. • We have come up with solution OBSCURE LOCK BRIEF LITERATURE REVIEW DESCRIPTION Today, security is a major area of concern for people with a lot of precious elements, gems, jewels etc.

Whether your company is a small local shop or a major international business, you must remain cognizant of the potential security issues facing your organization. To overcome these issues many security methods are designed and developed. designed and developed for the betterment of the jewellery showroom. This system will provide with virtual lock mechanism that can be used in any locker/safe/block of the showroom which will be operated using a Mobile Application with the concepts of augmented reality. The mobile application will use camera and will augment pattern dots or numeral while facing the objects.

You have to draw/write the correct pattern/numeral to unlock the Locker/safe/block which is under the Page | 4 • The block will open instinctively once the password/pattern is correctly entered. This functionality is performed using an IOT sensor and analyze weight inside the block/safe. • Another sort of functionality that is provided by the system is a chain of blocks between the user.

The authentication of each user is accomplished using blockchain notion. • The top level diagram depicts the complete user features that are on their ways for users FEATURES • The fundamental attribute of our system which builds the system: Obscure: The system is invisible to the surroundings.

There are some particular users been defined by the owners of the emporium to whom this is visible through there gadgets . User Authentication: Every individual who is a part of the system is provided with a user substantiation password which is noticeable only when user keep their mobile phones facing the walls.

Wall Scanning: When a particular individual whose is a responsible handler of the system keeps there mobile facing the walls a scanning takes place to examine the wall is under the surveillance of our system. Page | 5 ? Weighing Technology: Once a user tries to keep something or take out anything from the safe weight of the safe is calculated and recorded each time.

PATENT SEARCH • Relevant patents in regards of our project: ? PATENT 1 : Augmented reality advanced security authentication methodologies ? PATENT 2 : Intelligent door lock system ? PATENT 3 : Wireless door lock mechanism ? PATENT 4 : Embedded internet of things hub for integration with an appliance and association system and methods ASSUMPTIONS AND DEPENDENCIES • The assumption made to execute the core idea are: ? The staff members will have a smart phone ? The showroom/area where the locker is kept is having a Wi-Fi connection.

CONSTRAINTS The constraints that are required to efficiently run the system in any showrooms Wi- Fi Routers Data Analyst MULTIPLE LOCKING MECHANISM Each safe has a separate lock mechanism system where each lock system is given a unique locker id and the system will analyse the locker id accordingly. The locker id respective to the locker will be consulted in the database and the pin in regards with that locker will be used to open that locker.

Each safe is absolutely independent of the other accept the fact that they are assigned a locker id. Page | 6 WORKING • Face your mobile to the marker on the locker, the mobile camera will project to the marker and will check which locker id is corresponding to that locker and marker in the database. • If the pin corresponding to the locker is correct then the locker will open inside the locker.

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• Showroom Executives: They handle the safe directly by their mobile phones which helps them open and close the safe. Page | 7 MATERIALS AND METHODS OPERATING ENVIRONMENT Particulars Client System Server System Operating System Android IOS Platform independent(Web based) SOFTWARES REQUIRED • Front end software ' s Languages

Description Vuforia For Augmented Reality Ethereum IDE Blockchain Flutter IOS and Android Apps Deep Learning Wall Scanning • Back end software ' s Software Parts Description Operating System Windows/Linux Database Firebase HARDWARE REQUIRED • Servo Motor • Weight sensor(HX711) • Load cell(1 kg) • LOCK o Electric solenoid lock o Fire Walt 1mpr relay • Node MCU(ESP 8266) • Jumper wires Page | 8 UNIFIED MODELLING LANGUAGE The Unified Modeling Language (UML) is a general-purpose, developmental, modeling language in the field of software engineering that is intended to provide a standard way to visualize the design of a system. USE-CASE CLASS DIAGRAM Page | 9 SEQUENCE DIAGRAM ACTIVITY DIAGRAM

Page | 10 GANTT CHART Page | 11 METHODOLOGY OF DESIGN DRIVEN INNOVATION 1. AEIOU Summary Sheet Page | 12 2. EMPATHY CANVAS Page | 13 3. IDEATION CANVAS 4. PDC CANVAS Page | 14 OUTCOMES Page | 15 CONCLUSION The main objective behind this innovations was to take care of the your valuables and provide your with even safer environment.

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