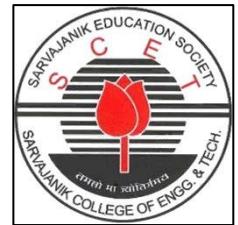




GUJARAT TECHNOLOGICAL UNIVERSITY



# Sarvajanik College of Engineering & Technology

(Faculty of Computer Engineering, Computer Department)

A  
Project Report  
On

## GEST-O-HOME

Under the course of  
**DESIGN ENGINEERING – 2B (2160001)**  
B. E. III, Semester – VI  
**(Computer Engineering)**

*Submitted by:*

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**Prof. (Dr.) Pariza Kamboj**  
(Head of the Department)

**Academic Year :2020-21**



## GUJARAT TECHNOLOGICAL UNIVERSITY

Chandkheda, Ahmedabad  
Affiliated



Sarvajanik College of Engineering & Technology

## CERTIFICATE

This is to certify that the students namely, NEVIL GHELANI (170420107014), KARTIK GONDALIYA (170420107015), ANVI KAKLOTAR (170420107020), SAHIL SHINGALA (170420107051) of **B.E. 3<sup>rd</sup> Year** (Computer Engineering) **Semester VI(*Shift-1*)** have successfully completed the course work and related tasks for the course of **Design Engineering-(2B) (2160001)** during the academic term ending in the month of April, 2020.

Date:

Place: SCET, Surat

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**Prof. Fagun Vankawala**  
(Faculty Guide)

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**Prof.(Dr.) Pariza Kamboj**  
(Head of the Department)

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# 1: INTRODUCTION

## 1.1 About the Topic

Engineering design is the creative process of identifying needs and then devising a solution to fill those needs. This solution may be a product, a technique, a structure, a project, a method, or many other things depending on the problem. The general procedure for completing a good engineering design can be called the Engineering Method of Creative Problem Solving.

Problem solving is the process of determining the best possible action to take in a given situation. In order to address lower grade levels, an alternate list has been developed and is included in the Teacher Notes section of this module.

1. Identifying the problem.
2. Gathering needed information.
3. Searching for creative solutions.
4. Overcoming obstacles to creative thinking.
5. Moving from ideas to preliminary designs (including modeling).
6. Evaluating and selecting a preferred solution.
7. Preparing reports, plans, and specifications. (Project Planning)
8. Implementing the design. (Project Implementation)

Here, in this project by means of design thinking, we have developed a gesture detection system for Home Automation named Gest-O-Home.

Controlling the home appliances and electronic gadgets through an infrared remote control is now in general. But the same controlling tasks can be done more easily. The primary motive of proposing the new system of hand gesture remote control is to remove the need to look into the handheld remote and to search for a specific key for specific function. An accelerometer, gyroscope and magnetometer are used to recognize the hand gestures in 3 perpendicular directions and transmitted through wireless protocol using radio frequency. The data is received by the hub section which controls the home appliances according to the decisions made. This project proposes a simple and easy way of controlling the home appliances.

In all around the world gestures consist as a universal language that preferable everywhere.

**Gestures recognition** is the process of identifying human gestures. The Gesture recognition automation system is suitably used for home automation in a cost-effective manner. In this system data from the xyz –axis of the accelerometer and gyroscope module is given to the transmitter. From there the encoded data is send to the receiver hub. The received data is decoded and given

to the microcontroller. Decision making is done by the microcontroller using the received data. According to the decisions the device such as fan, light and music system will function.[1]

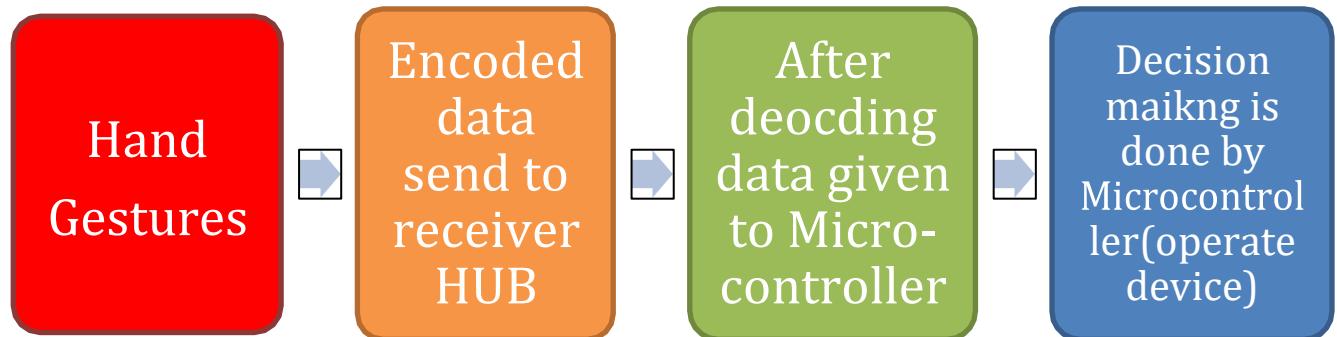


Fig 1.1: Basic Flow diagram of our system

## 1.2 Prior Art Search [2]

Part 1: Patent Search Technique Used				
	Patent 1	Patent 2	Patent 3	Patent 4
Patent Search Database used	<a href="https://patentscope.wipo.int">https://patentscope.wipo.int</a>	<a href="https://worldwide.espacenet.com">https://worldwide.espacenet.com</a>	<a href="https://scholar.google.com">https://scholar.google.com</a>	<a href="https://worldwide.espacenet.com">https://worldwide.espacenet.com</a>
Keywords used for Search	Gesture Home AND Hand Gestures		"SIXTH SENSE TECHNOLOGY"	Gyroscope
Search String used	Gesturer Recognition for Home	Hand Gestures	"SIXTH SENSE TECHNOLOGY"	Gyroscope
Number of Results/ Hits Getting	3	25	254	10000

Part 2: Basic Data of Patented Invention/Bibliographic Data				
	Patent 1	Patent 2	Patent 3	Patent 4
Title of Invention	INTELLIGENT HOME APPLIANCE CONTROL SYSTEM BASED ON HUMAN GESTURES	METHOD AND DEVICE FOR USE IN HAND GESTURE RECOGNITION	SIXTH SENSE TECHNOLOGY	THREE-DIMENSIONAL KINETIC GENERATOR
Patent No.	CN108983622 (A)	US2019188460(A1)	13485405	US2019319553 (A1)
Date of Application	06/07/2018	20/06/2019	29/04/2013	17/10/2019
Name of Inventor /s	WANG PEIQING	ZHANG ZHIWEI,TANG CHEN,ZHU MINGMING,YE PING ,WANG JIN	S.PRADEEP KUMAR, O. PANDITHURAI	MARC OEDONEZ

Part 3: Technical Part of Patented Invention				
	Patent 1	Patent 2	Patent 3	Patent 4
Limitation of Prior Technology/Art	It was used pyroelectric infrared sensor on body.	This idea is based on image processing so it's require camera.	This idea is based on image processing so it's require wearable camera.	Not helpful to find speed of motion
Brief about Invention	A pyroelectric infrared sensor is disposed in the module, and the pyroelectric infrared sensor detects the real-time detection in the sensing area, and converts the detected sensing signal into corresponding information, and the microcontroller is based on red pyroelectric infrared. The signal detected by the sensor determines whether the human body enters or leaves.	The method includes: acquiring a depth map of a hand in a current image; estimating first positions of joints of the hand according to the depth map; creating a 3D point cloud of the hand according to the depth map of the hand; matching the first position of the joints of the hand and a stored 3D hand model to find gesture.	Sixth Sense technology bridges the gap between the physical world and the digital world, bringing intangible, digital information out into the tangible world, and allowing us to interact with this information via natural hand gestures.	One or more rings with a plurality of gears attached thereto can: be connected such that the gyroscope drives the gears. Two magnets are further connected to the gyroscope such a core wrapped in coils is within the magnetic field between the two magnets, wherein movement of the spheres in relation to the magnets induces an electric current in the coils and an electrical lead provides an output for electric current in the coils.
How much this invention is related with your Project?	Idea is related to our projects for find person in which room.	The invention is useful for finding degree and axis for different gestures.	This patent is related to our project in many ways.	Using this patent we know how to work with Gyroscope to get data.
Key Learning Points	According to the system and method, how Gyro and accelerometer is used is useful.	Acquiring a depth map of a hand.	Sixth Sense technology is implemented in 'Sixth Sense /WUW using gesture recognition, augmented reality, computer vision and radio frequency identification	Learn how to interact with Axis in 3D using Gyroscope.

Part 1: Patent Search Technique Used				
	Patent 5	Patent 6	Patent 7	Patent 8
Patent Search Database used	<a href="https://patentscope.wipo.int">https://patentscope.wipo.int</a>	<a href="https://worldwide.espacenet.com">https://worldwide.espacenet.com</a>	<a href="https://patentscope.wipo.int">https://patentscope.wipo.int</a>	<a href="https://patentscope.wipo.int">https://patentscope.wipo.int</a>
Keywords used for Search	Accelerometer AND Gesture	Hand Gestures	Watch Gesture AND	Microcontroller AND Home
Search String used	Accelerometer AND Gesture	Hand Gestures	Watch Gesture AND	Microcontroller AND Home
Number of Results/ Hits Getting	6	126	11	1

Part 2: Basic Data of Patented Invention/Bibliographic Data				
	Patent 5	Patent 6	Patent 7	Patent 8
Title of Invention	METHOD AND SYSTEM FOR DETECTING LINEAR SWIPE GESTURE USING ACCELEROMETER	HIGH RESOLUTION TRACKING AND RESPONSE TO HAND GESTURES THROUGH THREE DIMENSIONS	SMART WATCH GESTURE INPUT METHOD AND SMART WATCH	MICROCONTROLLER OF SMART HOME CONTROL PLATFORM
Patent No.	CN107430417 (A)	US10261595 (B1)	WO2017005023	CN108427355 (A)
Date of Application	07/01/2016	16/04/2019	12/01/2017	03/05/2018
Name of Inventor /s	MIDHOLT MAGNUS, THORN OLA	KIN KENRICK CHENG-KUO	HUANG, YANFENG	YUE JINGFENG

Part 3: Technical Part of Patented Invention				
	Patent 5	Patent 6	Patent 7	Patent 8
Limitation of Prior Technology/Art	It was only for linear gestures.	Getting plenty of data some are related to our project but not much.	This idea is only use for operate watch instead of voice.	It is not gestured based controlled.

Brief about Invention	A device and method detect user input for an electronic device based on linear acceleration and/or linear acceleration rate of the electronic device through this detected gesture for controlling the electronic device.	A system includes an electronic display configured to display one or more simulated objects in accordance with display instructions, an imaging sensor configured to capture images of a user's hands, and a console. The console is configured to receive the captured images from the imaging sensor, extract joint information of the user's hands from the captured images, and determine one or more poses based on the extracted joint information.	Collecting user's gesture data and gesture duration. Identifying a gesture of the user according to a correspondence relationship of the text information corresponding to each gesture data stored in advance, and converting the corresponding text into a corresponding text. Output the text corresponding to the gesture.	The technical device of the present invention is a microcontroller for a smart home control platform, comprising a main chip, an Ethernet transceiver module, and a crystal oscillator module, wherein the data transmission port of the main chip is connected to an Ethernet transceiver module, and the main chip is The power input end is connected to the output end of the power conversion module, the input end of the power conversion module is connected to the power source, the clock pulse input end of the main chip is connected to the output end of the crystal oscillator module, and the write end of the main chip is connected with the JTAG interface.
How much this invention is related with your Project?	The base of our project is totally related to this invention.	Types of hand gestures position is useful from this invention.	Almost about 50%of our project is related to this patented invention	We will use this type of mechanism after fetching proper operation from gestures.
Key Learning Points	How to detects sliding gestures using accelerometer.	Generate a simulated directional pad adjacent to the user's thumb in a simulated environment.	Recognize gesture and using past record finding proper output.	Connection of different device with microcontroller in home.

## Summary Of Papers

**Patent 1:** A pyroelectric infrared sensor is disposed in the module, and the pyroelectric infrared sensor detects the real-time detection in the sensing area, and converts the detected sensing signal into corresponding information, and the microcontroller is based on red pyroelectric infrared The signal detected by the sensor determines whether the human body enters or leaves.[3]

**Patent 2:** The method includes: acquiring a depth map of a hand in a current image; estimating first positions of joints of the hand according to the depth map; creating a 3D point cloud of the hand according to the depth map of the hand; matching the first position of the joints of the hand and a stored 3D hand model to find gesture.[3]

**Patent 3:** Sixth Sense technology bridges the gap between the physical world and the digital world, bringing intangible, digital information out into the tangible world, and allowing us to interact with this information via natural hand gestures. [3]

**Patent 4 :** One or more rings with a plurality of gears attached thereto can: be connected such that the gyroscope drives the gears. Two magnets are further connected to the gyroscope such a core wrapped in coils is within the magnetic field between the two magnets, wherein movement of the spheres in relation to the magnets induces an electric current in the coils and an electrical lead provides an output for electric current in the coils.[4]

**Patent 5:** A device and method detect user input for an electronic device based on linear acceleration and/or linear acceleration rate of the electronic device through this detected gesture for controlling the electronic device.[4]

**Patent 6 :** A system includes an electronic display configured to display one or more simulated objects in accordance with display instructions, an imaging sensor configured to capture images of a user's hands, and a console. The console is configured to receive the captured images from the imaging sensor, extract joint information of the user's hands from the captured images, and determine one or more poses based on the extracted joint information.[5]

**Patent 7 :** Collecting user's gesture data and gesture duration. Identifying a gesture of the user according to a correspondence relationship of the text information corresponding to each gesture data stored in advance, and converting the corresponding text into a corresponding text. Output the text corresponding to the gesture[5]

**Patent 8:** The technical device of the present invention is a microcontroller for a smart home control platform, comprising a main chip, an Ethernet transceiver module, and a crystal oscillator module, wherein the data transmission port of the main chip is connected to an Ethernet transceiver module, and the main chip is The power input end is connected to the output end of the power conversion module, the input end of the power conversion module is connected to the power source, the clock pulse input end of the main chip is connected to the output end of the crystal oscillator module, and the write end of the main chip is connected with the JTAG interface.[5]

## 2: OBSERVASTION

### 2.1 A-E-I-O-U Frame Work

The A E I O U framework is very useful, and the most basic sheet required for design engineering.

A-Activity

E- Environment

I-Interaction

O-Object

U- User

It involves observation of the domain selected area with a group of four, each taking their individual observations at same time. The task was performed by each member and we had to go to our selected area for many times. In these activities we all group member had to use our observation skills to perform the ask of completing the AEIOU sheet. The frame work of our group is as follows:

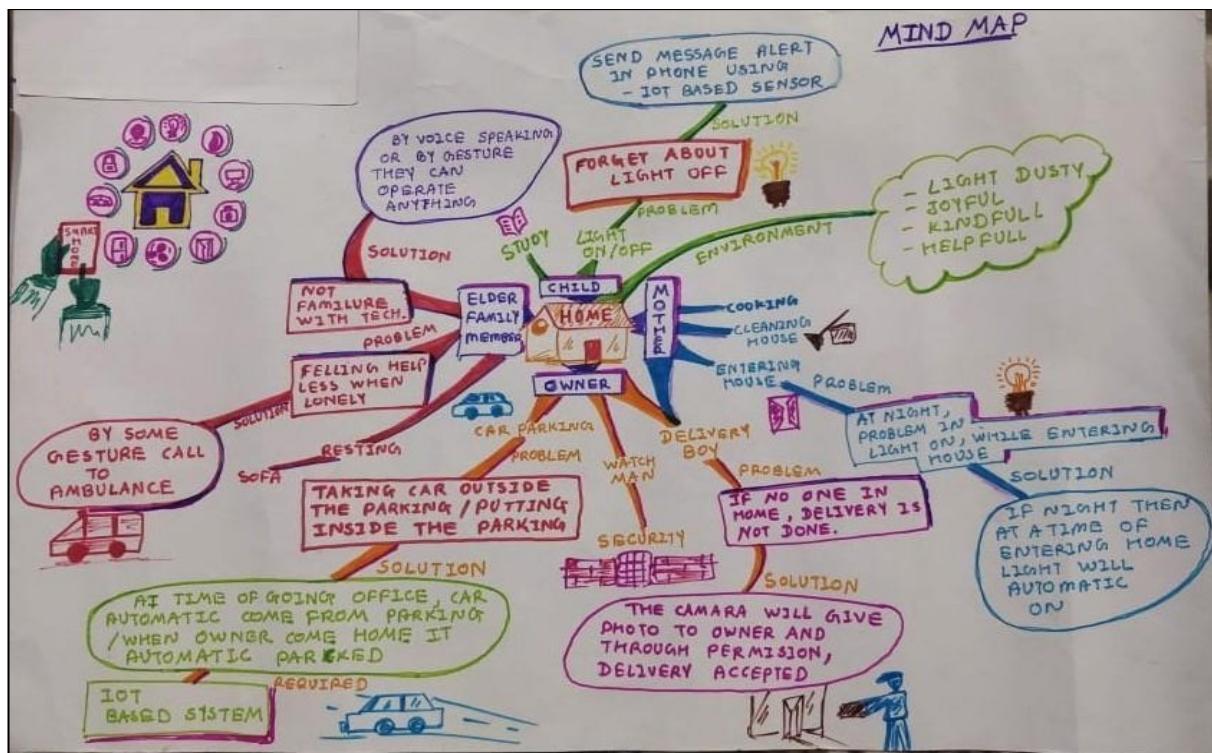
Environment:		Interaction:	Objects:
Serene atmosphere	Little dusty	Neighbour – Owner – Helping Hand	Light – Giving Light
Lightful	Clean floor	Vendor – Owner – Services	Sofa – Resting
Joyful	Crazy	Electrician – Owner – Electrical Services	Door – Protection
Ventilation	Day	Watchman – Owner/Guest – Security	Chair – Resting
		Plumber – Owner – Water Services	Kitchen Stuff – Preparing Food
		Delivery Boy – Owner – Give Products	Window – Ventilation
		Milkman – Owner – Selling milk	Fan/AC – Cooling Room
Activities:		Users:	
Study	Washing clothes	Owner – Earning Money	
Watching TV	Taking lunch	Servant – House hold work	
Family gathering	Cloth wearing	Mother – Cooking/Managing other activities	
Sleeping	Entering into home	Pet animal – Hobby	
Cooking	Playing indoor games	Child – Study/playing	
Bathing	Opening Refrigerator	Elder Member – Retirement Enjoy	
		Tenants – Financial purpose	
		Guest – Relationship	
		Watchman – Protect home	

### 3 : CANVASES /FRAMEWORK

#### 3.1 Mind Map

A **mind map** is a diagram used to visually organize information. A mind map is hierarchical and shows relationships among pieces of the whole. It is often created around a single concept, drawn as an image in the center of a blank page, to which associated representations of ideas such as images, words and parts of words are added. Major ideas are connected directly to the central concept, and other ideas branch out from those major ideas.

Mind mapping is a creative and logical means of note-taking and note-making that literally maps out your ideas. All mind maps have some things in common. They have a natural organizational structure that radiates from center use line, symbols, words, color and images according to simple, brain friendly concepts. Mind mapping converts long list of information into a colorful, memorable and highly organized diagram that works in line with your brain's natural way of doing things.



### **3.2 Empathy Map**

This canvas is about one particular user and the experience of that user about our domain that is shopping mall. It also includes activities, stakeholders and describes the sad and happy stories related to the user about the real you.

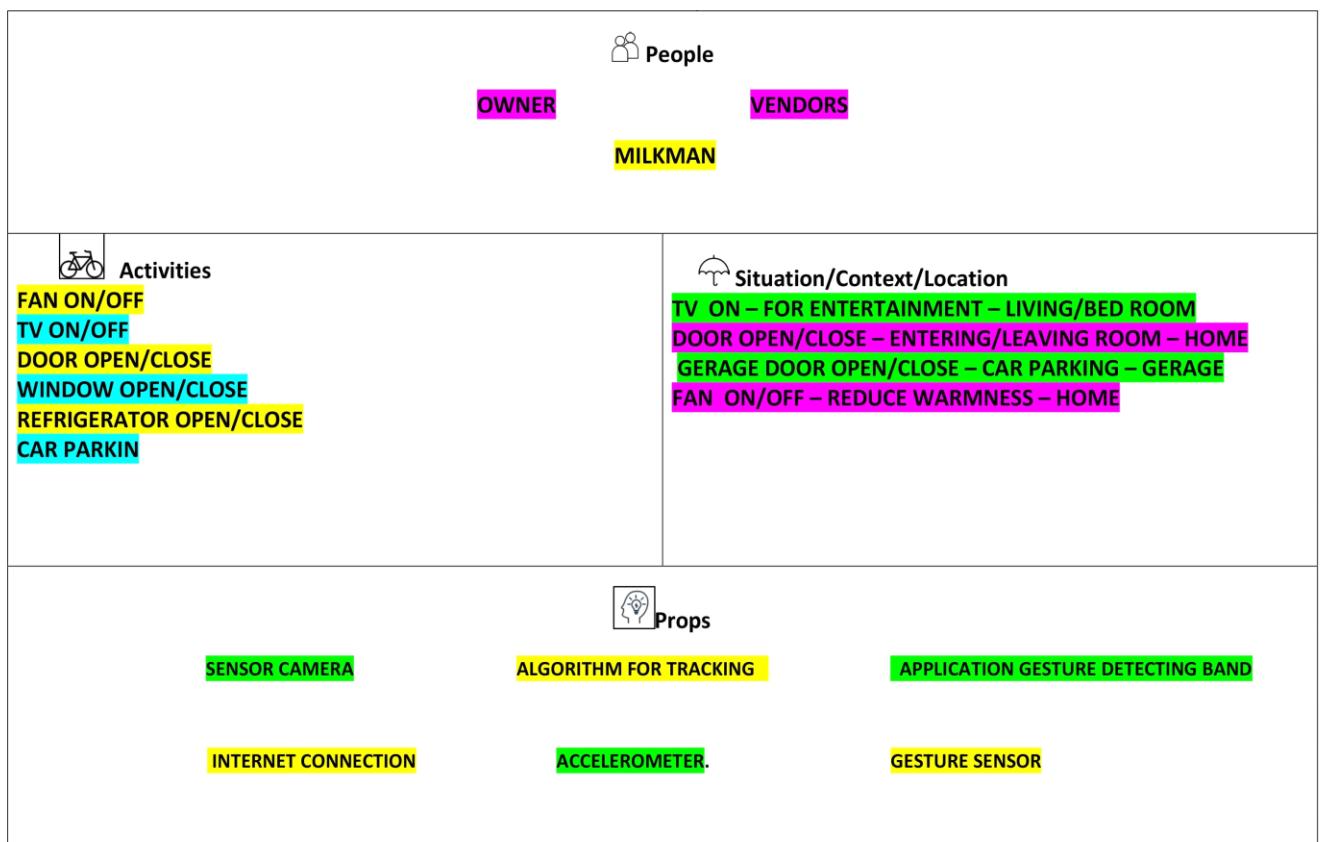
USER <b>OWNER</b>	STAKEHOLDERS NEIGHBOUR      MILKMAN      BANK DELIVERY BOY      WATCHMAN      VENDORS
<b>ACTIVITIES</b>	
STUDY	WASHING CLOTHES
OPENING REFRIGERATOR	TAKING LUNCH
FAMILY GATHERING	ENTERING INTO HOME
SLEEPING	WATCHING TV
CLOTH WEARING	BATHING
PLAYING INDOOR GAMES	COOKING
<b>STORY BOARDING</b>	
HAPPY	<b>OWNER OF THE HOUSE IS HAPPY AND JOYOUS BECAUSE HE IS TRANSFERRING FROM HIS OLD HOUSE WHICH WAS SMALL COMPARED TO HIS NEW HOME. HIS FAMILY IS EXCITED TO LIVE IN NEW HOME AS IT IS BIG AND HAVE GOOD SURROUNDING COMPARED TO THEIR OLD HOME.</b>
HAPPY	<b>OWNER ALSO FEELS SELF-SATISFIED AND HAPPY BECAUSE GOVERNMENT HELP HIM BUY HIS NEW HOUSE BY GIVING HIM HOME-LOAN. HE IS ALSO GREATFUL TO GOVERNMENT BECAUSE HE GOT LOAN OF SUCH LESS INTREST ON BASE OF SUBSIDY THOUGH HE WISHES HE HAD ENOUGH MONEY TO BUY HIS HOUSE ON HIS OWN.</b>
SAD	<b>OWNER IS WORRIED ABOUT THE HEALTH OF HIS PARENTS. AS HIS PARENT ARE OLD THEY ARE NOT FAMILIER WITH USING TECHNOLOGY LIKE PHONE. HE IS WORRIED THAT WHEN FAMILY WAS FAR FROM HOUSE AND IN CASE OF ANY MEDICAL EMERGENCIES, HIS PARENTS WOULD BE HELPLESS. HE WISHES HE CAN DO SOMETHING ABOUT THAT ISSUE.</b>
SAD	<b>OWNER ALSO FEELS SAD THAT HIS WIFE HAS TO WORK A LOT HARDER IN ORDER TO CLEAR NEW HOME. AS THE NEW HOME IS BIG IT TAKES A LOT OF TIME, PEOPLE AND ENERGY TO CLEAN THE HOUSE. ALSO IN CASE OF ANY FESTIVAL, DECORATING WHOLE HOUSE IS A BIT DIFFICULT. HE WISHES HE CAN HELP CLEANING AND DECORATING HOUSE.</b>

### **3.3 Ideation Canvas**

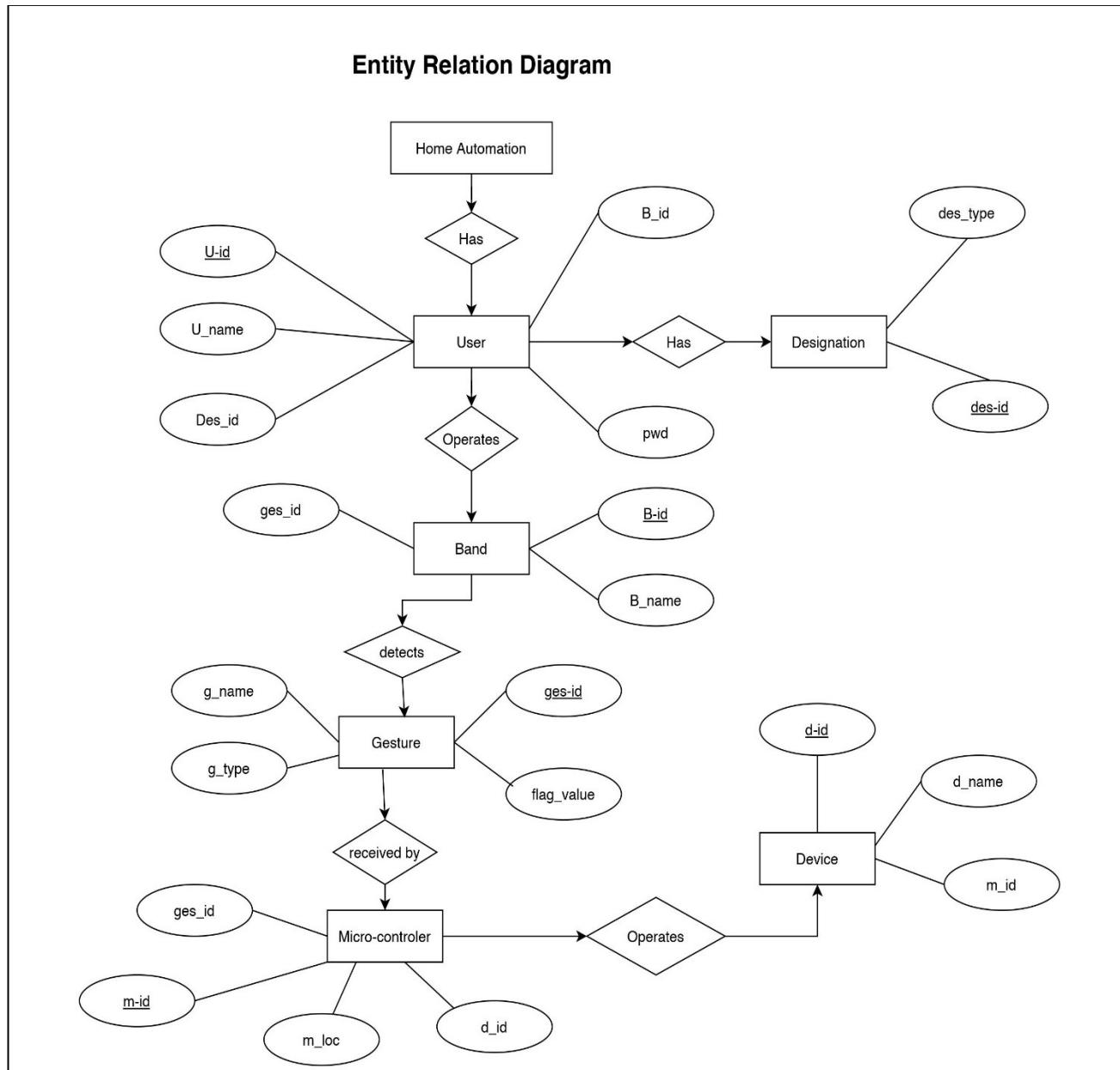
Ideation is the process of creating new ideas. Ideation is often the most exciting stage in a Design Thinking project, because during Ideation, the aim is to generate a large quantity of ideas that the team can then filter and cut down into the best, most practical or most innovative ones in order to inspire new and better design solutions and products.

Ideation is the mode of the design process in which you concentrate on idea generation. Mentally it represents a process of 'going wide' in terms of concepts and outcomes. Ideation provides both the fuel and also the source material for building prototypes and getting innovative solutions into the hands of your users.

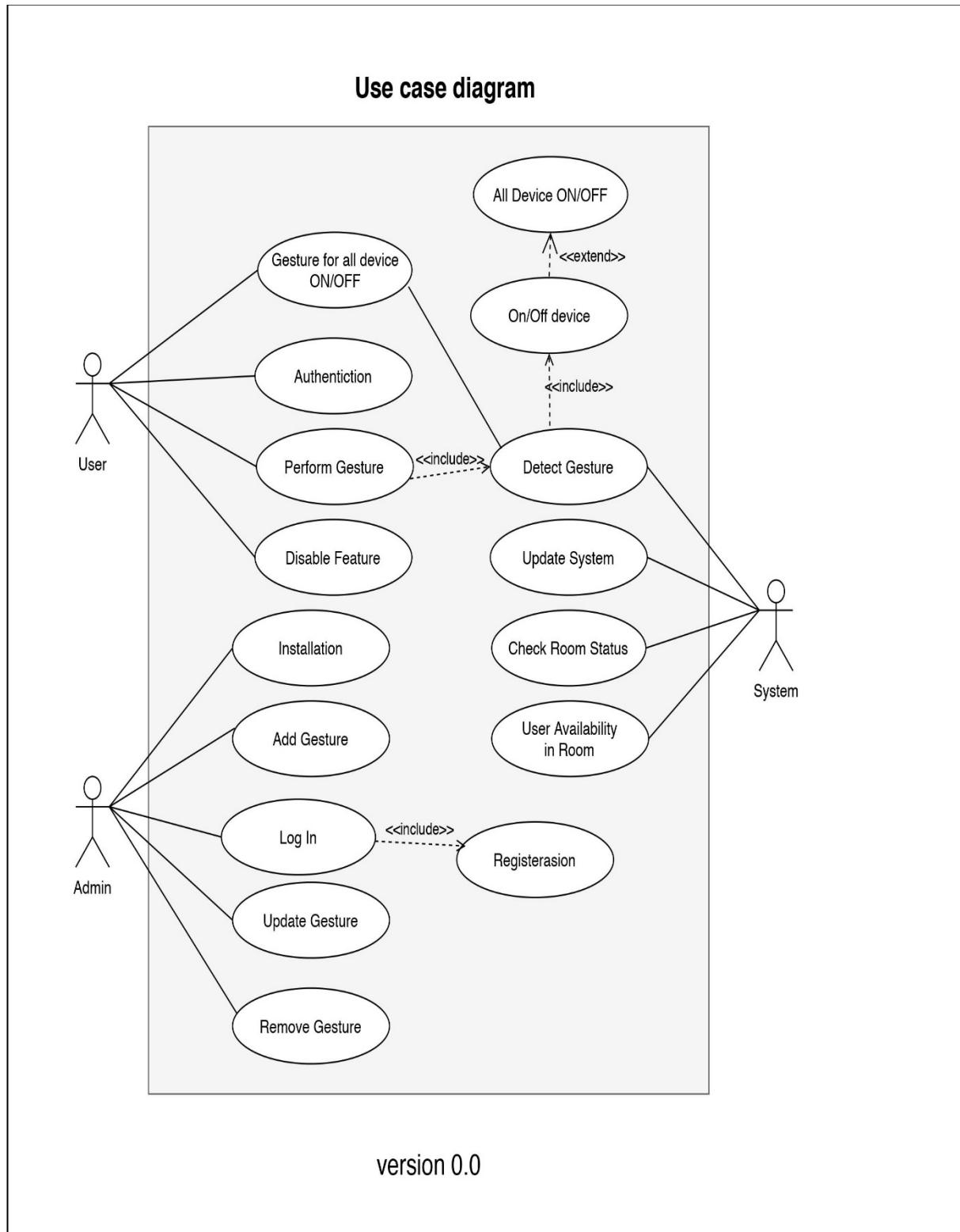
In this canvas we have mentioned about different users, activities, situation with context to the location and the possible props related to it.



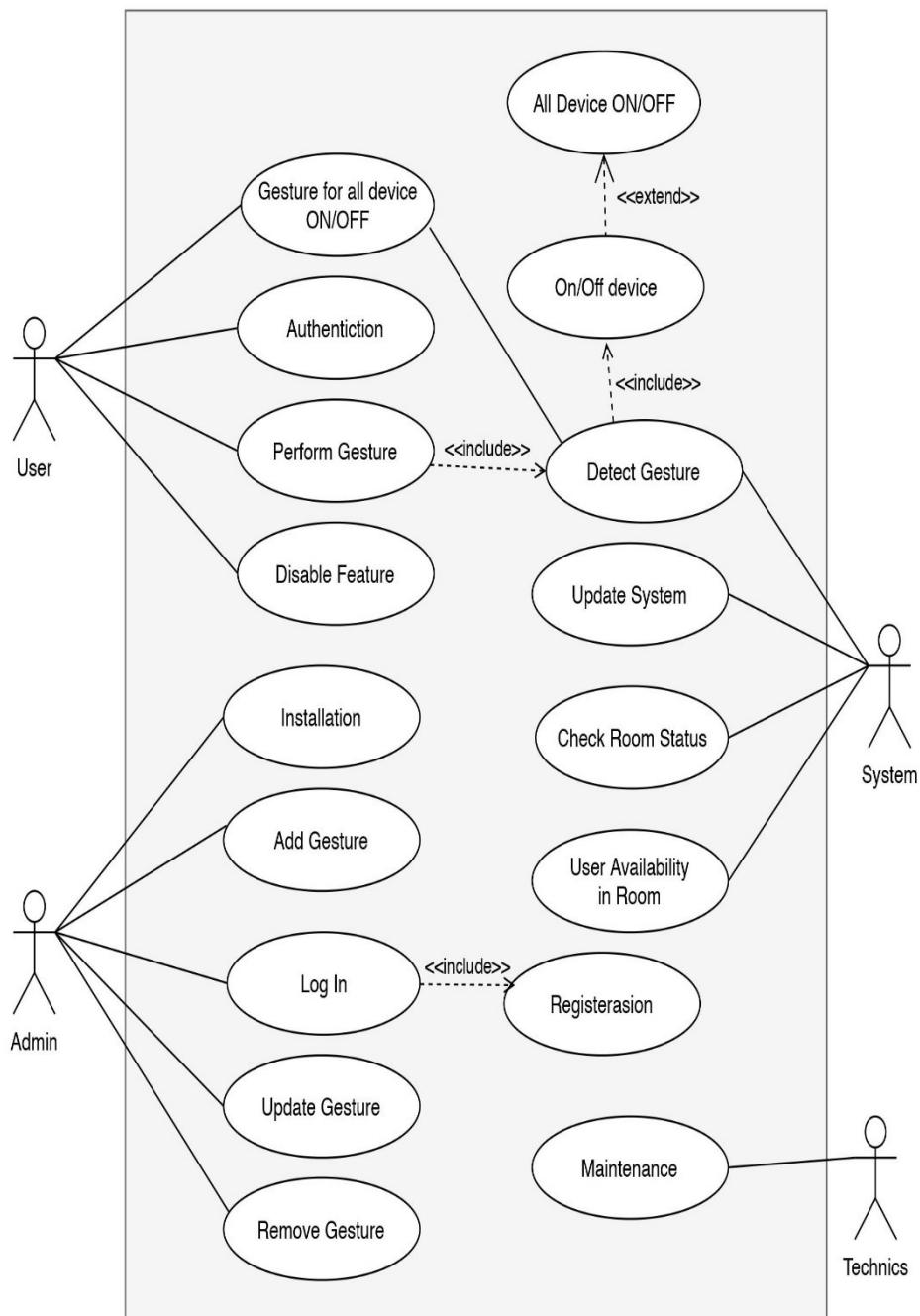
### 3.4 E-R Diagram



### 3.5 Use Case Diagram with iterations



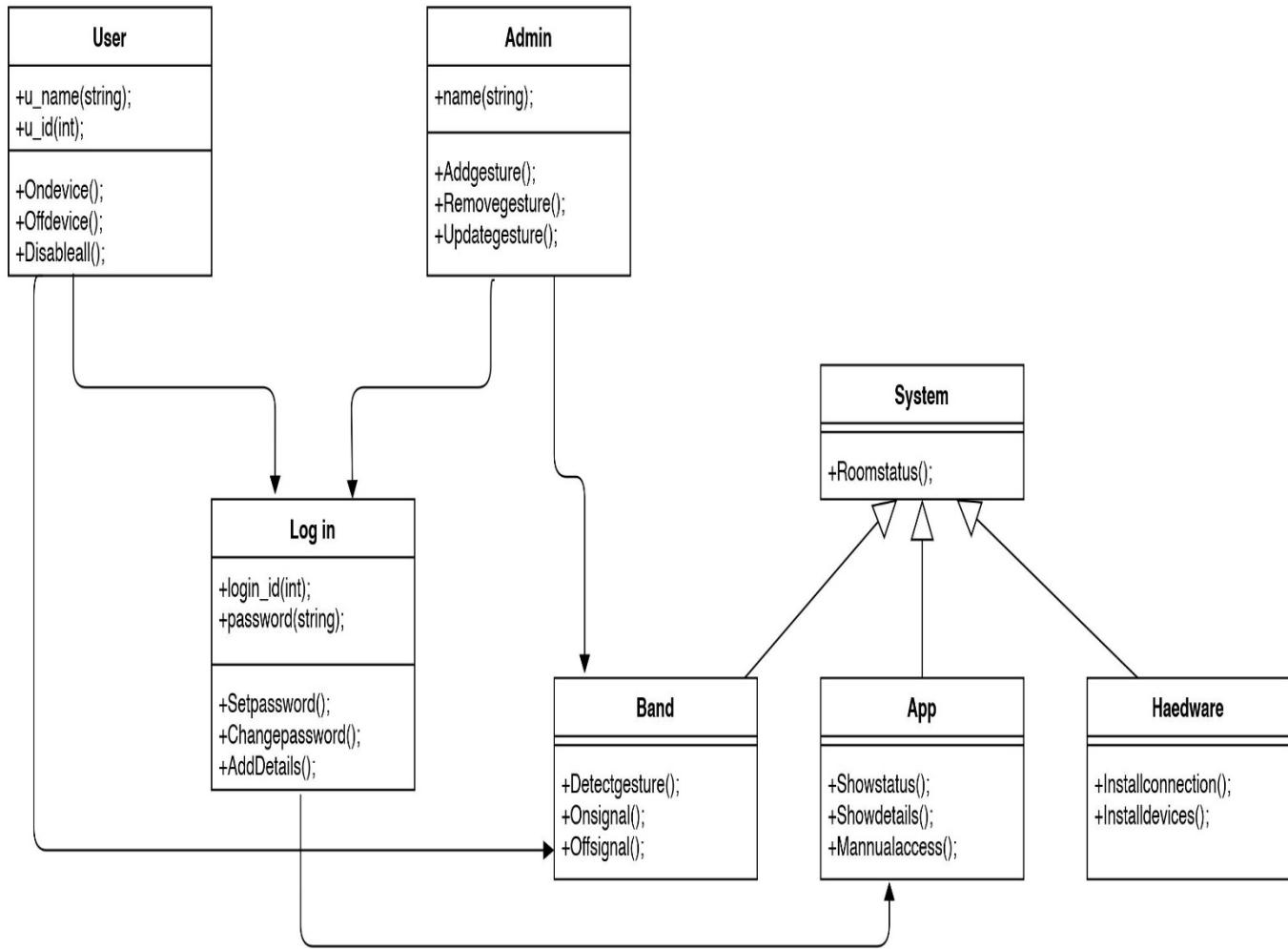
## Use case diagram



version 0.1

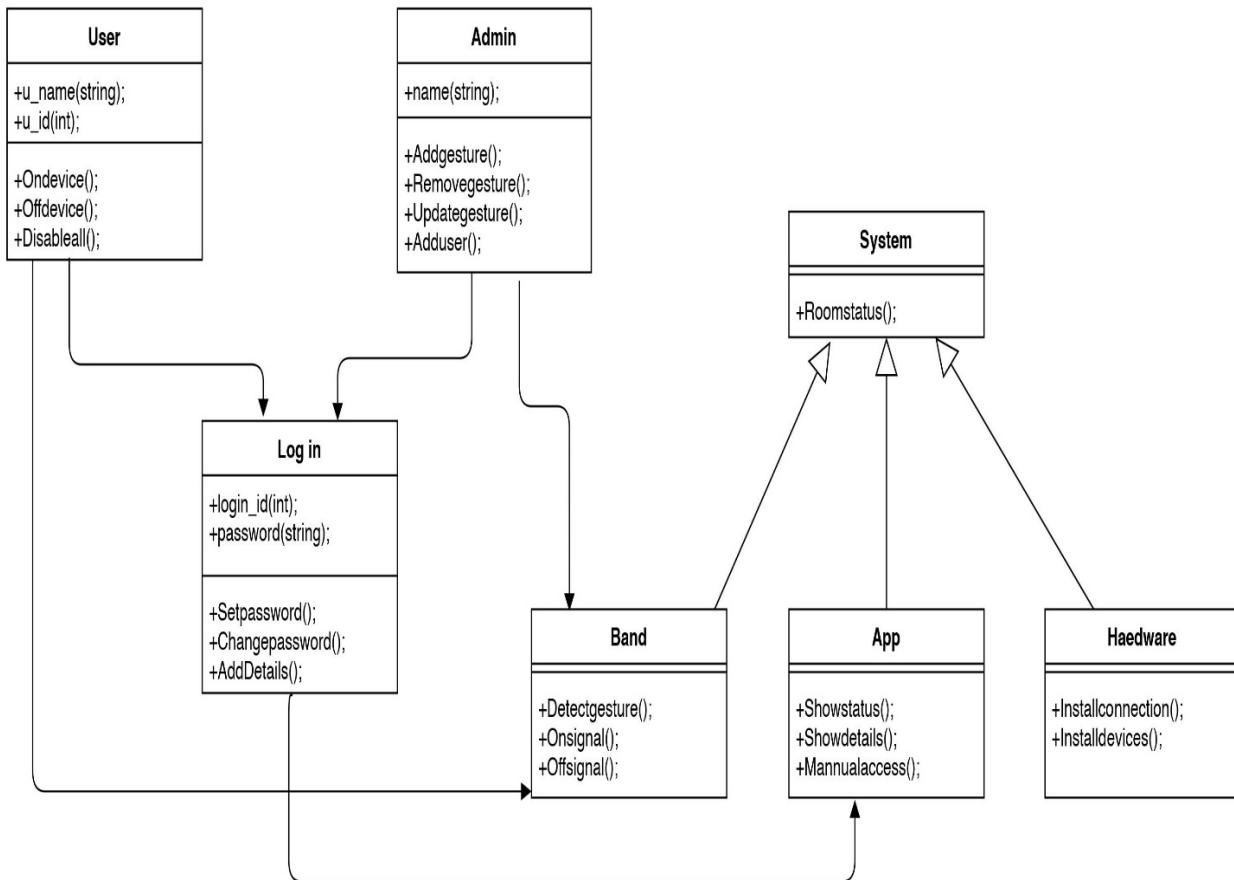
### **3.6 Class Diagram with iterations**

**Class diagram**



version 0.0

## Class diagram



version 0.1

### 3.5 Product Development Canvas

Product development typically refers to all of the stages involved in bringing a product from concept or idea, through market release and beyond. In other words, product development incorporates a product's entire journey.

Now arrive the important part of design process. We have to design a product based on a key solution. A key solution accordingly to our understanding was a solution which solves a key problem. Out of many possible solutions for multiple problems that were listed down in the Ideation phase, we recognized some problems that if solved would be very useful to everyone.

In this canvas, we mentioned purpose of our domain, product function and features, product experience, components.

#### **Iteration 1:**

 Purpose  A NEW SIGN TECHNOLOGY WHICH HELPS TO ACCESSING HOME APPLIANCES BY GESTURES, AND EASIER FOR ALL AGE PEOPLE.	 Product Experience  COMFORTABLE LIFE EASILY ACCESSIBLE	 Customer Revalidation
 People  OWNER  FAMILY MEMBERS	 Product Features  GESTURE SENSING DEVICE PROVIDE THE FACILITY IN ALL OVER THE HOME USER DEFINED GESTURE	 Reject, Redesign, Retain

## Iteration 2:

 Purpose  <b>A NEW SIGN TECHNOLOGY WHICH HELPS TO ACCESSING HOME APPLIANCES BY GESTURES, AND EASIER FOR ALL AGE PEOPLE.</b>	 Product Experience  <b>COMFORTABLE LIFE EASILY ACCESSIBLE NO LANGUAGE BARRIER</b>	 Customer Re-validation
	 Product Function  <b>GESTURE BASED CONTROL SYSTEM</b>  <b>ACCORDING TO SPECIFIC GESTURE SPECIFIC TASK IS PERFORMED</b>	
 People  <b>OWNER FAMILY MEMBERS</b>	 Product Features  <b>GESTURE SENSING DEVICE PROVIDE THE FACILITY IN ALL OVER THE HOME USER DEFINED GESTURE FOR SECURITY, UNIQUE GESTURE DETECTING BAND</b>	 Reject, Redesign, Retain
	 Components  <b>GESTURE DETECT SENSOR CAMERA SENSOR PROPER APPLICATION GESTURE DETECTING BAND</b> <b>ARDUINO UNO ACCELEROMETER GYROSCOPE</b>	

## Iteration 3:

Product Development Canvas		Team/Date/Version:
 Purpose  <b>A NEW SIGN TECHNOLOGY WHICH HELPS TO ACCESSING HOME APPLIANCES BY GESTURES, AND EASIER FOR ALL AGE PEOPLE.</b>	 Product Experience  <b>COMFORTABLE LIFE EASILY ACCESSIBLE NO LANGUAGE BARRIER EFFORTLESS CONTROL BEST SUITED FOR OLD AGE PEOPLE</b>	 Customer Re-validation
 People  <b>OWNER FAMILY MEMBERS</b>	 Product Features  <b>GESTURE SENSING DEVICE PROVIDE THE FACILITY IN ALL OVER THE HOME USER DEFINED GESTURE FOR SECURITY, UNIQUE GESTURE DETECTING BAND MOBILE APPLICATION OR WEB BASED SERVICES</b>	 Reject, Redesign, Retain

## 4 : FEEDBACK ANALYSIS

Feedback is the process of allowing customers to give transparent details about their experiences with a product or service. Feedback is very important as It points out aspects of your product that need improvement. We know that our product's every feature and application has been thought through and discussed by our team members thousands of times. Unfortunately, that is why we might not see its imperfections. So, feedback is very useful for the improvement of the product.



After completing the whole activity, we also tried to take reviews and feedback of different people by explaining them our final product. After getting to know about our product all of them gave different ideas and suggestions to make our project a better one. This helped to make our work a successful one. Some reviews of our project is:

- 1) It operates by any age person effectively.
- 2) Increase comfortness of life.
- 3) Easily accessible.
- 4) It is easy to set comfortable gestures for user, to what they won't for operates any electronic devices.
- 5) Accessible from any place of house (The device which is operate it should be in this place) is big advantage of this system.

## 5 : DETAIL DESIGN CALCULATIONS/DATA

### 5.1 Design for Performance, Safety and Reliability

- Performance measurement is the process of collecting, analyzing and/or reporting information regarding the performance of an individual, group, organization, system or component.
- Reliability is the ability of an item to perform are required function under stated conditions for a stated period of time.
- Safety is the state of being "safe", the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequences of failure, damage, error, accidents, harm or any other event which could be considered non-desirable.

### 5.2 Design for Ergonomics and Aesthetics

- Ergonomics is a man-machine relationship and the application of anatomical, physiological, psychological principles to solve the problem arising from man-machine relationship, including health, safety, convenience and comfort.
- Aesthetics is concerned with how things look including shape, texture, color, symmetry and simplicity.

### 5.3 Design for Manufacturability and Assembly (DFMA)

- Design for Manufacturability (DFM) – which means for ease of manufacturing of parts/components of final product.
- Design for Assembly (DFA) – which means manufactured parts can be easily assembled to form a final product.

### 5.4 Design for Cost, Environment (Cost Estimation with COCOMO, FP model)

**Using COCOMO :-** Our system has complexity of the type semidetached where team members have limited experience on such type of systems. Cost for such systems using basic COCOMO can be calculated as follows:-

$$\text{Effort} = 3.6(\text{KLOC})^{1.12}\text{PM}, \text{KLOC}=\text{kilo lines of code}$$
$$= 3.6(1.5)^{1.12} = \mathbf{3.6 \text{ PM}}$$

$$T_{\text{dev}} = 2.5 (\text{Effort})^{0.35} \text{Months}$$
$$= 2.5(3.6)^{0.35} = \mathbf{3.76 \text{ Months}}$$

**Using FP :-** Our system consists of 4 EXTERNAL INPUT, 2 EXTERNAL OUTPUT, 1 EXTERNAL INQUIRIES, 1 INTERNAL LOGIC FILE and 4 EXTERNAL INTERFACES and our weighting factor is average.

$$\text{FP} = \text{Total Count} * [0.65 + 0.01 * \sum (F_i)]$$

$$\text{Total Count} = 102$$

$$F_i = 49$$

$$\text{FP} = 102 * [0.65 + 0.01 * 49] = \mathbf{116.28}$$

## **5.5 Modelling and Analysis using Software**

**Analysis Model** is a technical representation of the system. It acts as a link between system description and design model. In Analysis Modelling, information, behaviour and functions of the system is defined and translated into the architecture, component and interface level design in the design modelling.

### **Objectives of Analysis Modelling:**

- ✓ It must establish a way of creation of software design.
- ✓ It must describe requirements of customer.
- ✓ It must define set of requirements which can be validated, once the software is built.

## **5.6 Prototyping and Proofing of Concepts**

- A Proof of Concept (POC) is a small exercise to test the design idea or assumption.
- The main purpose of developing a POC is to demonstrate the functionality and to verify a certain concept or theory that can be achieved in development.
- Prototyping is a valuable exercise that allows the innovator to visualize how the product will function, it is a working interactive model of the end product that gives an idea of the design, navigation and layout.
- While a POC shows that a product or feature can be developed, a prototype shows How it will be developed.

## **5.7 Engineering Economics of Design**

- Economics is an important aspect of engineering design.
- Cost, Time and Market are frequently noted as important factors in:
- Needs/Goal Statement.
- Mission Statement.
- Objectives/ Constraints.
- Decision making process.
- Evaluation of Design.
- Documentation.

## **5.8 Design for Use, Reuse and Sustainability**

- Sustainable design seeks to reduce negative impacts on the environment, and the health and comfort of building occupants, thereby improving building performance.
- The basic objectives of sustainability are to reduce consumption of non-renewable resources, **minimize** waste, and create healthy, productive environments.
- Utilizing a sustainable design philosophy encourages decisions at each phase of the design process that will reduce negative impacts on the environment and the health of the occupants, without compromising the bottom line.
- It is an integrated, holistic approach that encourages compromise and tradeoffs. Such an integrated approach positively impacts all phases of a building's life-cycle, including design, construction, operation and decommissioning.

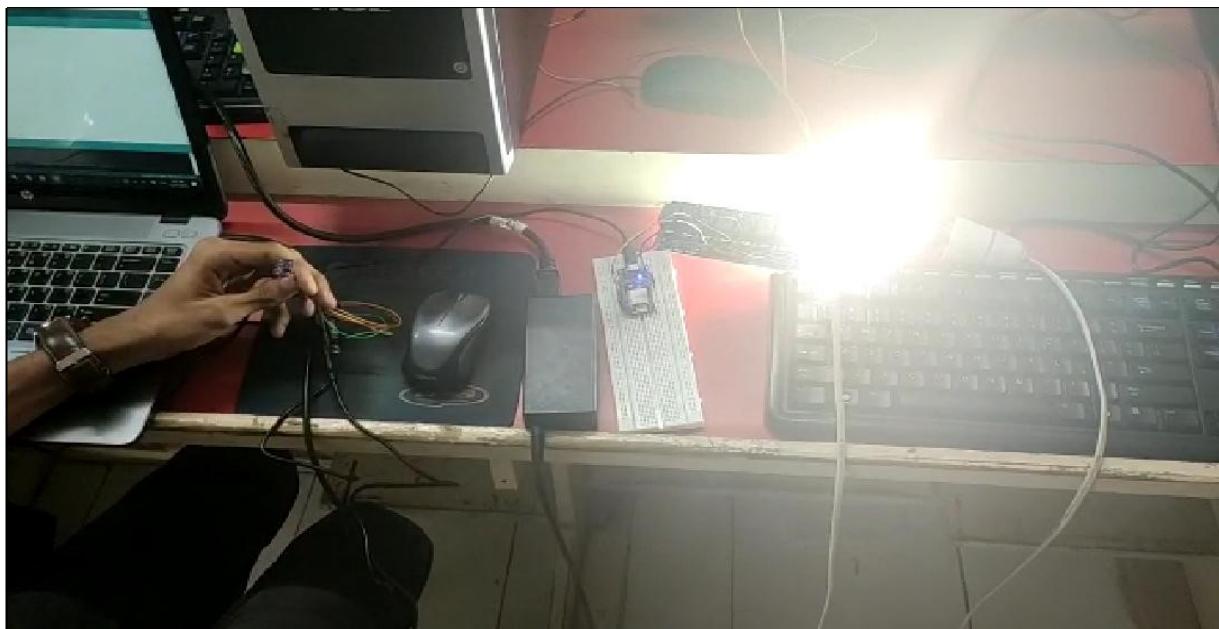
## **5.9 Test For Prototype**

Discuss in detail in Section 6 (Page No. : 26)

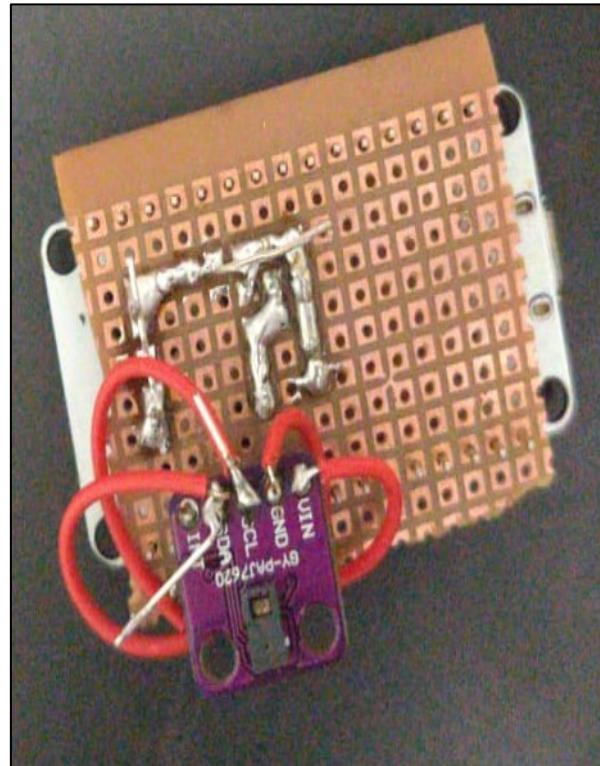
## **5.10 Ethics in Design**

- Design ethics concerns moral behaviour and responsible choices in the practice of design.
- It guides how designers work with clients, colleagues, and the end users of products, how they conduct the design process, how they determine the features of products, and how they assess the ethical significance or moral worth of the products that result from the activity of designing.
- Design is the human power of conceiving, planning, and bringing to reality all of the products that serve human beings in the accomplishment of their individual and collective purposes.
- These dimensions represent the web of means and ends that are the central concern of ethics and moral conduct in design.
  - a) **Character and Personal Values**
  - b) **Integrity of Performance**
  - c) **Product Integrity**
  - d) **Ethical Standards and the Ultimate Purpose of Design [6]**
- In our Project Gest-O-Home we work on Structural Integrity of form means technological reasoning that ensures the proper performance of a product so that it is useful in supporting an activity. Technological reasoning means employing mechanical and electrical principles in an efficient and safe relationship. In computer software best practices of program layout in order to create efficient and reliable computation and, increasingly, security of information.
- We gives product features such as operating controls, control surfaces, information displays, that allow human beings to access and operate a product—or deliberately prevent dangerous access or operation of a product—and maintain it in a safe and reliable condition. Which is Usability of form.
- We makes a product desirable to possess and use and this is the aesthetic element.

## 6: PROTOTYPING & TESTING



The screenshot shows the Firebase Realtime Database interface. At the top, it displays the URL <https://home-automation-ed077.firebaseio.com/>. Below the URL, there are tabs for Data, Rules, Backups, and Usage. The main area shows a tree view of the database structure under the root node 'home-automation-ed077'. The structure includes four child nodes: 'AMBULANCE' (value: false), 'DOOR' (value: false), 'FAN' (value: false), and 'LAMP' (value: false).



## Testing:

### Black Box Testing:-

- Black Box Testing is a software testing method in which the internal structure/ design/ implementation of the item being tested is NOT known to the tester.
- This is generally used for higher levels of testing.
- For the Black Box Testing programming knowledge is not required.
- We just have to check the validation of the system.

### Admin Login

Title	Admin Login Successful
Pre-Conditions	Fill Required Data
Test Steps	<ol style="list-style-type: none"> <li>1. Enter User Id</li> <li>2. Enter Password</li> <li>3. Click on “login”</li> </ol>
Expected Result	Login Successful

### User Login

Title	User Login Successful
Pre-Conditions	Fill Required Data
Test Steps	<ol style="list-style-type: none"> <li>1. Enter User Id</li> <li>2. Enter Password</li> </ol>

	3. Click on “login”
Expected Result	Login Successful

### **User Registration**

Title	User Registration Successful
Pre-Conditions	Fill Required Data
Test Steps	<ol style="list-style-type: none"> <li>1. Enter First Name</li> <li>2. Enter Last Name</li> <li>3. Enter E-mail Id</li> <li>4. Enter Mobile No.</li> <li>5. Create Password</li> <li>6. Confirm Password</li> <li>7. Click on “Submit”</li> </ol>
Expected Result	Registration Successful

## **7 : CONCLUSION**

On analyzing various problems faced mainly by residential people is for on\off switch one has to going near to witch board, but by using gesture based smart home. So by proper hand movement one can easily do any operation and this will give full comfortness of any electronic device. This will give easier life to the user.

### **Future Scope:**

- Our idea will helpful for increase the comfortness of normal lifestyle. It also applies the advance technology in real life.
- That project will solve many problems of different group age people. That kind of technology may be useful in any other fields like health sector, government sector, transportation sector and many more.
- This gesture control may be replaced with mind vibes.
- We can think in that field which can allow us to use that kind of facilities by only thinking of that action. That all are assumption but science also research on that field also, so we can be able to devolve that kind of equipment that done this idea in possible.

## **8: REFERENCES**

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