1.Conceptual Models:

Conceptual model 1:

This model is basically a web application that has a navigation bar to help you hop from one page to another. It makes use of icons for easy use and memorability, so that the user is able to know where to go and what to do.

- **metaphors and analogies:**
    - Using visual icons such as a house for home button, camera icon for the camera sensor, thermometer icon for the temperature sensor, and the moving ball icon for the movement sensor. There is also a gear icon for settings.
- **Interaction types:**
    - Drop down menu to next to name of room in the navigation bar to enable you to go to other rooms.
- **concepts**: user (with attributes: user-id, username, password and type), room (with attributes: room name, room-id), sensor (sensor id, sensor type, sensor name and description) and event (sensor id, is-enabled, sensor data)
- **relationships**:
    - A user has rooms.
    - Rooms have sensors.
    - Sensors trigger events.
- **mappings**:
    - Each sensor in the system corresponds to the physical sensor in the room.
    - Each room in the system corresponds to the physical room.
    - Each switch mechanism in the system corresponds to the physical switch, that can override the LDR sensor (by turning the light on or off manually)

Conceptual Model 2:

A collection of linked pages, where the history of pages you have gone through to arrive here is shown. Uses a side navigation bar.

- **metaphors and analogies:**
    - Using visual icons such as a house for home button, thermometer for temperature sensor and Light bulb for light sensor.
    - On and off switch mechanism on the interface is reminiscent of a physical switch that you can toggle on and off.

- **Interaction types:**
    - Drop down menu arrows, instructing command.
    - Feedback from buttons, such as colour change.
- **concepts**: user (with attributes: user-id, username, password and type), room (with attributes: room name, room-id), sensor (sensor id, sensor type, sensor name and description) and event (sensor id, is-enabled, sensor data)
- **relationships**:
    - A user has rooms.
    - Rooms have sensors.
    - Sensors trigger events.
- **mappings**:
    - Each sensor in the system corresponds to the physical sensor in the room.
    - Each room in the system corresponds to the physical room.
    - Each switch mechanism in the system corresponds to the physical switch, that can override the LDR sensor (by turning the light on or off manually)

Conceptual Model 3:

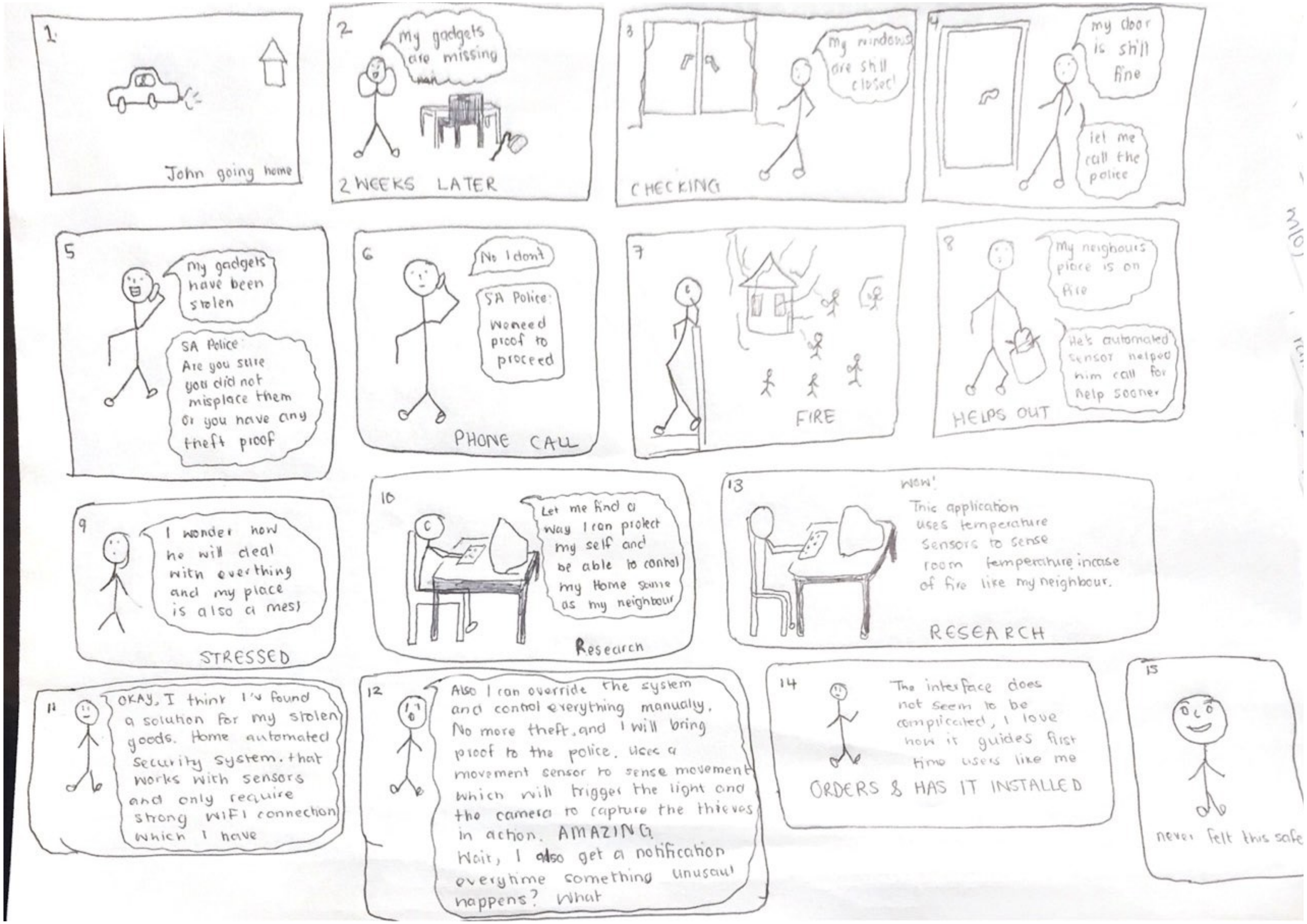
Also collection of linked pages, where the history of pages you have gone through to arrive here is shown. Also has a top navigation bar.

- **metaphors and analogies:**
    - On and off switch mechanism on the interface is reminiscent of a physical switch that you can toggle on and off.
- **Interaction types:**
    - Drop down menu arrows on the specific room for the admin side, instructing to add or delete the room.
    - Feedback from buttons, such as colour change.
- **concepts**: user (with attributes: user-id, username, password and type), room (with attributes: room name, room-id), sensor (sensor id, sensor type, sensor name and description) and event (sensor id, is-enabled, sensor data)
- **relationships**:
    - A user has rooms.
    - Rooms have sensors.
    - Sensors trigger events.

- **mappings**:
    - Each sensor in the system corresponds to the physical sensor in the room.
    - Each room in the system corresponds to the physical room.
    - Each switch mechanism in the system corresponds to the physical switch, that can override the LDR sensor (by turning the light on or off manually)

We are choosing the first the conceptual model based on simplicity, understandability and easy navigation. It is more user friendly.

2.1. Storyboard Model


1.
John going home
2
My gadgets are missing
2 WEEKS LATER
3
My windows are still closed!
CHECKING
4
my door is still fine
let me call the police
5
My gadgets have been stolen
SA Police: Are you sure you did not misplace them or you have any theft proof
6
No I dont
SA Police: We need proof to proceed
PHONE CALL
7
FIRE
8
My neighbours place is on fire
He's automated sensor helped him call for help sooner
HELPS OUT
9
I wonder how he will deal with everthing and my place is also a mess
STRESSED
10
Let me find a way I can protect my self and be able to control my Home same as my neighbour
Research
13
Wow!
This application uses temperature sensors to sense room temperature incase of fire like my neighbour.
RESEARCH
11
OKAY, I think I'v found a solution for my stolen goods. Home automated Security system. that works with sensors and only require strong WIFI connection which I have
12
Also I can override the system and control everything manually. No more theft, and I will bring proof to the police. Uses a movement sensor to sense movement which will trigger the light and the camera to capture the thieves in action. AMAZING. Wait, I also get a notification everytime something unusual happens? What
14
The interface does not seem to be complicated, I love how it guides first time users like me
ORDERS & HAS IT INSTALLED
15
never felt this safe

User Feedback:

“Does the system automatically call the helpline or should I?”

“Can I get the alert via sms. So that I don't have to log into the app to see the notifications”

2.2. Card Based Prototype

The card based prototype is attached again below the document for better viewing.

User Feedback:

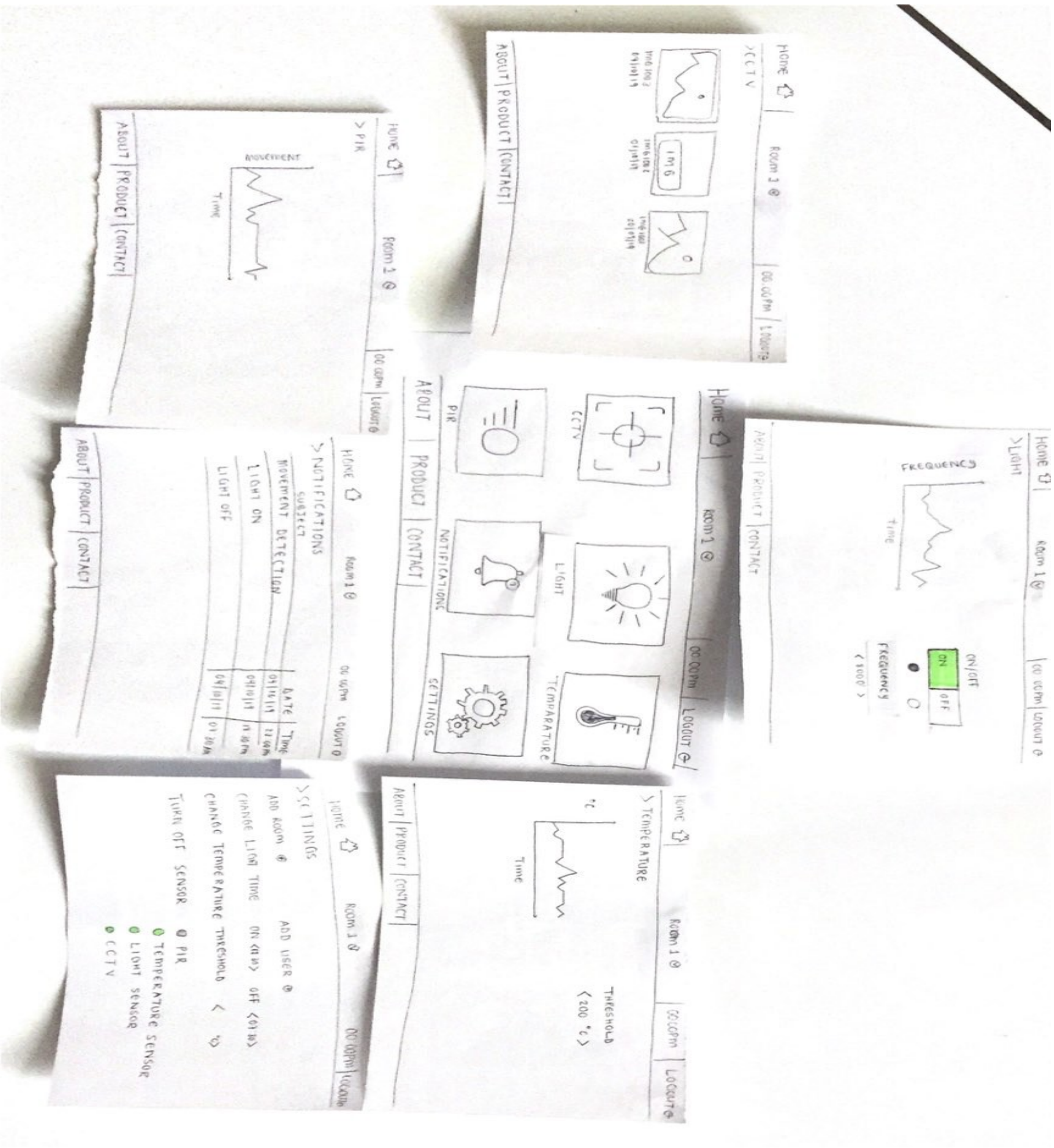
“I like the green to indicate when light is on”

“Calling the camera sensor part CCTV doesn't make sense to me. I would rather you call it CAM”

“The system looks easy to use”

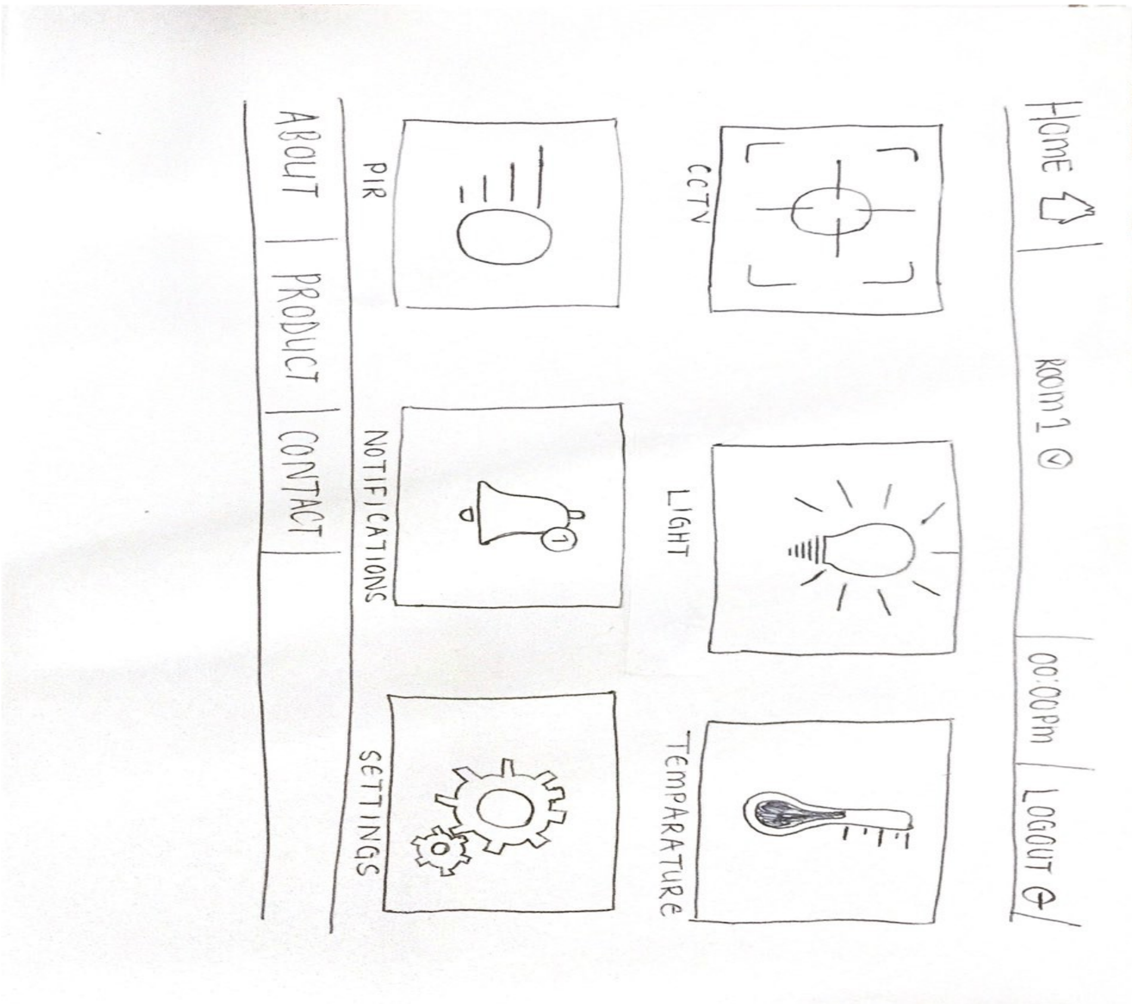
“I'd like some colour. It looks rather bland at the moment”

“I'd like to be able to rename the room name instead of it being just 'room 1'”



3.Sketch of Application Main Screen

The sketch is below



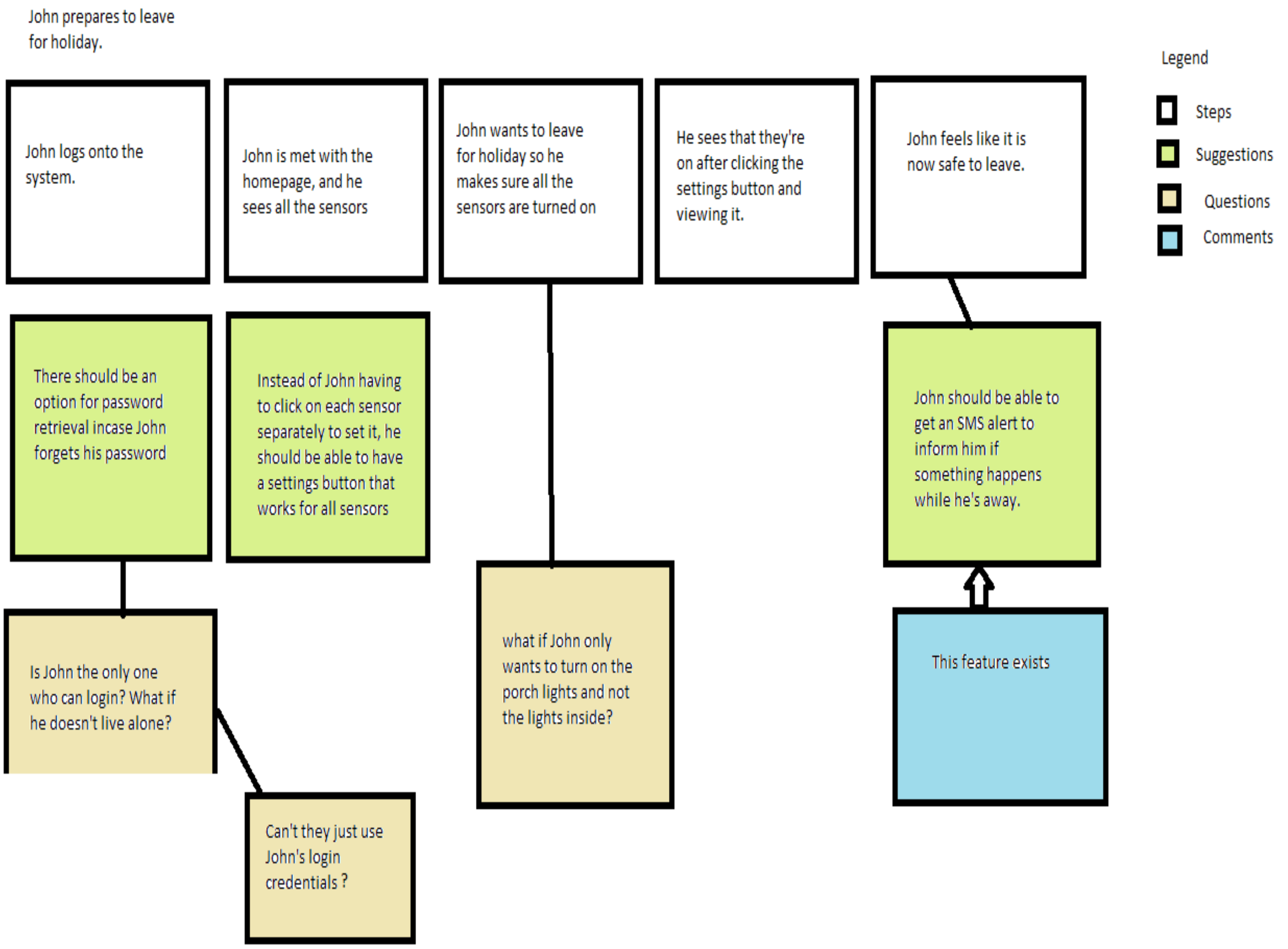
Where am I? : We decided it would work best if the user is met with the sensor icons at first glance. We particularly chose icons instead of just words because it is so much more aesthetically pleasing to see pictures instead of words.

What's here?: There are also words beneath the sensor icons to explicitly show which sensor is which and so the user knows exactly what is there, and when they click on that icon they know information about that particular sensor will show up.

Where do I go?: The icons also helps the user remember where to go for what very easily, when they see the thermometer icon they can immediately think “Oh, there's where I go for the temperature”

All of this makes it easier for the user to use the application and understand how it works.

4. Experience Map



John prepares to leave for holiday.

John logs onto the system.

There should be an option for password retrieval incase John forgets his password

Is John the only one who can login? What if he doesn't live alone?

Can't they just use John's login credentials ?

John is met with the homepage, and he sees all the sensors

Instead of John having to click on each sensor separately to set it, he should be able to have a settings button that works for all sensors

John wants to leave for holiday so he makes sure all the sensors are turned on

what if John only wants to turn on the porch lights and not the lights inside?

He sees that they're on after clicking the settings button and viewing it.

John feels like it is now safe to leave.

John should be able to get an SMS alert to inform him if something happens while he's away.

This feature exists

Legend

- □ Steps
- 🟩 Suggestions
- 🟨 Questions
- 🟦 Comments

5. The application allows you to toggle/play with physical sensors in the house but you get to do it on your phone. As the primary user you can decide to change, for example, the desired temperature threshold. So since the sensor is meant to alert you if the temperature crosses a certain threshold, you are able to change that threshold.

The product differs from the products that typically emerge from the Maker Movement in the sense that it's not a “install-it-yourself” type of system. While you can play around with the virtual switches etc, you cannot as a user physically install or build the sensors yourself.

We are making use of Bootstrap which is a responsive framework for developing with html, css and javascript. It has many in-built components which you can easily drag and drop to assemble responsive webpages.

6. Given the fact that we had very little time on our end, conducting the user research remotely is the method that we have selected as it allows us to move faster and be more flexible, fitting into the agile process. It doesn’t take long to configure studies for remote participants (*using any cloud services such as Google Forms/Sheets*), and results can be collected quickly at a relatively low or negligible cost. This gives us an insight into the return on their investment and allows us to progress through the next cycle quickly.

1) Search for users’ need, 2) Refine search, 3) View existing product details, 4) Adjust requirements to users’ need. For each of the steps, ask the analyst to provide review to describe how they’re feeling towards the product at that point in time. Once they’ve provided their feedbacks, ask them whether they can expand on this and explain why it is they feel this way. This technique allows the design/develop team to then bridge the gap between what the user currently feels (As Is) and what they expect from the product (To Be).

The basic steps are the following:

- Initial Research looking at As Is and To Be scenarios

- Use it to benchmark against competitors by modifying slightly

- Use it to help validate the design

The outcome of this method is that it allows our team to understand a user’s emotion at the different stages of the user journey as well as how they would want to feel at this stage with reasoning. Having gathered this information, our product team can then look to implement changes which aim to improve the experience for our users overall and not simply implementing direct feedback from users and our analyst in our team which may be without context. We used the card model, feedback reviews and prototyping to recreate the perfect use case scenario. We spent a lot of time asking people who have previously used similar products, what are their emotions and point of view on the different flaws encountered on those products.

Some of the benefits we found:

- Rich information

- Allows our stakeholders to be open and honest

- Doesn’t cost much and easy to set-up
- Able to be completed remotely

7. Link to mockup of homepage: https://drive.google.com/open?id=1bnGEM9AZwMQ8PZeWQ0Ef5hkKvvUKqqm8

8. Link to modified prototype:

https://drive.google.com/drive/folders/1BFP8iv6r6h-eOV8GyB7gF-7vl68GvB5O?usp=sharing

Dashboard interface provides critical, pertinent data at a glance.

a) Assistant dialogue - A user is using the interface for the first time. He/She does not know what is where on the interface. A see-through layer will be positioned over the screen to visually explain how to use the interface. This layer will be present only the first time the user uses the system.

Accelerator - If too much information is presented at once, users might suffer from analysis paralysis. Some content will be hidden by default. Users who are interested in viewing this content will have to click on accelerators (button or other widgets) to see it. This keeps the interface as simple as possible.

one-hand design- Users do not want to use their whole body to interact with the system. They would rather multi-task.

A one-hand design will be used for the mobile version of the interface. This design will enable users to interact with the system without repositioning the holding hand or using a second one.

Database Side

Entities

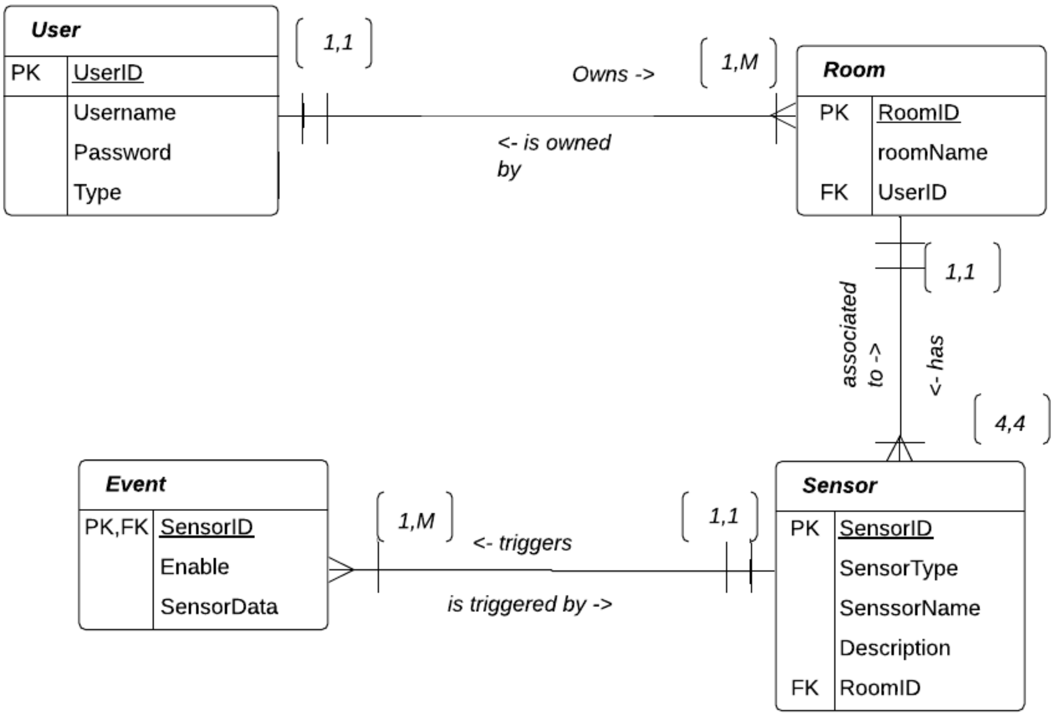
1. User
2. Room
3. Sensor
4. Event

Business Rules

- 1 User owns Many Rooms, at least one
- 1 Room is owned by 1 User, exactly one
- 1 Sensor is associated to 1 Room, exactly one

- 1 Room has Many Sensors, exactly 4
- 1 Event is triggered by 1 Sensor, exactly one
- 1 Sensor triggers Many Events, at least one

Entity Relationship Diagram (ERD)



User
PK
UserID
Username
Password
Type
1,1
Owns ->
<- is owned by
1,M
Room
PK
RoomID
roomName
FK
UserID
1,1
associated to ->
<- has
4,4
Event
PK,FK
SensorID
Enable
SensorData
1,M
<- triggers
is triggered by ->
1,1
Sensor
PK
SensorID
SensorType
SenssorName
Description
FK
RoomID