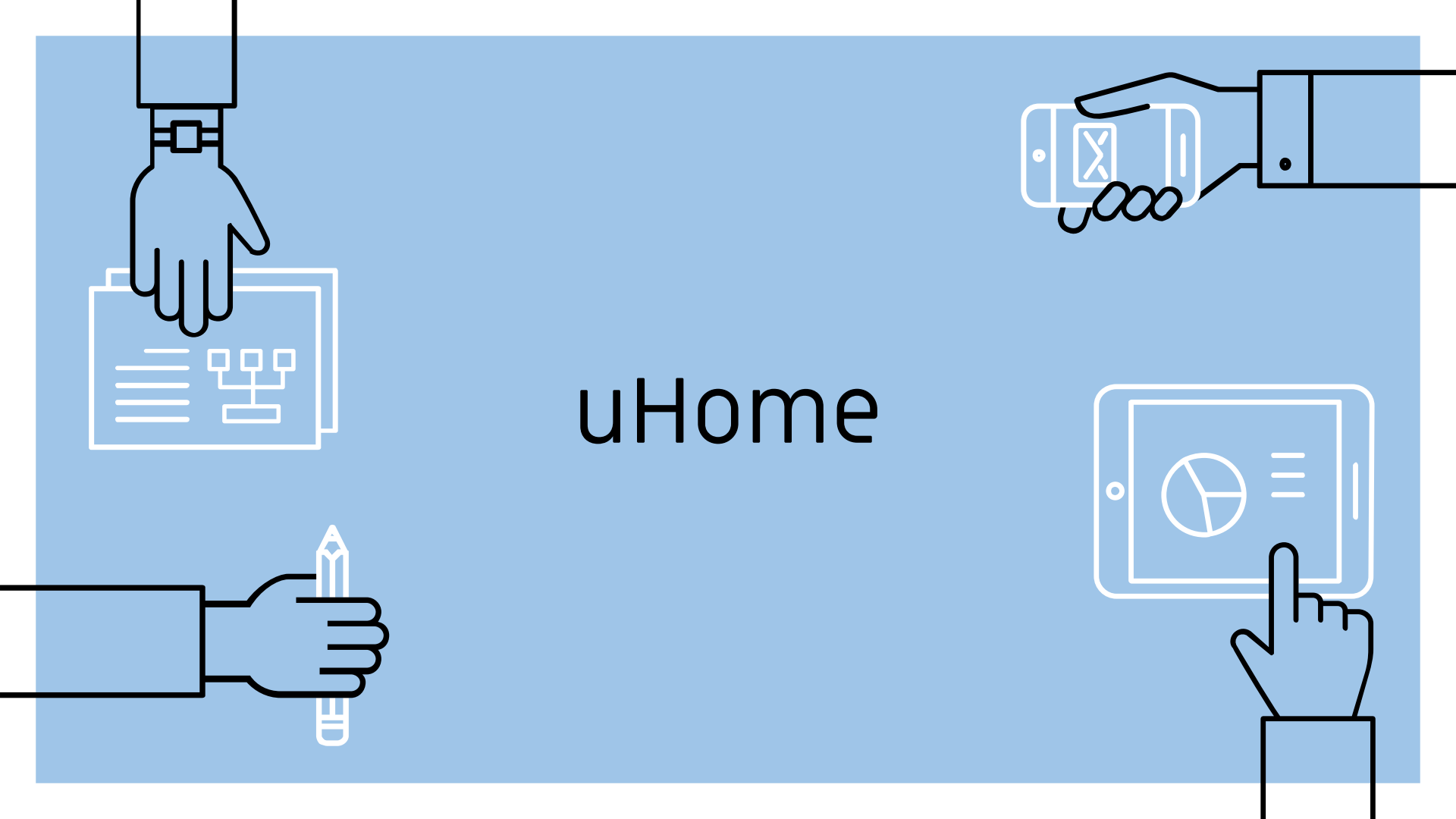
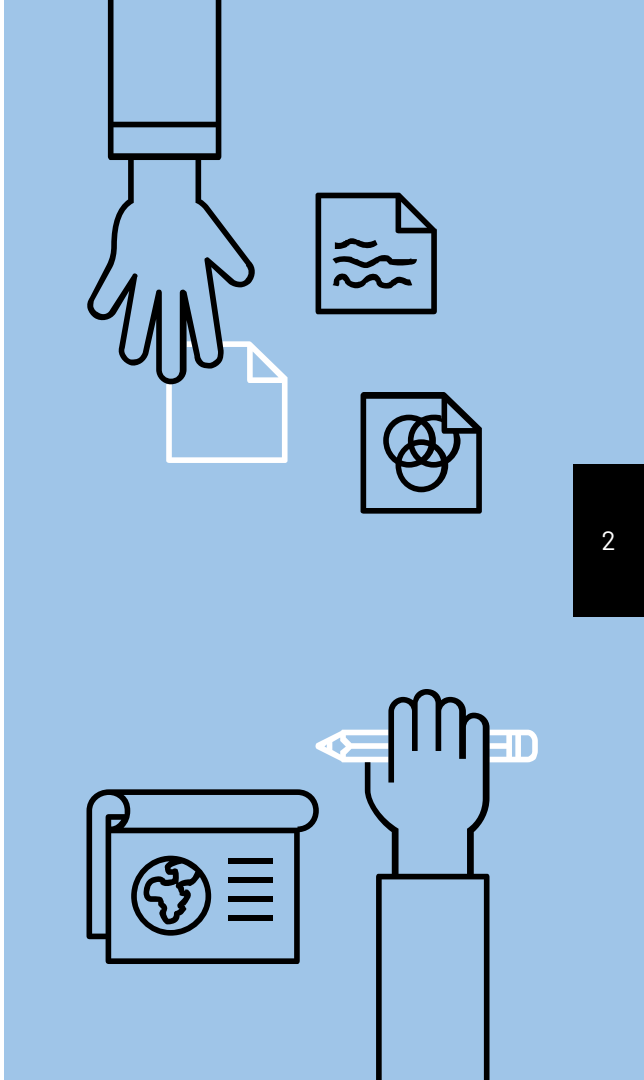
uHome



CONTENT

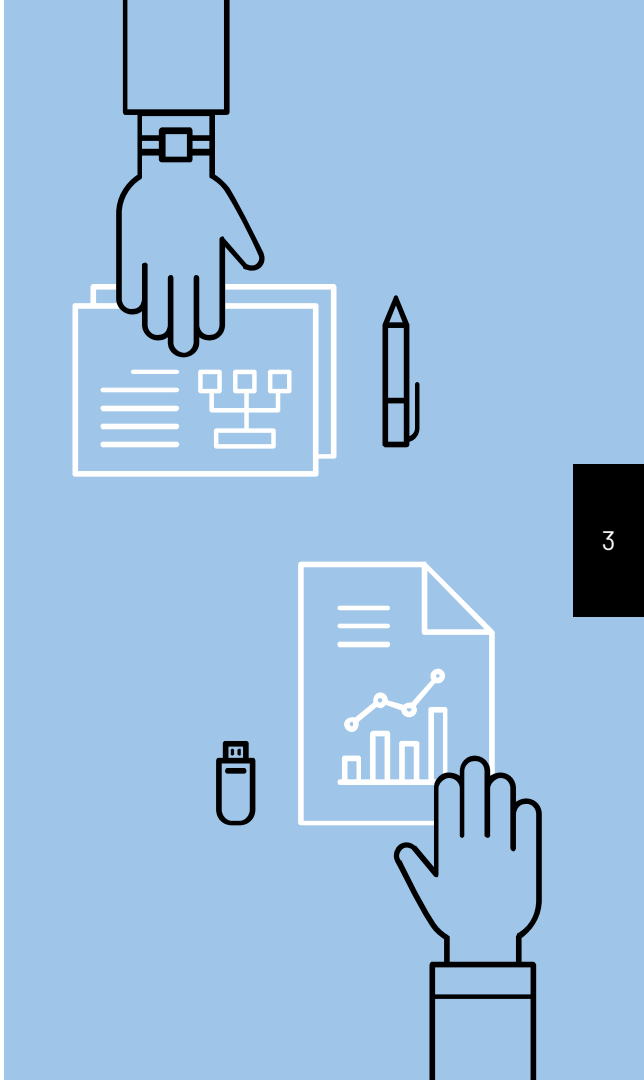
- Background and Motivation
- Objective and Scope
- Literature Review
- Methodology
- Expected Results
- Timeline



Background and Motivation

- Smart homes
  - Multiple applications
  - Not interconnected

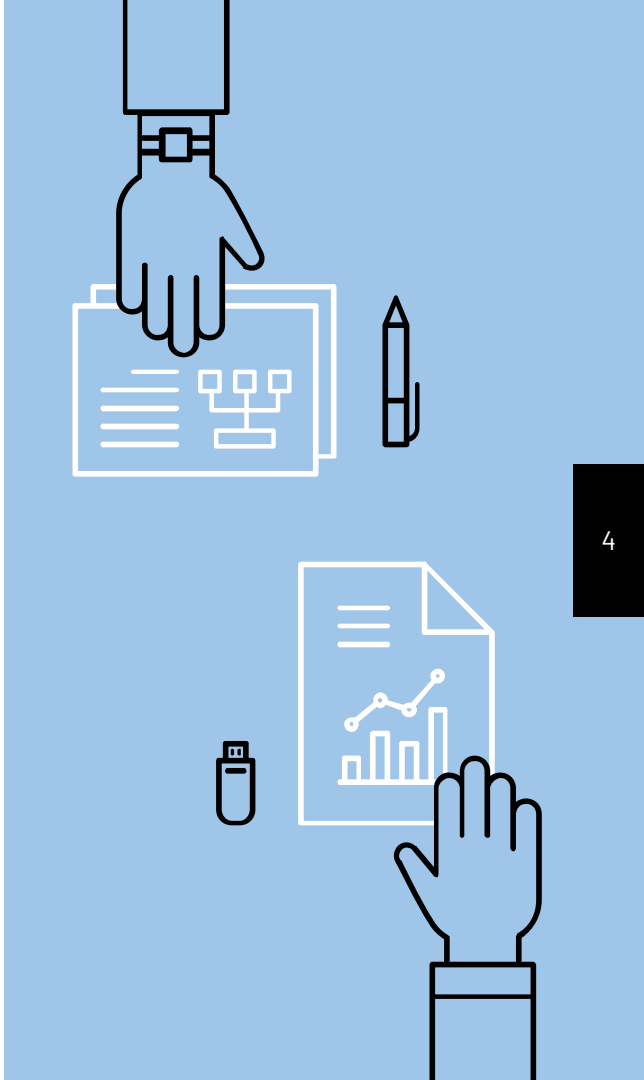
- Home for elderly people
  - User friendly
  - Monitoring



Objective (1)

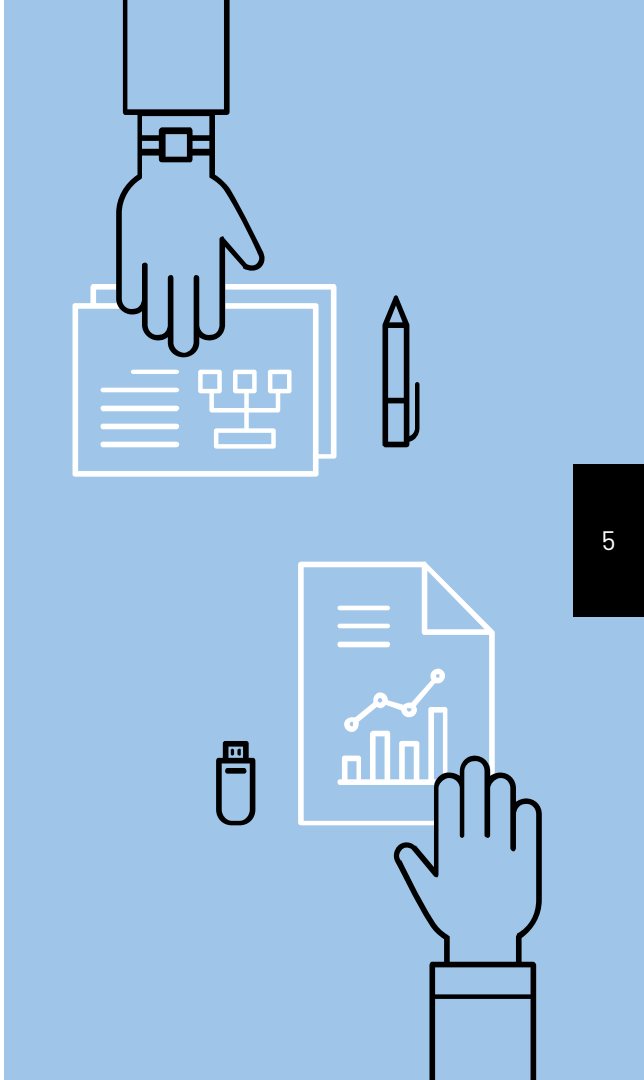
- To develop a platform that can support the use of IoT devices in the home environment including adding, removing and managing iot devices

- To develop a mobile application to control the IoT devices in a smart home.



Objective (2)

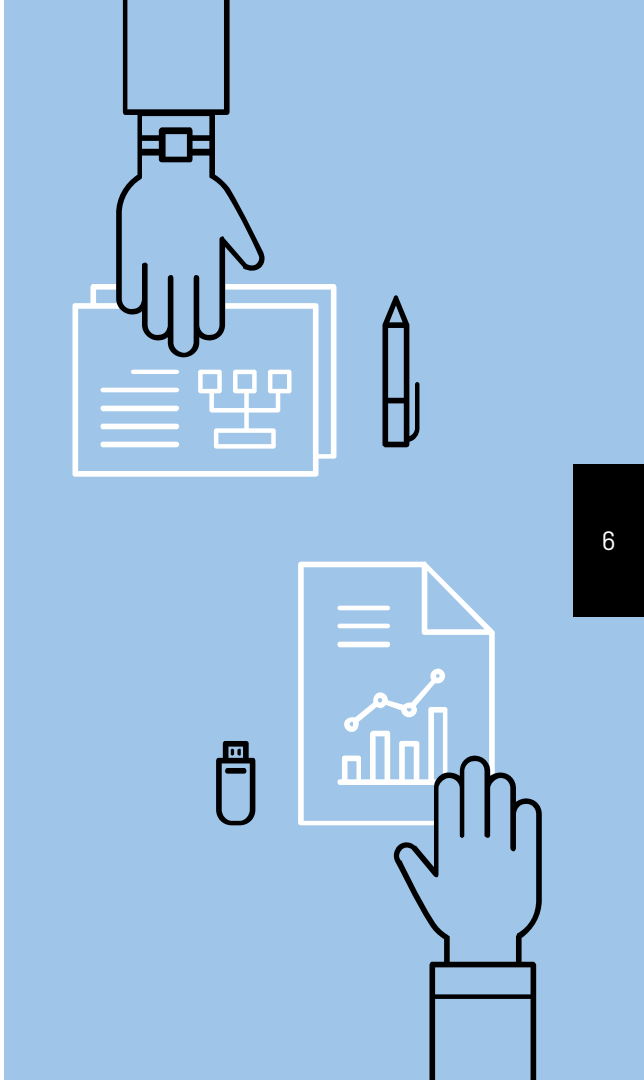
- To integrate the uHome platform with IoT devices including camera, beacons and lights.
- To use a camera to monitor a person in a room.
- To use Beacons in order to trigger events.



Objective (3)

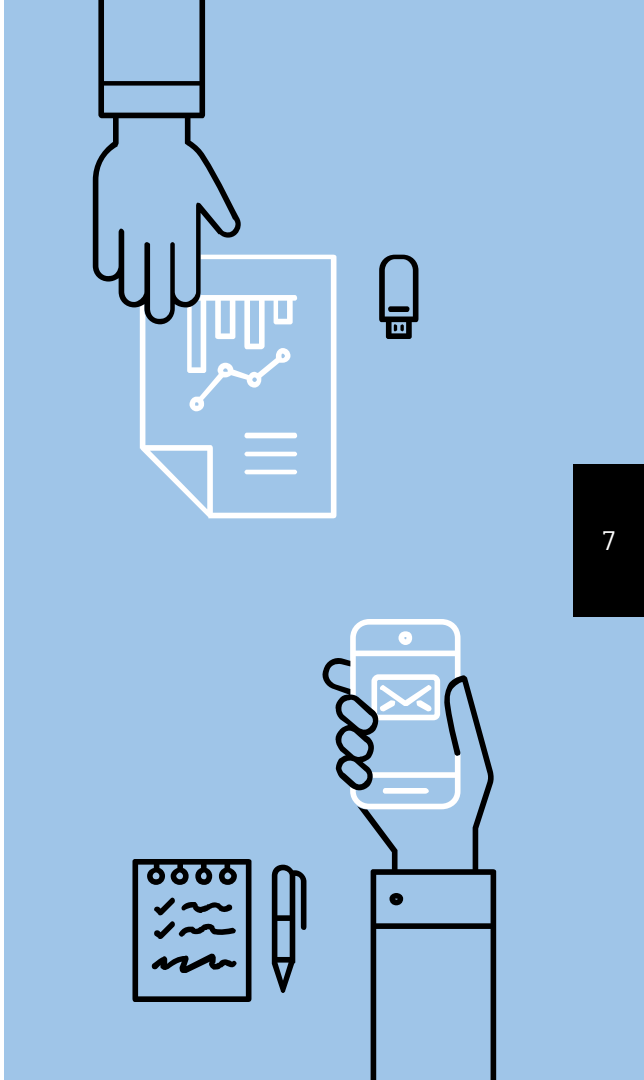
- To use the data from other sources in order to automate the house based on their profile.

  - Retrieve data from device that connect through the internet connection.
  - Collect data from the internet for weather forecast and sunrise and sunset time.
  - Store the data on a cloud server.



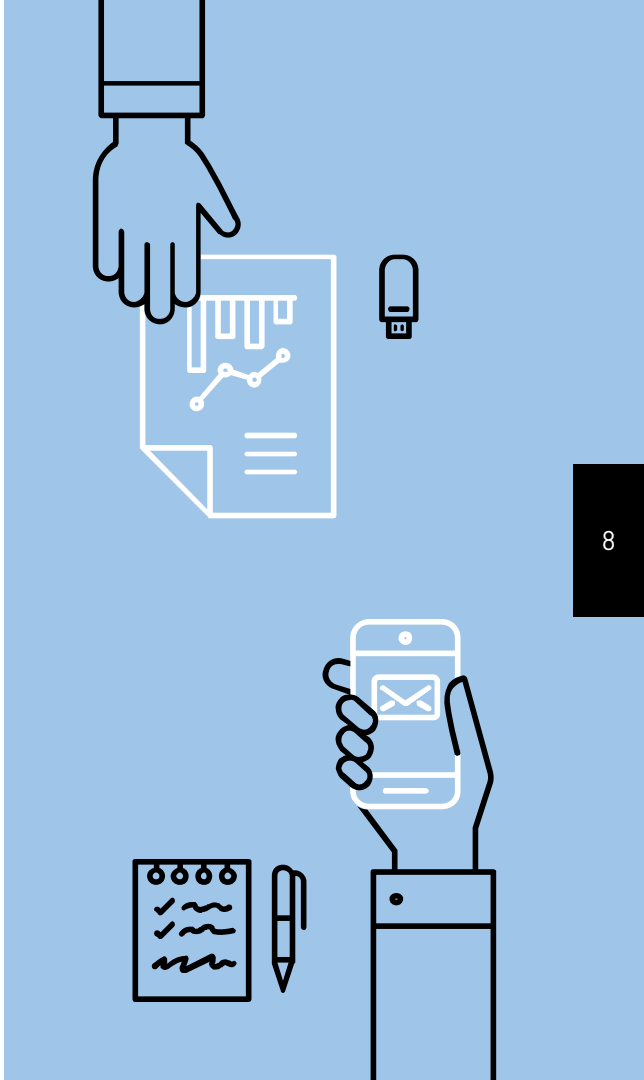
Scope (1)

- An Android mobile application with Kotlin programming that can control smart home devices.
- Control electronic devices such as LEDs light bulbs, cameras, Alexa and Bluetooth enabled-devices.

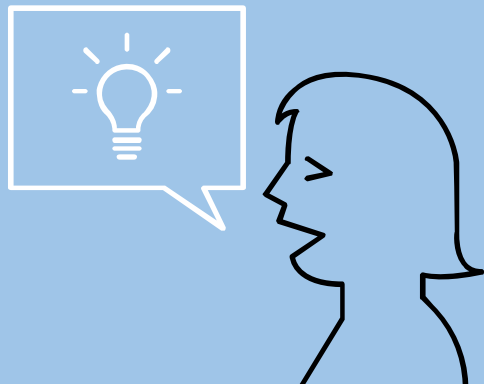


Scope (2)

- Trigger events according to the user activities.
- A platform serving as a backbone for the IoT devices that can be controlled by the mobile application.



Literature Review



Assistive Social Robot in Elderly Care

- Review of different publishings regarding the use of social robots in elderly care.

- It has positive effects on elderly people's emotional state.
- Similar experience can be replicated using Amazon's Alexa.

Environmental Hazards in Home for Older People (1)

- Objective
  - Investigate possible environmental hazards
  - Knowledge of injury
- Method
  - A cross-sectional survey of 425 people aged 70 and above living in the defined area

Horgas A L. (2019)

Environmental Hazards in Home for Older People (2)

- Result
  - 80% of participants had at least 1 hazards
  - 39% of participants had more than 5 hazards
  - 66% of bathroom had at least 1 hazards
  - 88% of participants can identify cause of injury
  - Most elders have self-assessment of their home's safety but there more than 5 hazards found in their home.

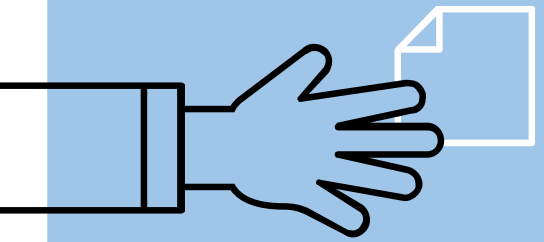
Horgas A L. (2019)

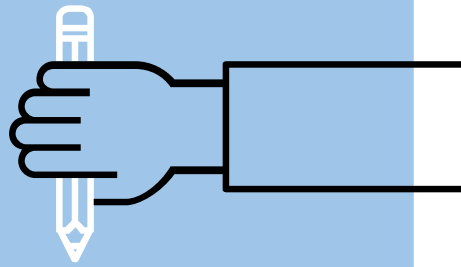
Table 2. Location of hazards found during safety housecheck

Room/location[a]	Potential no. of hazards	No. of hazards found (%)			
		1	2	3-5	+5
Bedroom ($n = 422$)	8	14	4	1	-
Hallway ($n = 343$)	9	9	3	1	-
Lounge ($n = 408$)	10	12	3	2	-
Dining ($n = 349$)	11	10	2	1	-
Kitchen ($n = 416$)	16	19	8	6	1
Bathroom ($n = 425$)	19	19	21	23	3
Laundry ($n = 342$)	3	14	2	-	-
Toilet ($n = 422$)	5	27	20	12	-
Stairs ($n = 364$)	16	20	11	7	2
Outside ($n = 376$)	2	11	3	-	-

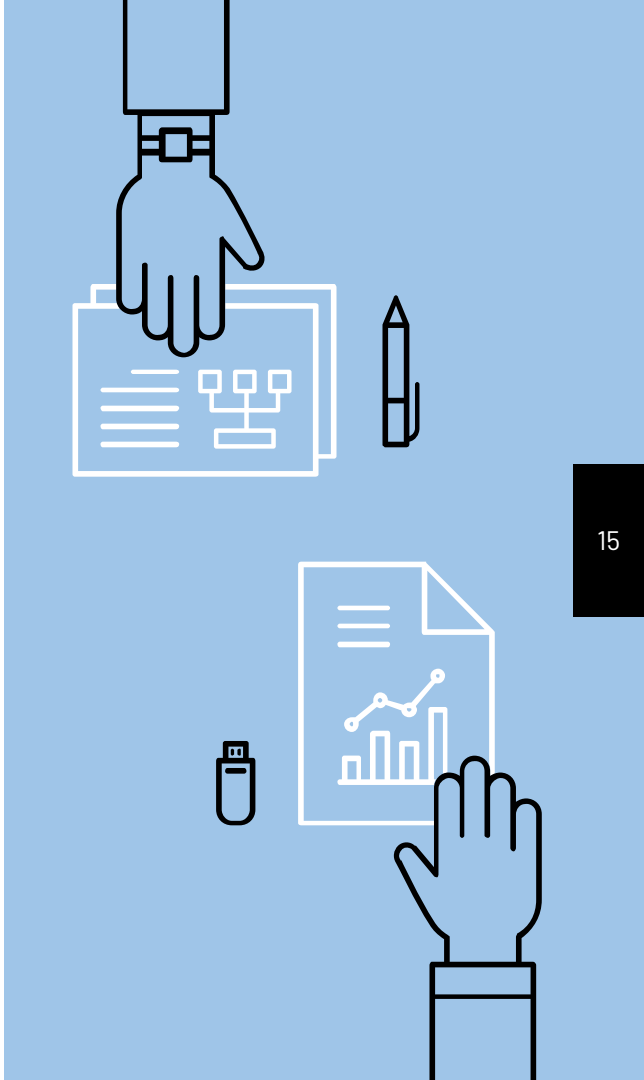
[a]'Missing' and 'not applicable' not included in figures.

Methodology

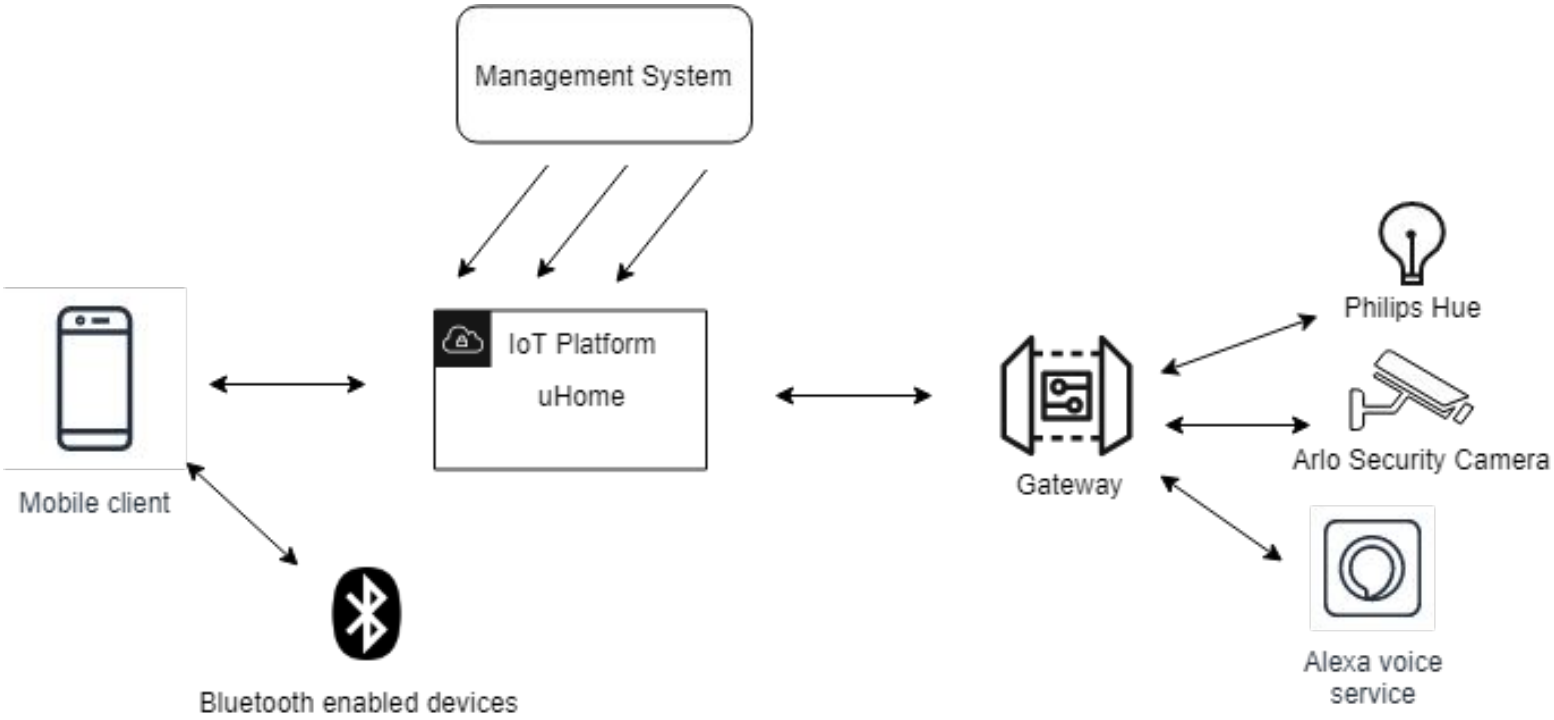




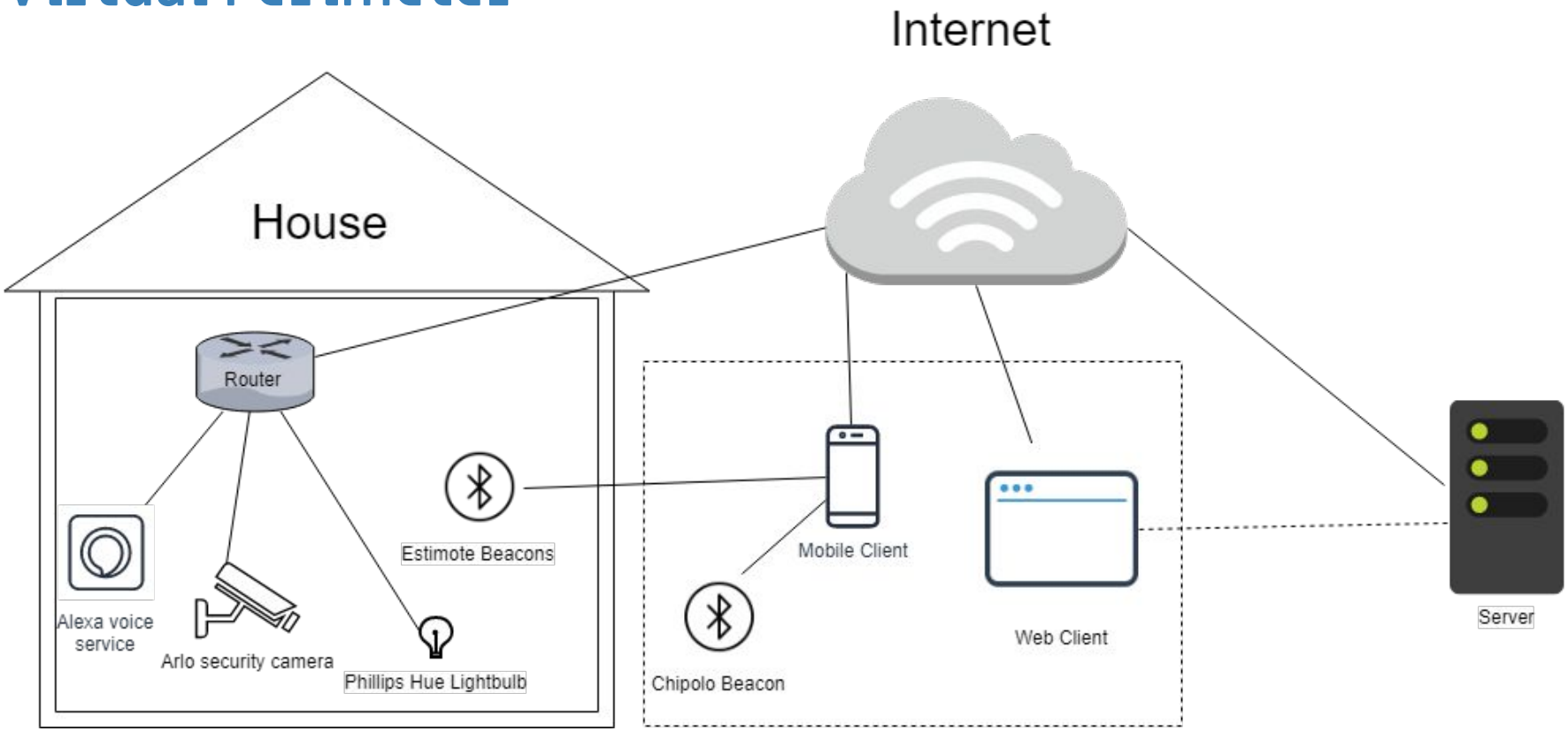
- IoT devices:
  - Arlo Security Camera
  - Philips Hue
  - Alexa
- Bluetooth enabled devices:
  - Chipolo
  - Estimote
- Mobile application using Kotlin
- Web application NodeJS
- Storage using Firebase database



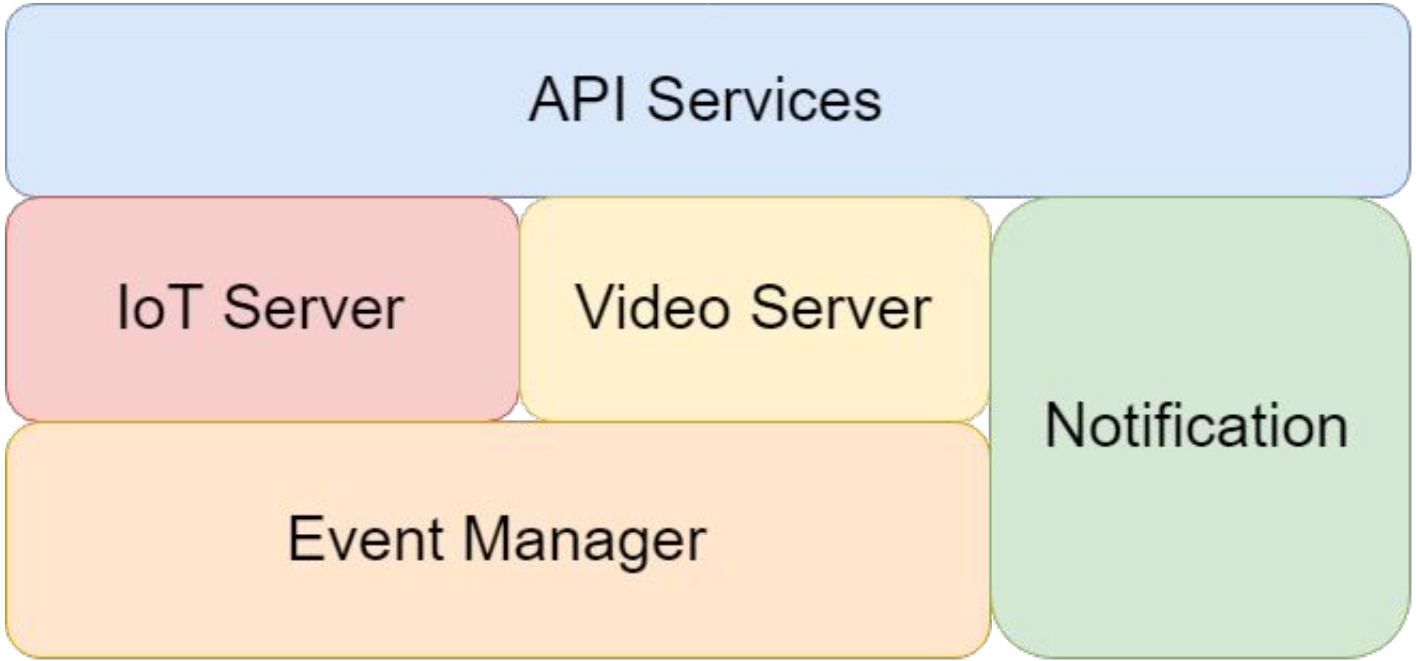
System Scenario

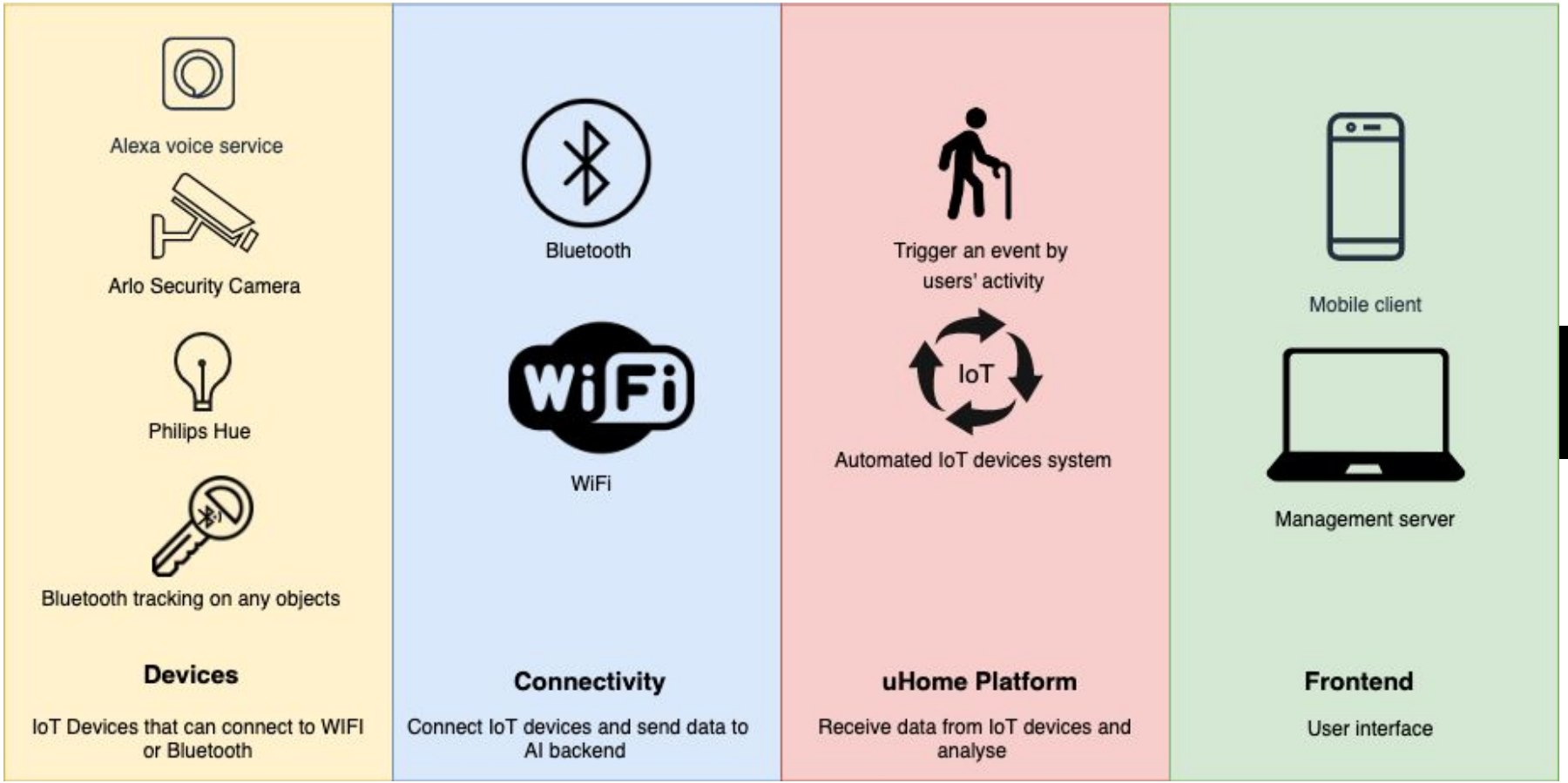


Virtual Perimeter

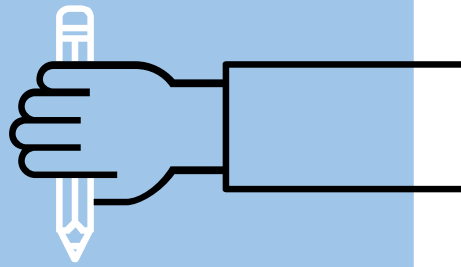


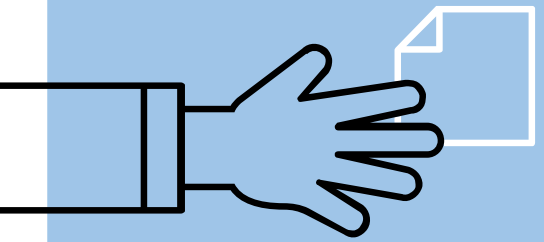
uHome Platform

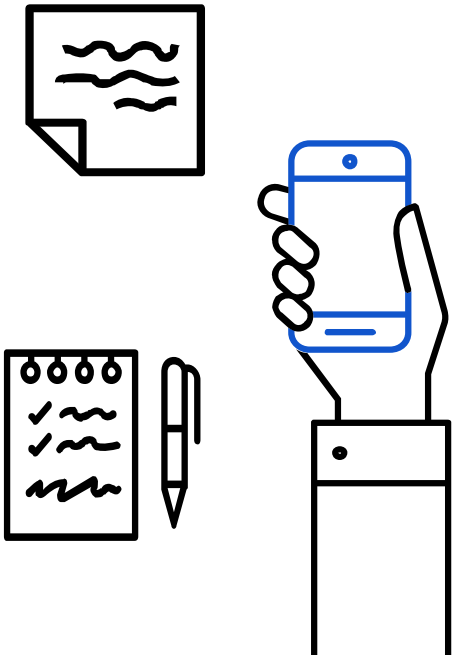



Alexa voice service
Arlo Security Camera
Philips Hue
Bluetooth tracking on any objects
Devices
IoT Devices that can connect to WIFI or Bluetooth
Bluetooth
WiFi
Connectivity
Connect IoT devices and send data to AI backend
Trigger an event by users' activity
IoT
Automated IoT devices system
uHome Platform
Receive data from IoT devices and analyse
Mobile client
Management server
Frontend
User interface

Expected Results







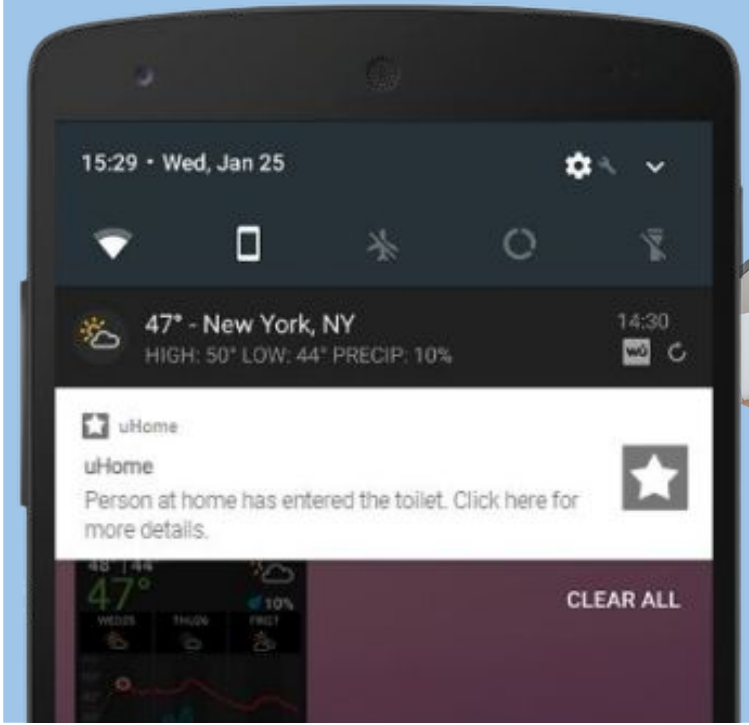
- A user friendly dashboard on Android mobile application.
- The application can control all the smart home devices.
- The smart home devices which trigger the users' activities and respond to the specific task.

Testing Methods

- Unit testing
- User testing
- Scenario testing

Designed Scenario :

Designed Scenario :

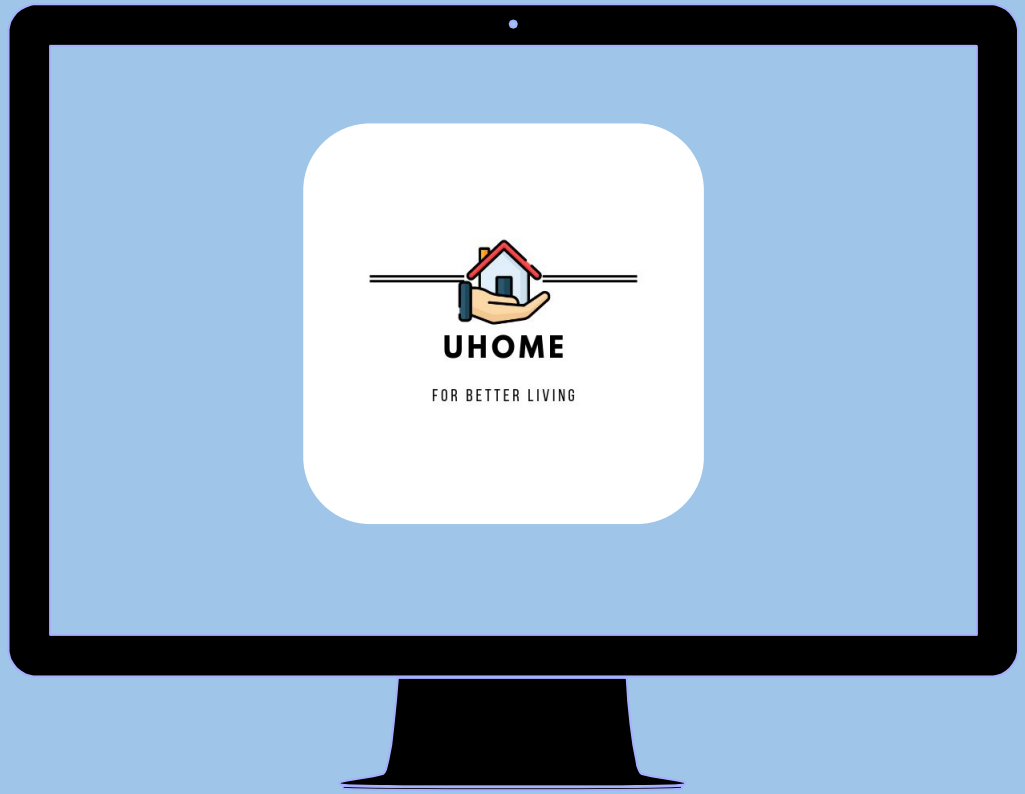


Designed Scenario :

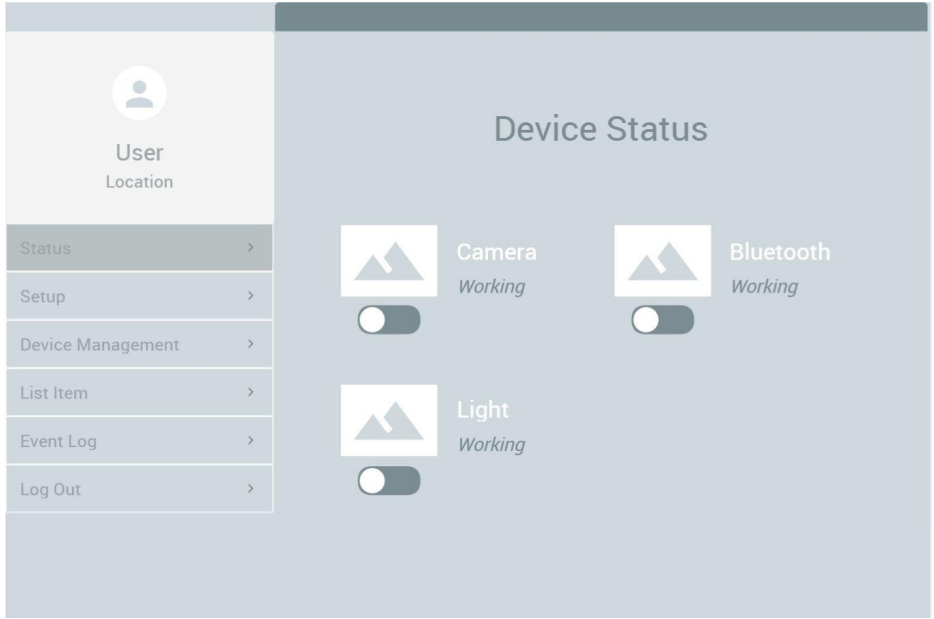
Alexa, Turn on the light

MANAGEMENT SYSTEM

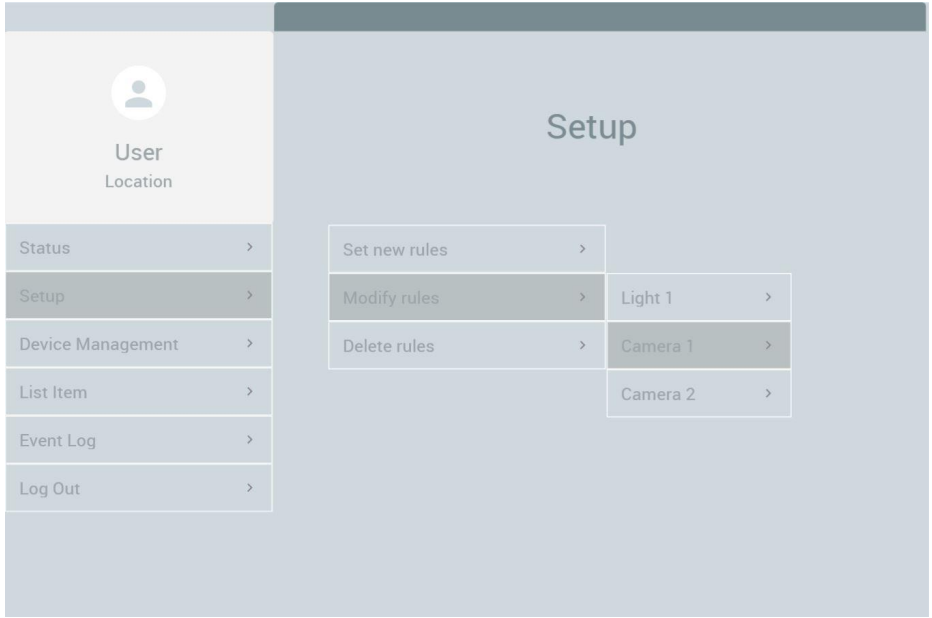
- Admins can add , remove and set up devices
- Admins can set up rules for each device
- Admins can activate devices



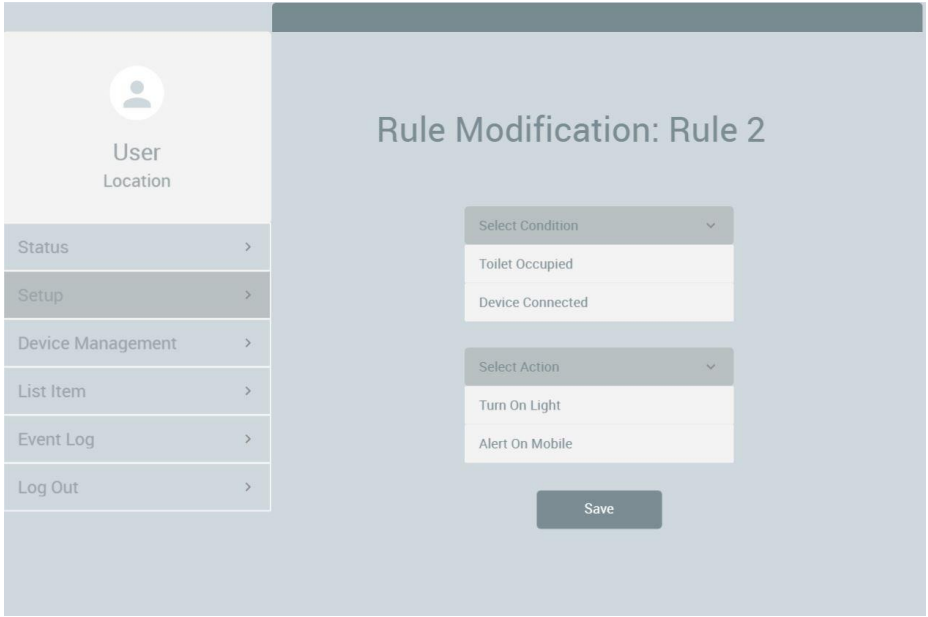
Login Page


User
Location
Status
Setup
Device Management
List Item
Event Log
Log Out
Device Status
Camera
Working
Bluetooth
Working
Light
Working

Status Page


User
Location
Status
Setup
Device Management
List Item
Event Log
Log Out
Setup
Set new rules
Modify rules
Delete rules
Light 1
Camera 1
Camera 2

Setup Page

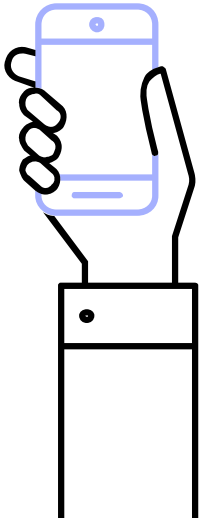

User
Location
Status
Setup
Device Management
List Item
Event Log
Log Out
Rule Modification: Rule 2
Select Condition
Toilet Occupied
Device Connected
Select Action
Turn On Light
Alert On Mobile
Save

Modify Page

Add/Remove Page

ANDROID APPLICATION

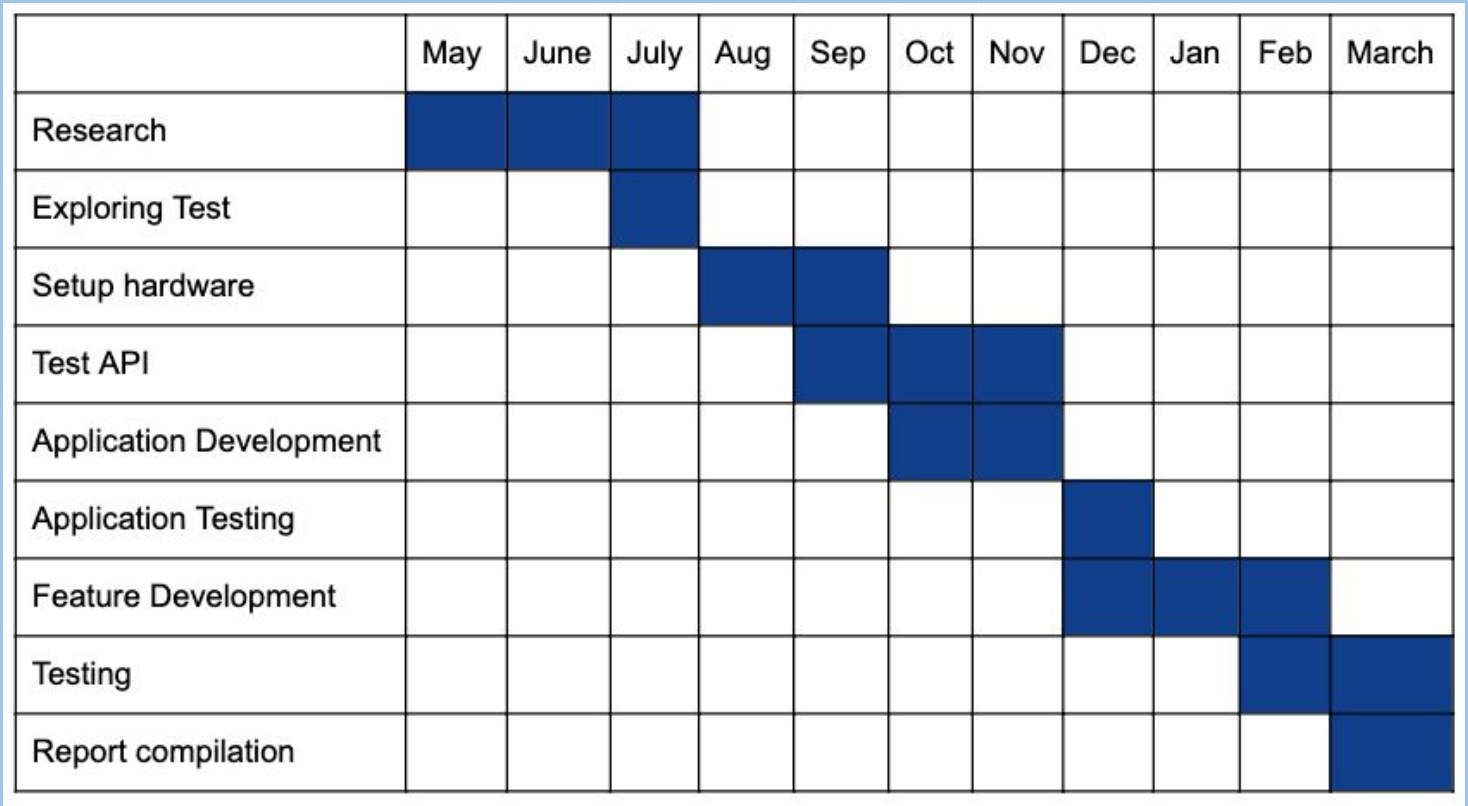
- Users can operate IoT devices
- Users can see their profile




UHOME
FOR BETTER LIVING
Username:
Password:
Login


uHome
Home Network Status: Connected
My Devices
Phillips Hue 1
Status: Connected
Phillips Hue 2
Status: Disconnected
Arlo Security Camera
Status: Connected
Alexa
Status: Connected
Find bluetooth device (ring)

Timeline


May
June
July
Aug
Sep
Oct
Nov
Dec
Jan
Feb
March
Research
Exploring Test
Setup hardware
Test API
Application Development
Application Testing
Feature Development
Testing
Report compilation

CONCLUSION

- uHome Platform
- Mobile Application
- Web Application