
FACULTY OF ENGINEERING

SCHOOL OF COMPUTING

SEMESTER 1/20212022

# SECP1513 – TECHNOLOGY INFORMATION SYSTEM

## SECTION 08

## PROJECT – PHASE 2 (PROJECT PROPOSAL)

## IoT (Smart Home)

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**YOUTUBE VIDEO LINK: https://www.youtube.com/watch?v=2glcQ0jCOxI**

## 1. INTRODUCTION

The Internet of Things (IoT), specifically smart homes, is the primary focus of this project. What exactly is the internet of things? The Internet of Things (IoT) is a network of networked computing devices, mechanical and digital machinery, and the ability to transport data without requiring human-to-computer or human-to-human interaction. IoT devices can do most of their work without human intervention, yet people can still communicate with them. For instance, users can set them up and give them instructions or access data on specific devices remotely.

What is a smart home, then? A smart home is a convenient living environment in which appliances and equipment can be controlled remotely from any location as long as it has an internet connection just by using a smartphone or other networked device. The equipment in a smart home is linked via the internet, allowing the user to control aspects like temperature, security, lighting, and a home theatre from afar. Smart home gadgets have self-learning capabilities, allowing them to pick up on the owner's habits and make changes as needed.

Based on this low-fidelity prototype project, our report will explain how the smart home system works. The project steps and descriptions, the problem statement, the solution, the AWS architecture, the business flow diagram, the low-fidelity mock-ups, and reflections will be discussed below. The main goal of this project is to make future human life easier and better. Humans no longer need to be concerned about non-productive duties at home and instead focus on more vital ones.

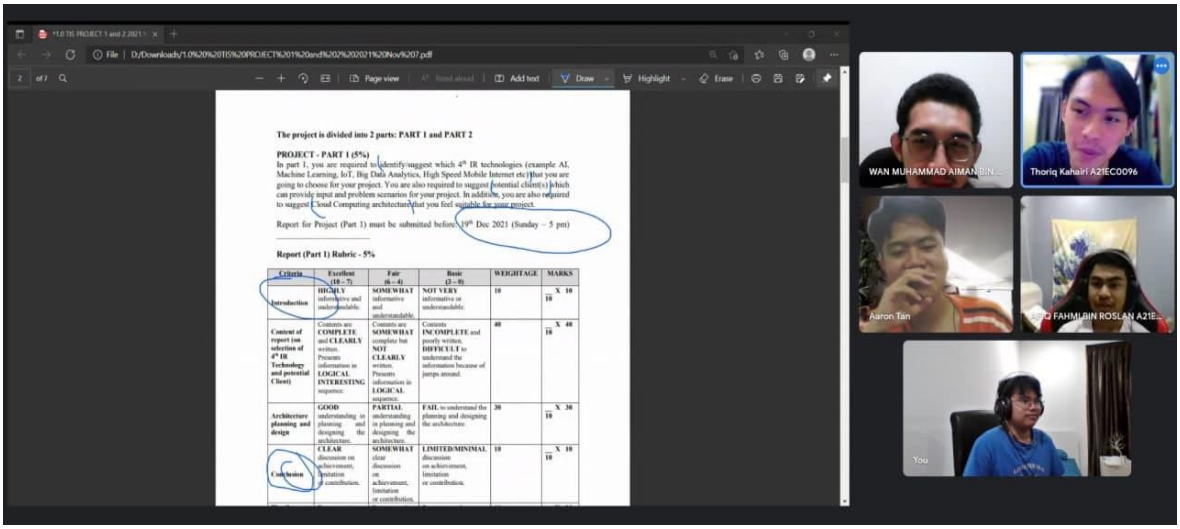
## 2. JOURNEY

Detail steps and descriptions related to the project

| Date | Details |
|---|---|
| 12 December 2021 | Start |
| 13 December 2021 | All members discuss the work allegations for Project Part 1 |
| 13 December 2021 | Understand and proceed with the detail about Project Part 1 |
| 15 December 2021 | Working on Project Part 1 report |
| 25 December 2021 | Project 1 is completed and prepared to be submitted |
| 17 January 2022 | Discuss on Project Report Part 2 |
| 17 January 2022 | Proceed for the detail about Project Report Part 2 |
| 18 January 2022 | Working on Project Part 2 process for smart home application |
| 19 January 2022 | Suggestions from group members |
| 19 January 2022 | Working on problems, solutions, and team working |
| 19 January 2022 | Description for the process flow of the Smart Impact Application |
| 20 January 2022 | Prepare for the mock-ups |
| 26 January 2022 | Each member make student reflection |
| 27 January 2022 | Finished Project Part 2 |

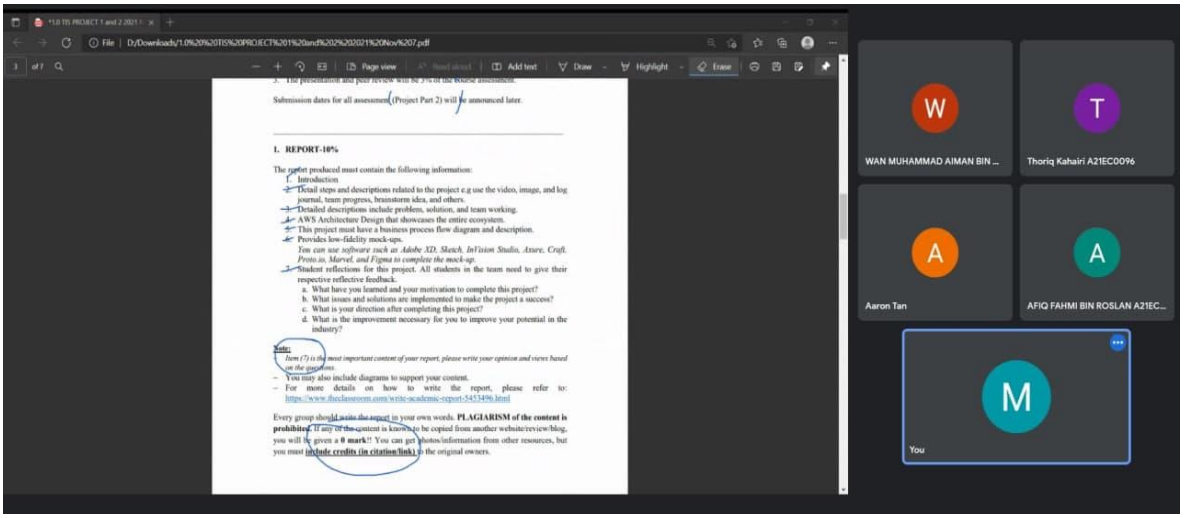
*Table 1*

1. Our first meeting



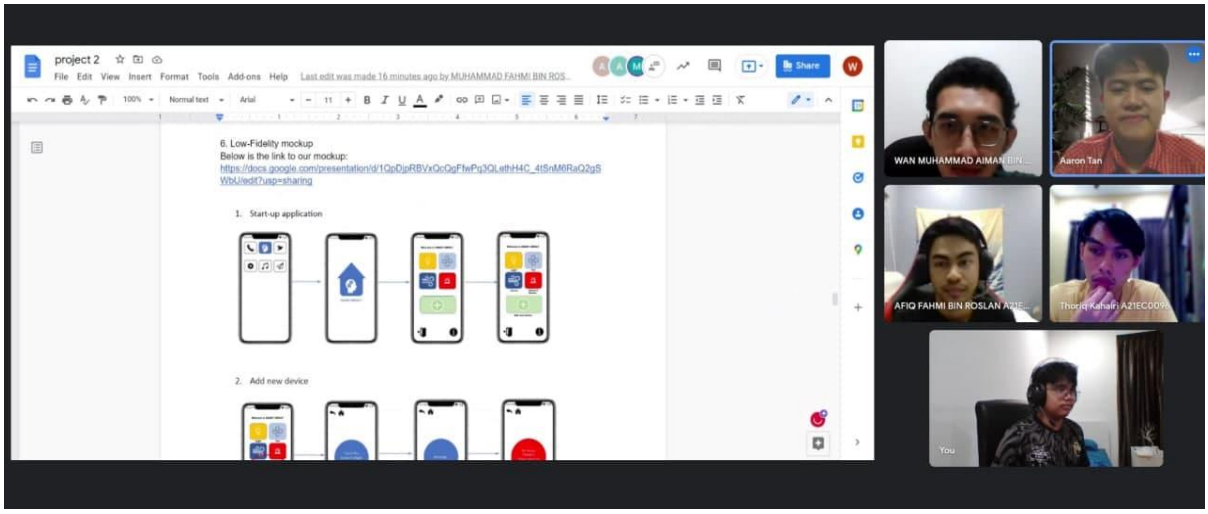

*Picture 1*

2. Second meeting - Working on project report part 2




*Picture 2*

3. Our last meeting before finalizing all information




*Picture 3*

## 3. PROBLEM, SOLUTION AND TEAMWORKING

### *Problem*

You may be exhausted from your daily responsibilities at home. Cleaning the floor, turning on the air conditioner and lights, or simply locking the door are all basic tasks. Consider how all of this may be managed from faraway and occur on its own. The electronics in your home can communicate with one another. The data collected by the gadgets will be stored in the cloud and evaluated using machine learning and artificial intelligence (AI). Gadgets can learn and adapt to the user's routine using this technology in order to satisfy the user's needs.

Problem. Every aspect of life is fraught with difficulties. This includes completing this project. Some problems are about the smart home itself and some about the group members. First and foremost, the installation of a smart home system is relatively high. However, a smart home can save your money in the long run due to energy savings. It is crucial to consider the short-term and the long-term benefits if you are willing to invest in the installation cost. Next, every system must need maintenance and repair, this includes smart home systems. This might be a problem for users to keep a portion of money just for the maintenance of this system. This will be more difficult if you are living in a rural area. Other than that, another difficulty in using this system is you will need a reliable and strong internet connection. If you are in the city there is no problem but if you are in a rural area, you might need to think again about installing a smart home. The security issue is also another problem in installing smart homes. With technologies, there is always a security concern and privacy. This brings us to the last problem which is privacy concerns. People are already concerned about this problem since having a smartphone. For example, voice recognition is listening to you all day even when you are not in an active mood.

Some issues that we experience as a team include difficulty in dividing tasks. Following that, some of us lack expertise in how to use technology. Last but not least, we only have a certain amount of time to complete this assignment. In addition, there were other tasks and tests that we had to complete while working on this project.

***Solution***

Every problem has a solution. To overcome the high cost of installing smart homes, the system needs to be installed in a bundle to have an extra discount. This is when comparing the smart home that is being installed one by one. Next, maintenance can be avoided by making sure the first installation needs to be perfect. Upgrading the software from time to time also will help to avoid maintenance as the system will become fully optimized. A strong internet connection cannot be avoided. The only solution for this is to install at least a fibre connection to have a strong, reliable internet connection. Security issues are not a problem. The management of the smart home will guarantee and take responsibility when anything happens that involves security matters. So, users do not need to be concerned about it. Last but not least, privacy concerts also can be solved by the management agreeing with the user to comply with users' needs.

Appointing a leader solves the problem of task division. Wan Muhammad Aiman bin Wan Muhamad Faisal is the group's leader. He would distribute the duty according to the strength of each member after picking the leader. This will help to lighten the load on each individual. Because we are working as a group, the person with limited expertise is not an issue. We can teach each other so that all members are capable of executing the task at hand. Last but not least, splitting duties and managing time systematically can help us solve the problem of not having enough time. We must adhere to the leader's deadline for completing each duty. For our group, we do not do all of the work at once, instead, we prioritize the most important jobs first, followed by the easy ones.

***Teamworking***

Our team is working by completing the difficult task first, then working on the easier one. Our team is concerned about group discussion. We believe that without discussion, any tasks given will be impossible. When we are discussing, we will make sure each of our members understands what the task is about and divide the tasks as fair as possible. This will avoid any drama or problems in completing the task. Teamwork is the key. When all tasks are divided, we will complete our tasks at our own pace as long as following the due date that has been discussed. Any problem when completing the tasks will be discussed at the next meeting and the cycle will continue. These are our ways of adapting online distance learning while completing assignments given by the lecturers.

## 4. AWS ARCHITECTURE DESIGN

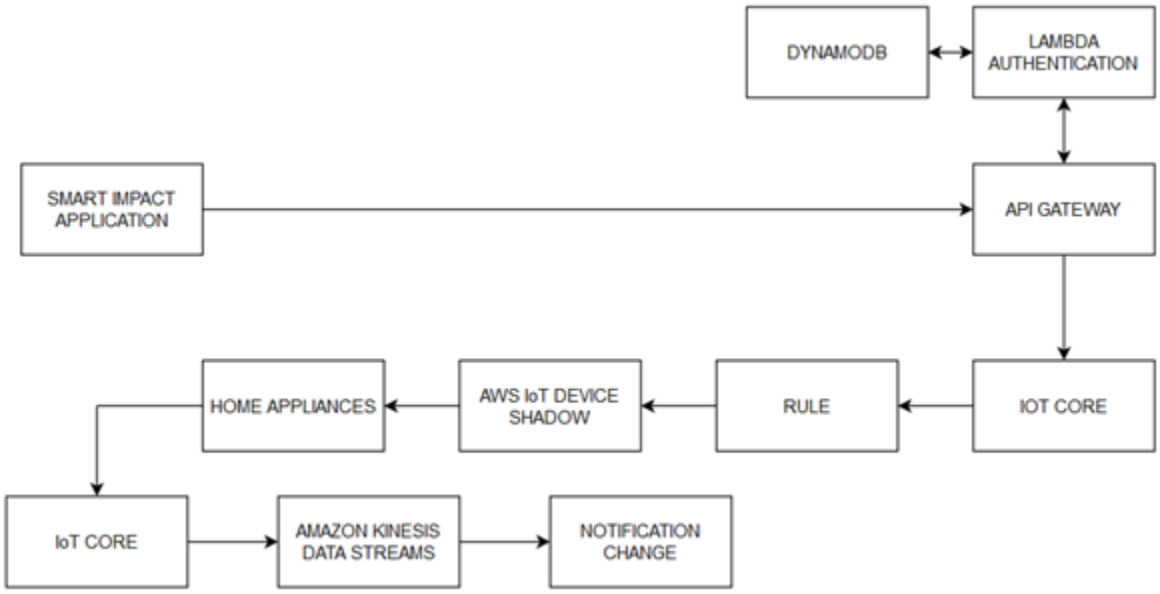



*Chart 1*

When An instruction is received from our Smart Impact Application, the instruction will be sent to Amazon API Gateway where it will manage confirming the authorization and access control by sending the information to Lambda Authentication that is connected to DynamoDB before the instruction is being run. Amazon DynamoDB holds the user authorization data that associates our users to their devices while the API Gateway verifies whether the request should be accepted or not. After that, the instruction will be sent to AWS IoT Core which enables the user to connect devices to the cloud. IoT Core will send and receive updates based on user instruction. Each instruction will trigger an IoT rule which will reroute the messages to other AWS services. Next, the instruction received will be sent to AWS IoT Device Shadow. AWS IoT Device Shadow is going to send the user instruction to home appliances that need to be updated to match the user's request. Information from the devices will then be sent again to AWS IoT Core, which uses an IoT rule to write data to Amazon Kinesis Data Streams. Amazon Kinesis Data Streams is a serverless streaming data service that makes it easy to capture, process, and store data streams at any scale. Thus, Amazon Kinesis Data Streams will then update the instruction received from the user and update them back by updating the data in the user devices after the instruction is run.

## 5. BUSINESS PROCESS FLOW DIAGRAM

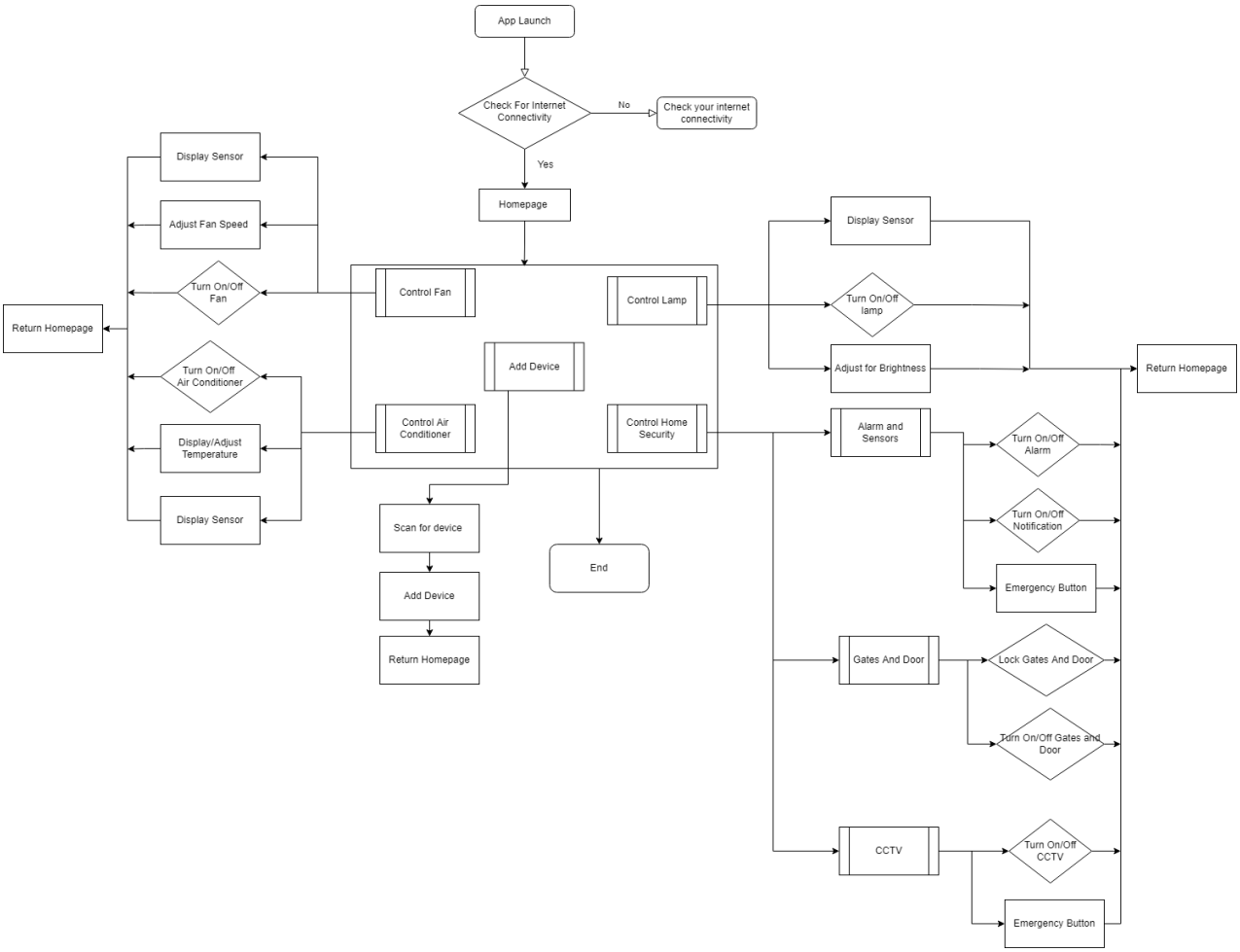



*Chart 2*

***Description***

I. The user launches the app called smart impact and bring the user to the homepage

II. Before entering the homepage, the user needs to connect to the internet, so the user is able to control and monitor the device.

III. The homepage site will display the devices that can be monitored. The device that can be monitored is divided into 4 options of devices. The user is able to control the lamp, fan, air conditioner, and home security.

IV. This app is capable of connecting with any smart device. The app will scan for any available devices if the user wishes to.

V. For the first option, when the user requests to control the fan. The app will bring the user to the control fan section. On the control fan section, the user is allowed to turn on and off the fan. The user also can adjust the speed of the fan in any room. This system is also equipped with a sensor to alert the user which fan is open.

VI. For the second option, the user can control the air conditioner. When the user presses the air conditioner symbol it will enter the control air conditioner section. In that section, it will show the turn on and off buttons for the air conditioner. It also displays the temperature of the room, and the user can adjust the temperature whether to lower or higher the temperature. This system uses a sensor to alert the user to which air conditioner is open.

VII. Moving on to the third option which is the user able to control the lamp. When the user presses the lamp symbol, it will bring the user to the control lamp section which there are 3 options for the user to monitor. The user can turn on and off the lamp in the chosen room and the user is also allowed to adjust the brightness of the lamp. Lastly, the sensor will display which lamp that opens and off in what room.

VIII. The fourth option is to control the home security option. The app will bring the user to the control home security section when the user presses the security symbol. In that section, it will display three options for the user to control which are alarm and sensors, gates and door, and CCTV.

IX. Firstly, if the user wishes to monitor the alarm and sensors the app will ask for three options to control which are a button for turn on and off for alarm, notifications button, and

emergency button. Smart Impact is complete with security to ensure the user's safety and it also will notify the user at home or when away from home if any door or windows or gate are open.

X. Secondly, when the user presses the button gates and door, the user will be asked whether they want to open and close the gates and door, or to lock gates and doors. If the user wishes to lock gates and doors, they only need to choose and press the lock button. It will automatically lock the gates and doors so it will not consume time and user energy.

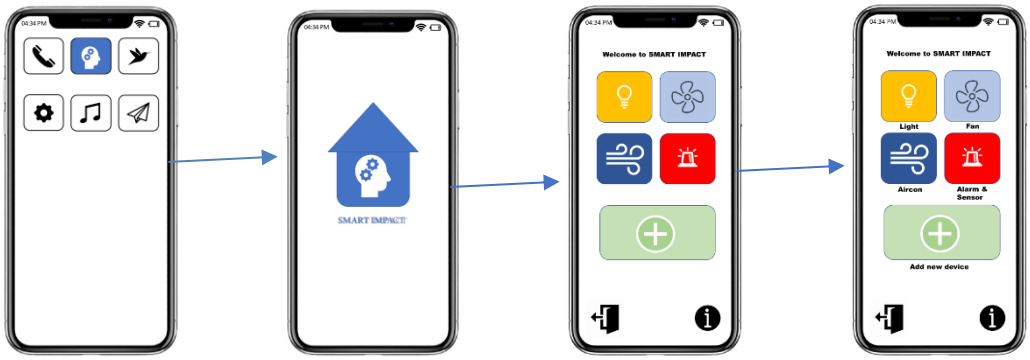
XI. Thirdly, the smart impact is also equipped with a CCTV system to enhance users' safety. When the user wishes to control the CCTV, it will bring the user to the CCTV section where the user can turn on and off the CCTV and, it is also equipped with the emergency button. If the emergency button is activated, it will directly call the emergency number

XII. Lastly, the user returns to the homepage and exit.

## 6. LOW-FIDELITY MOCK-UP

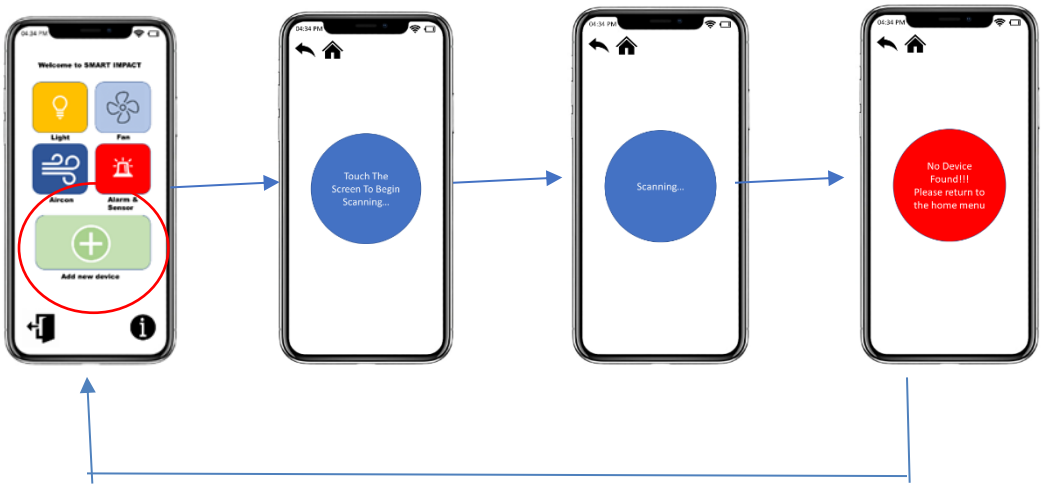
Below is the link to our mock-up:
https://docs.google.com/presentation/d/1QpDjpRBVxQcQgFfwPq3QLethH4C_4tSnM6RaQ2gSWbU/edit?usp=sharing

1. Start-up application



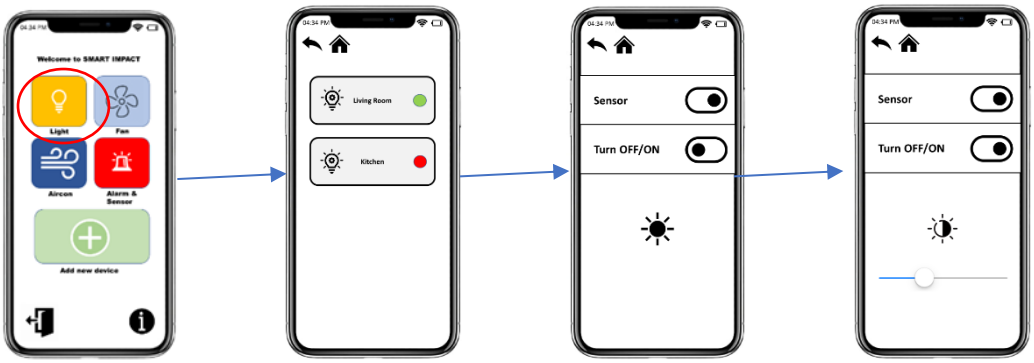

*Picture 4*

2. Add a new device



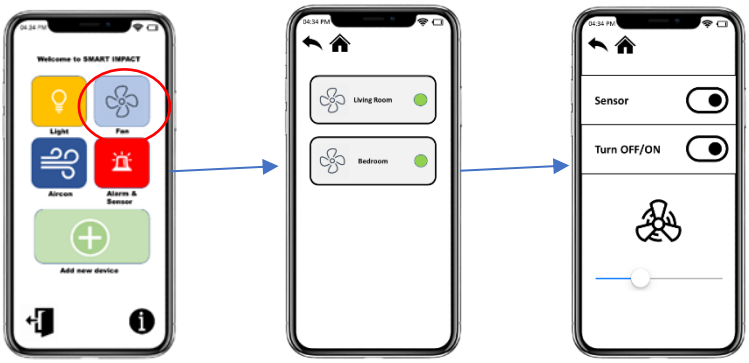

*Picture 5*

3. Lights



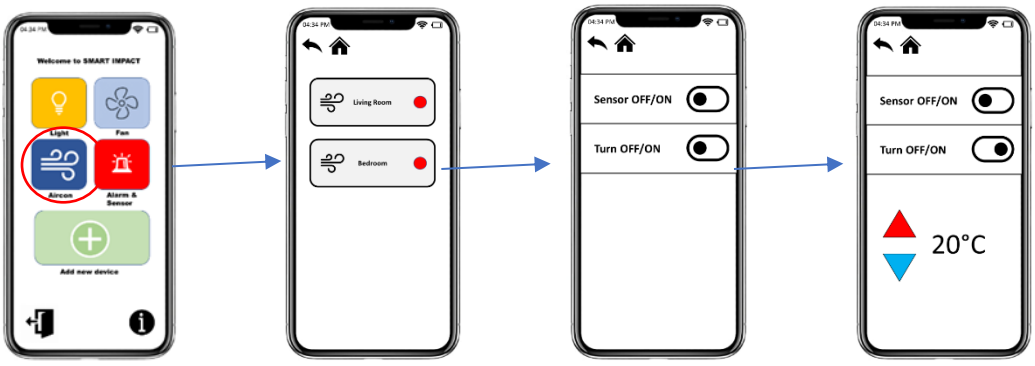

*Picture 6*

4. Fan




*Picture 7*

5. Air-conditioner

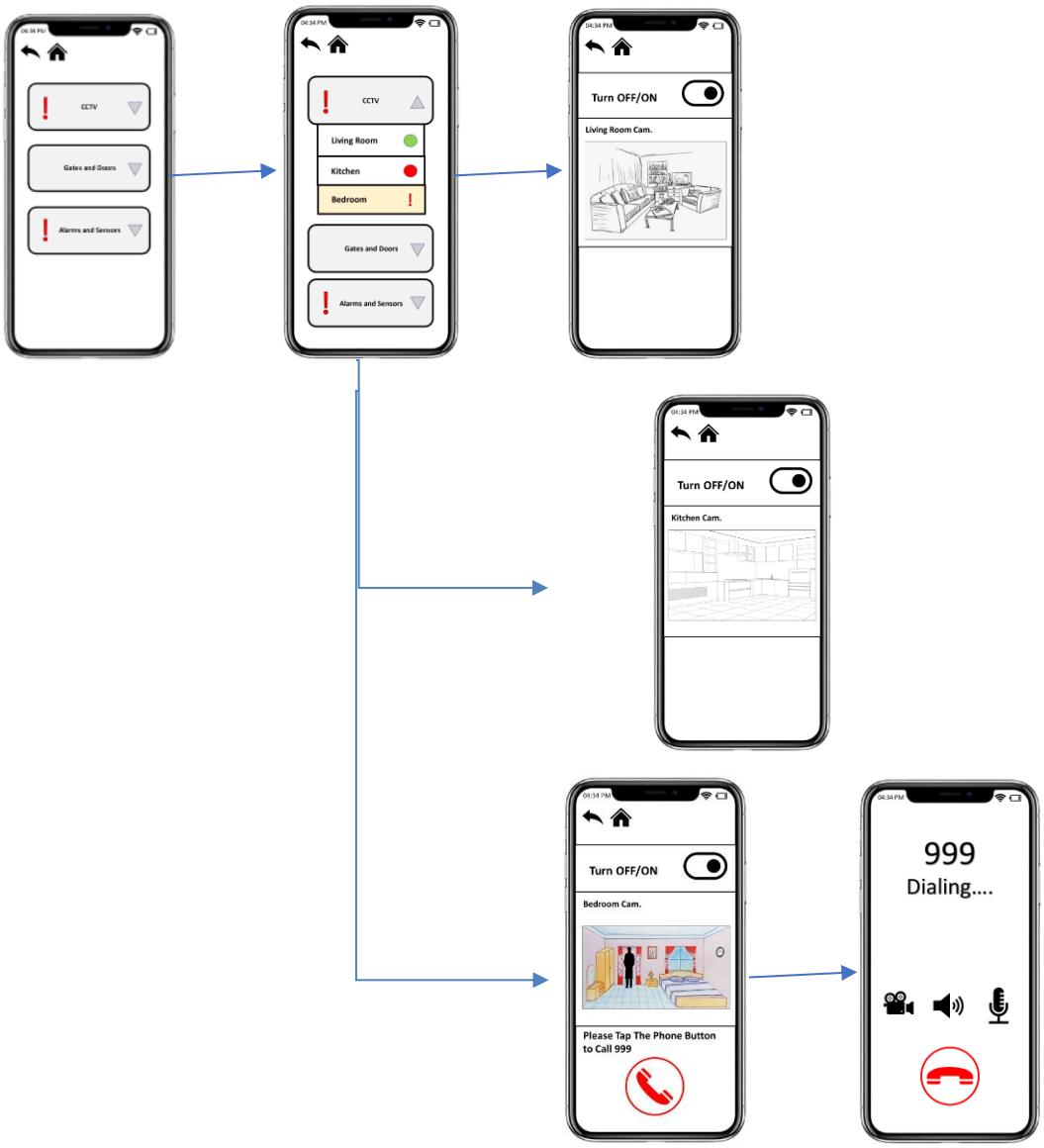



*Picture 8*

6. Security

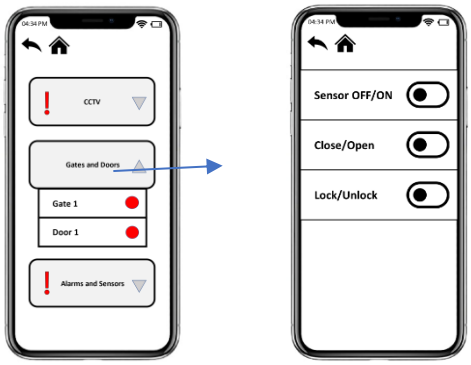

*Picture 9*

6. (a) CCTV



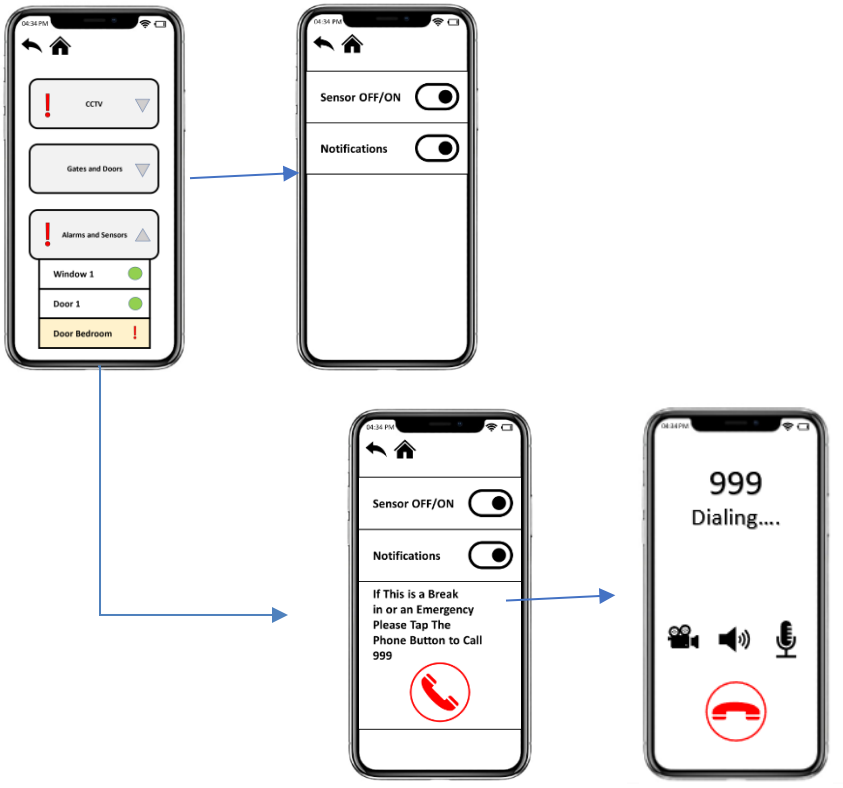

Picture 10

6. (b) Gates and Doors




*Picture 11*

6. (c) Alarms and Sensors




*Picture 12*

## 7. REFLECTION

a. What have you learned and your motivation to complete this project?

During this group project, I learned a lot about applications, software, and advanced devices that can bring many benefits to future users. I have gained a lot of knowledge which is very beneficial to me in the future. In this project, I also learned a lot about teamwork and communication to try to convey ideas or opinions to the team. For me, I think teamwork is the most important key for completing this project. By having minute meetings, the discussion about the project becomes even clearer and also eases the process of giving tasks to all the group members. I have set the motivation to complete this project by implementing the idea of wanting to learn and improve myself for my future assignments and work.

b. What issues and solutions are implemented to make the project a success?

The difficulty in splitting tasks is one of the issues we face as a group. Then there's the issue of some of us not knowing how to use technology. Finally, we only have a limited amount of time to accomplish this project. Furthermore, while working on this project, we had to perform other tests and assignments.

So how did we solve these issues? The problem of task division is solved by appointing a leader. The group's head is Wan Muhammad Aiman bin Wan Muhamad Faisal. After selecting the leader, he would distribute the duties based on the strength of each member. This will help to alleviate the burden on each individual. The person with limited competence is not an issue because we are working as a group. We can teach each other so that everyone is capable of executing the task at hand. Last but not least, dividing responsibilities and systematically managing time has helped us in resolving the issue of not having enough time. Each assignment must be completed by the deadline set by the leader. We don't accomplish all of the work at once in our group, instead, we prioritize the most critical tasks first, followed by the simple ones.

c. What is your direction after completing this project?

After completing this project, we will strengthen our knowledge of technology, especially the Internet of Things and Cloud Computing in order to actualize our project. Some improvisation needs to be done to make sure our project has no issues. Our team is looking forward to making this project into reality as we see some potential in our project. Moreover, although it is only a mock-up project, we try to gain as many as we can. With the experience, we gain after completing this project we will use it to produce projects that will benefit other people related to the technology industry.

d. What is the improvement necessary for you to improve your potential in the industry?

In our opinion, one of the necessary improvements needed to be improved in the industry would be our communication skills. This is very important to keep us on the same wavelength as other people in an industry to strive towards a certain goal or milestone. If we do improve our communication with one another, we are able to give out resourceful ideas that may help with the growth of a certain company in an industry as well as know when to be strict and professional or to be kind when interacting with others colleagues. This could also help in clearing up confusion in the task we are given by asking questions when needed to. Besides improving communication, we must also be disciplined in our time management in the industry. This allows us to do and finish tasks within the given time without too much stress or giving pressure on our colleagues in the industry. We should constantly remind ourselves of the due date by making a schedule on which part we should finish on that day and be consistent in following it to prevent any random events that could hinder our progress. From this project, we learned that time and communication is crucial component in whether or not we are able to produce a quality product or otherwise. With crucial planning on when we should finish our tasks were given and constant meetings to keep an eye on our progress, we were able to finish our project without too many problems.

## 8. CITATION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