FACULTY OF ENGINEERING / SCHOOL OF COMPUTING

SEMESTER 1/20212022

SECP1513 – TECHNOLOGY AND INFORMATION SYSTEM 21

SECTION 08

Project Part 2 (Low Fidelity Prototype)

Emerging IoT in Tracking and Management System

Lecturer: Dr. Izyan Izzati binti Kamsani

GROUP NO: 4

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1.0 Introduction

Low fidelity prototype is a quick and simple tangible representation of a concept, flow of usage or information structure created for obtaining feedback and product improvement. Based on the technologies in Industrial Revolution 4.0, we have decided to create a low fidelity prototype related to the Internet of Things (IoT). IoT refers to all of the physical devices around the world that have the ability to connect to the internet in order to collect and share data without human intervention. The prototype we created is an IoT-based tracking and management system.

1.1 Problem background

In this technology era, electronic commerce, commonly known as e-commerce has become a popular way for people to sell or purchase things. The e-commerce platforms such as Lazada, Shopee, Alibaba, Amazon and many more have allowed the user to start their online shopping or selling journey. Online shopping has brought a lot of benefits to people such as the goods can be delivered to their homes. Hence more and more people are starting to use their electronic devices such as computers and smartphones to shop online instead of shopping at physical stores. The number of online orders is increasing, and the number of parcels that the sellers need to deliver is also increasing. For instance, Amazon ships over 66000 orders per hour. During the transportation of the parcels from the seller to the buyer, we have observed that many problems may arise. For instance, the parcel is damaged due to a collision when the parcel is in transit. The buyer felt disappointed and gave a low rating to the seller although that is not the seller's fault.

1.2 Proposed Solution

Hence, we decided to create an IoT-based tracking and management system with some advanced functions to overcome the problems faced during the transportation of the parcels and make the process of delivery transparent to the users. This is because although there are a lot of tracking systems in the market, there are also some limitations of the function that did not fulfill

the requirement of the user. In this system, we have used RFID technology and GPS to track the real-time location and condition of the parcel to make sure the parcel is always safe and trackable.

1.3 Objective

- To allow the users to track the real-time location of their parcel to avoid losing.
- To allow the user to check the condition of their parcel.
- To help the user to choose the most suitable logistic company for them.
- To make the operation of tracking easier and more concise with a user friendly interface.
- To simplify the process of assigning parcels to the courier.

1.4 Scope

We need to create a low-fidelity prototype of a tracking and management system. This system collects the information of the users for login and chooses whether they are a buyer or a seller. For sellers, this system allows them to manage their goods with a simple inventory management system. They can choose their goods that need to ship to the users from the inventory management system to book the courier and get an auto generated tracking number. For buyers, this system allows them to track the real-time location and condition of their parcels and rate their experience with courier services. The real-time location is shown in the map form and the condition is in pictures and text form.

2.0 Detail steps related to the project

2.1 Empathy

Empathy is a stage where developers need to understand the problems met by the user. Our target was to allow users to select the best courier service company and let the customers track their parcel with real-time location to avoid losing. In our meeting, our group members shared their experience and personal opinion when we are online shopping or working at the logistic.

2.2 Define

Define is a stage for us to verify the problems faced by users. After we collect the response from group members, we have identified all the problems and needs we faced currently by analyzing the response.

2.3 Ideate

Ideate is a stage for brainstorming to gather different types of opinions and solutions to solve the problem statement. After discussion, we have found the solution to solve the problem by using Internet Of Things and RFID technology to improve users' online shopping experience.

2.4 Prototype

Prototype is a stage for us to determine the most suitable solution and put it into the product. After we make the conclusion in the meeting, we start to do the prototype of our project by using Adobe XD. The prototype is based on the user interface of the application designed by the tracking logistics center.

2.5 Test

Test is a stage in which the product is tested by users and gets feedback from them to identify the flaw of our product to improve and enhance our product. After we accomplish the

prototype, we have demonstrated the tracking parcel application and collected the feedback from users.
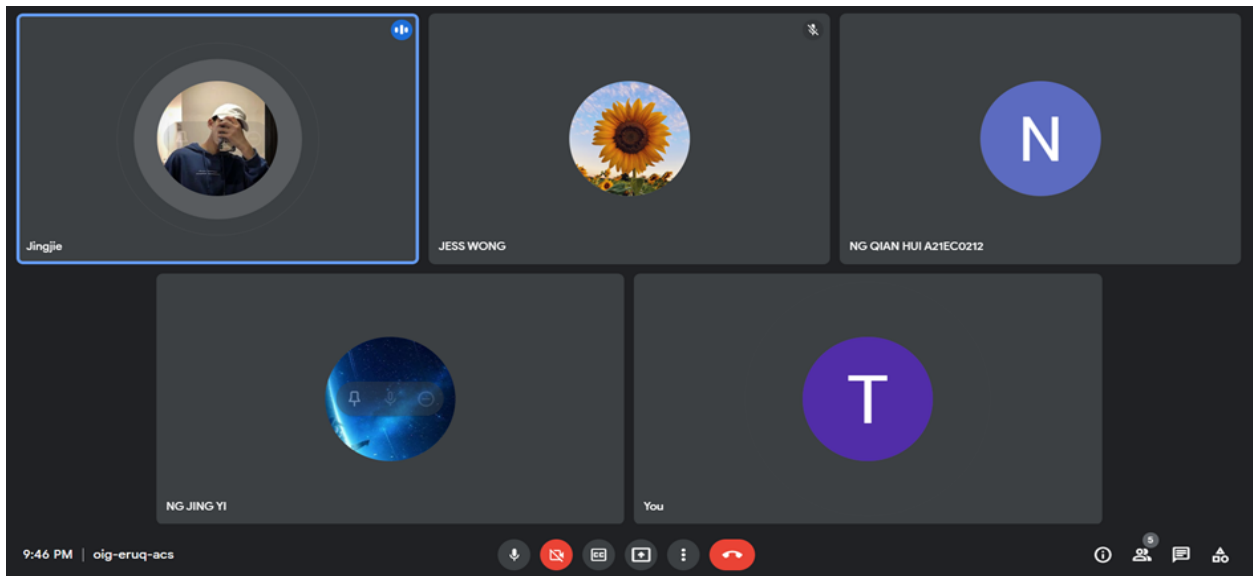
2.6 Evidence
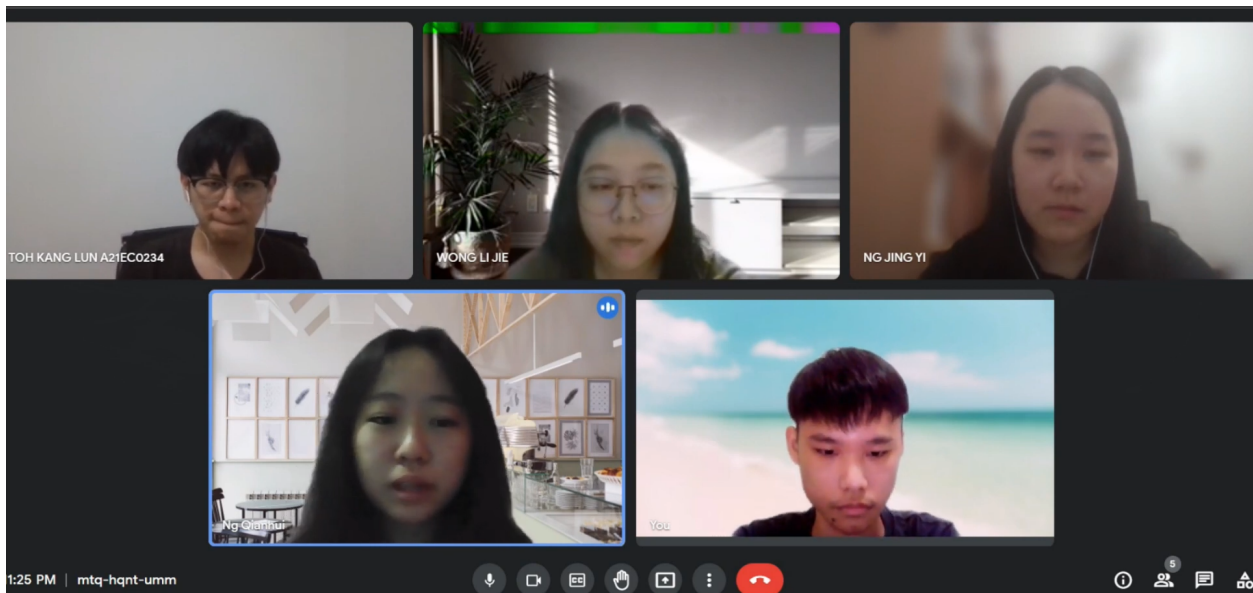

Figure 2.1:   Interview in the Empathy stage

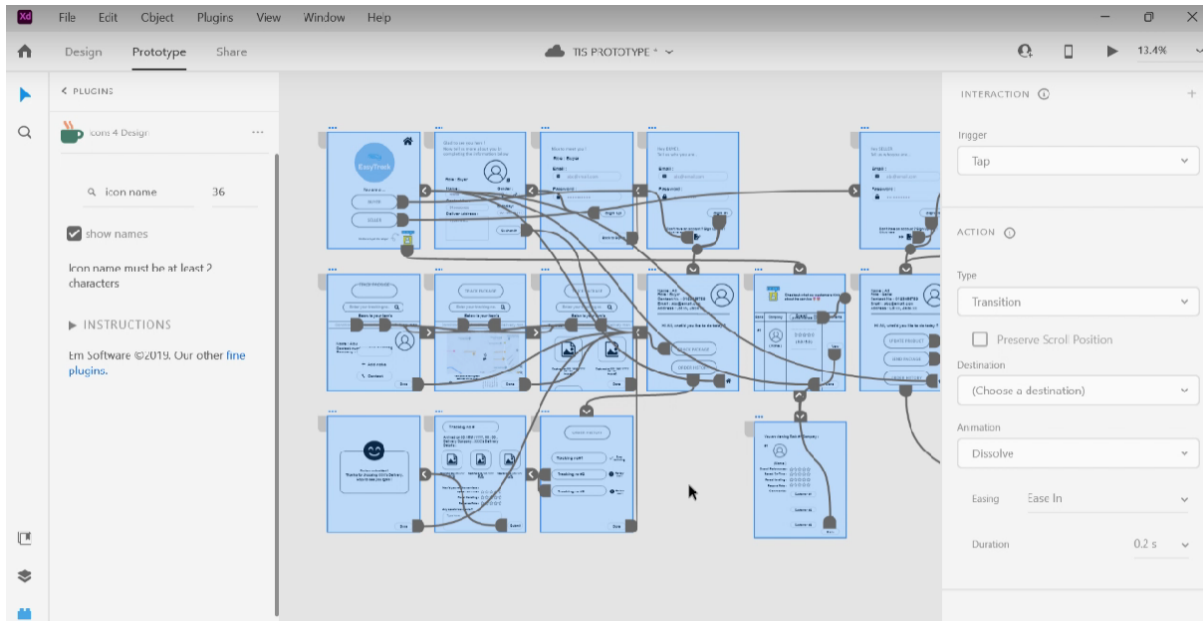Figure 2.2 Discussion during define and ideate phase

Figure 2.3 Prototype phase
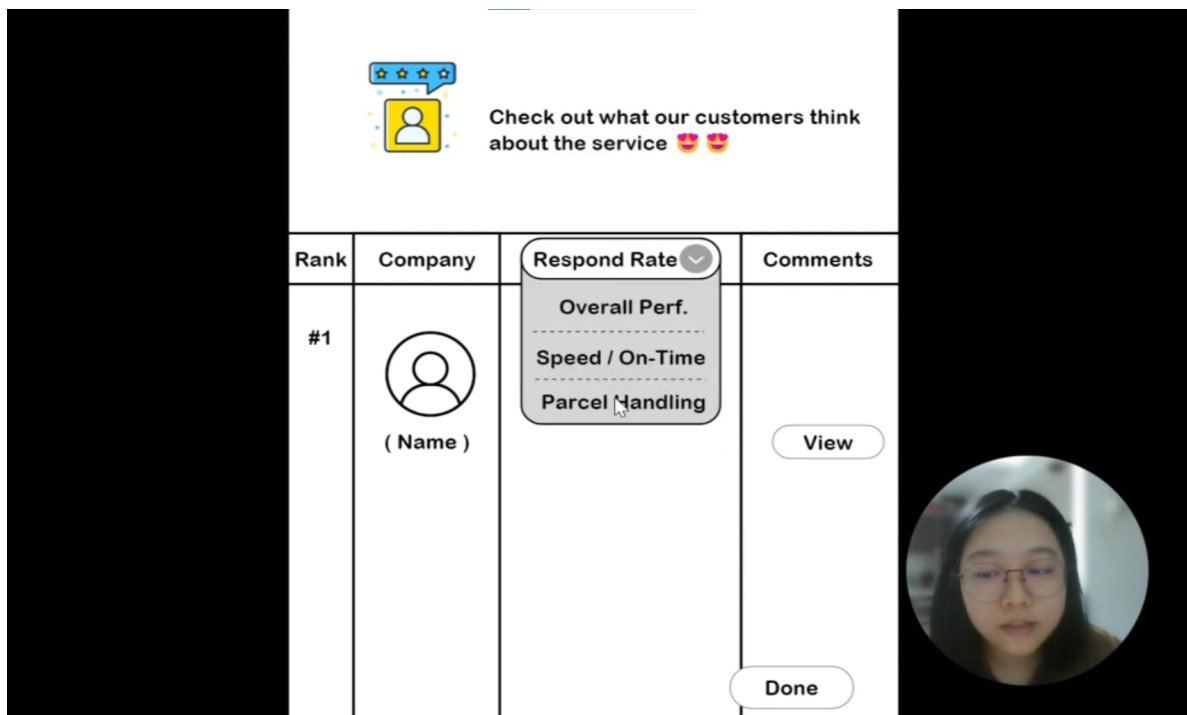

Figure 2.4 Test phase

3.0 Detailed descriptions related to the project

3.1 Problem

As the world becomes more and more interconnected, the rise of technology leads many people to choose to shop online. Recently, the world has been ravaged by the pandemic and the demand for online shopping has skyrocketed. Most people try to go out as little as possible, so they stay at home and shop online. Therefore, couriers play an imperative role as they must ensure that the goods ordered by customers are delivered safely to their homes. Although the couriers have tried their best to deliver the parcel to customers' home, some accidents could not be unavoidable. They still receive customers' feedback such as parcels being delayed, damaged or even missing at logistic. In this case, if the parcel is damaged or missing, the courier must be held responsible. However, some unsuspecting customers choose to criticize the seller's poor service and give the seller negative reviews, causing the seller's business to plummet.

3.2 Solution

In order to solve the problems encountered from different perspectives, our group intends to create an IoT-based tracking and management system. Our system can provide complete parcels' status. The latest status of the parcel will be updated every time when it arrives at a hub. In addition, the package will also be attached with RFID tags so that real-time location and condition can be tracked. Our customers can see where their parcels are through our app. We believe that through our proposed innovation, the shopping experience of customers will definitely be enhanced. Next, sellers will receive more positive reviews by customers and the sellers will have a prosperous business. The reputation of the couriers will also be improved and will build an excellent e-commerce ecosystem.

3.3 Teamwork

In our group, Toh Kang Lun will handle detailed steps related to the project. Next, Wong Li Jie will be focusing more on AWS Architecture Design and provide low-fidelity mock-ups. Moreover, Ng Qian Hui will focus on business flow. Ng Jing Yi will be focusing on introduction and lastly Ng Keng Keat is in charge of video editing and to provide detailed description of problem and solution.

Due to Covid-19 pandemic, we are unable to meet face-to-face in real life. Hence, we use Google Meet to hold meetings to discuss our project. We are also using WhatsApp to solve the problems faced by group members. Moreover, we have some little problems deciding which application is more suitable to develop. Luckily, we all have the same idea after voting among several applications and choose the best application to propose during the meeting.

4.0 AWS Architecture Design
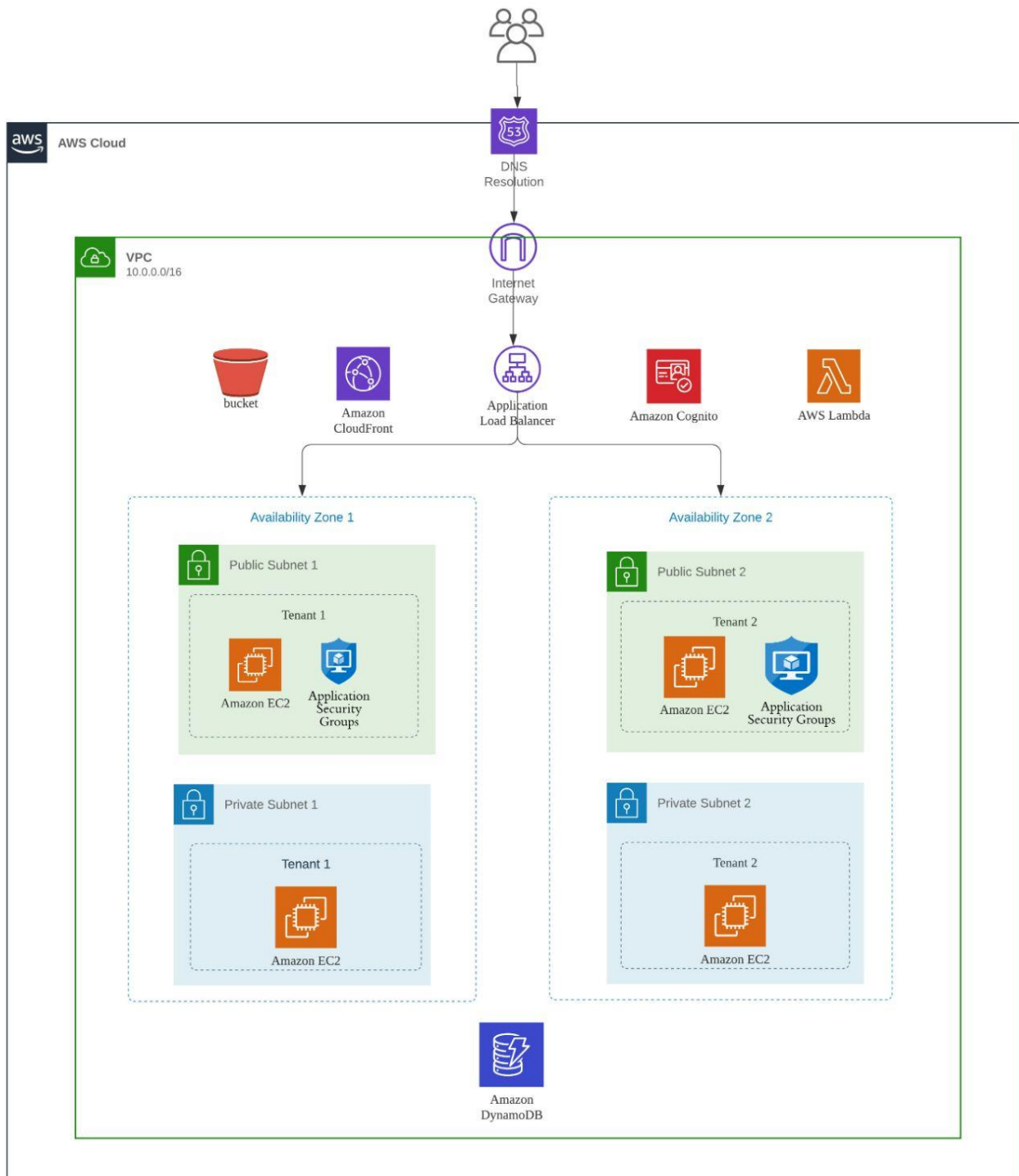
5.0 Business Flow

5.1 Diagram
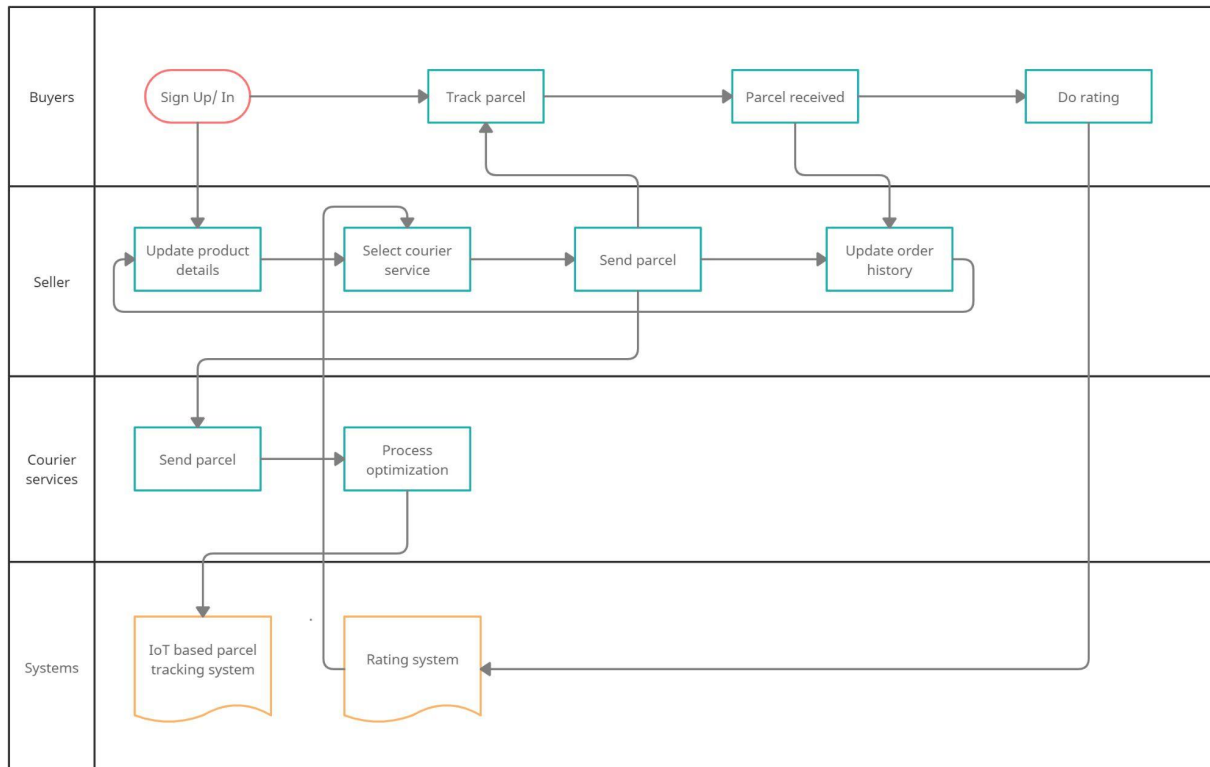
5.2 Description

A business process flow diagram is a visual representation of a process that a company carries out to achieve a goal. In reference to the business flow diagram above, the main components involved in the process of our IoT-based parcel tracking system are buyers, sellers, courier services, and systems.

With respect to the role as a buyer, a buyer is required to sign in with his email address first before entering the system. If there is no user record found in the system, a sign-up is needed for all new users. By entering the tracking number of his parcel, the user can receive information such as x-ray photos that show the inner condition of his parcel, details of the delivery man, and also the parcel near-real-time location. When any loss, damage, and delay of the parcel are found from the system, the user can immediately seek for his respective seller to report on this matter to the particular courier service with the evidence attached. Once his parcel arrives at its destination, the user will be prompted to rate the customer experience which covers the arrival time, parcel handling and response rate of the courier services.

In terms of sellers, a seller is necessary to sign in to the system as usual or sign up if he is a new user of the system. Next, the seller will be directed to update the product details on the smart inventory system by entering information such as name, category, photo, and amount of his product. Whenever there is an order from the buyer via the other online shopping platforms, the seller must first select the desired courier service with the reference to our courier service rating and review contributed by the group of buyers. Once the parcel is handed over to the respective courier service, a tracking number will be generated by the system and sent to both buyer through his email and seller to the order history. The order history page of the seller will be then updated with the product, recipient and delivery status of the parcel. The amount of available stock in the smart inventory system will also be deducted by the amount of items bought by the buyer. An alert notification will be sent to the buyer when the stock available is running low.

For courier services and systems, an IoT-based parcel tracking system with RFID technology, IoT devices and GPS are utilized to optimize the overall parcel sending process.
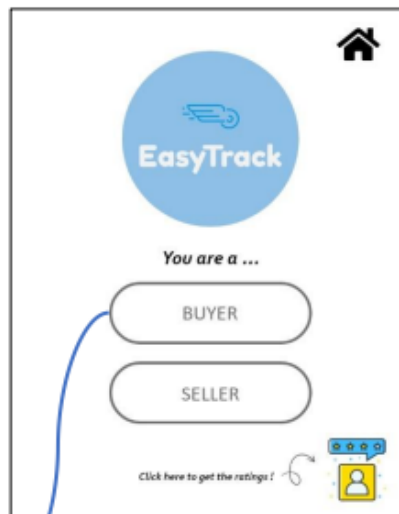 For example, RFID tags are used to embedded inside every parcels and once they arrive at each transition hub or warehouse, all the RFID tags will be received by readers RFID gate, RFID smart shelves and RFID X-ray Security Scanner to record and upload the data such information, quantity, image and et cetera to cloud database automatically.

6.0 Low-fidelity mock-ups

Link to experience the user interface: Group 4 Prototype

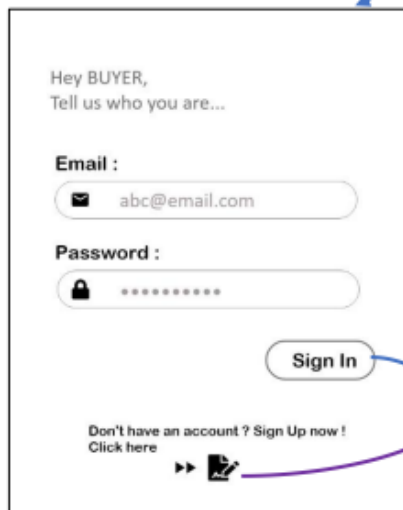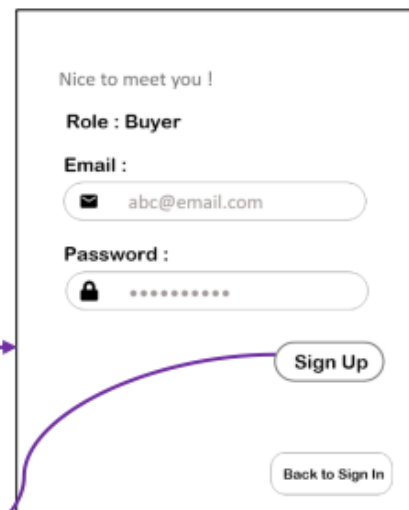Proceed with the prototype flowchart :

// Home Page

EasyTrack

You are a ...

BUYER

SELLER

Click here to get the ratings !
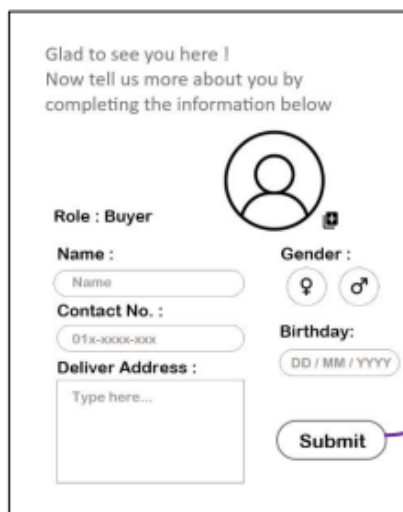
// Buyer's page
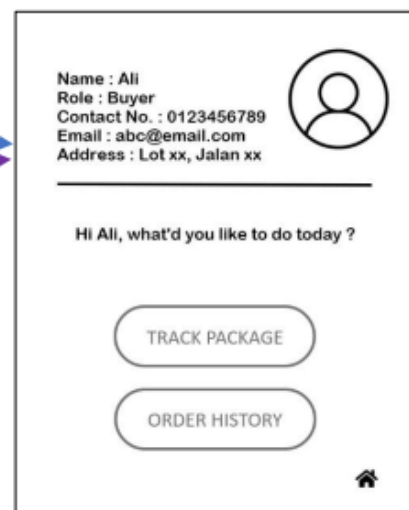
Hey BUYER,
Tell us who you are...

Email :

abc@email.com

Password :

••••••••••

Sign In

Don't have an account ? Sign Up now !
Click here
▶▶

Nice to meet you !

Role : Buyer

Email :

abc@email.com

Password :

••••••••••

Sign Up

Back to Sign In

Glad to see you here !
Now tell us more about you by
completing the information below

Role : Buyer

Name :

Name

Contact No. :

01x-xxxx-xxx

Deliver Address :

Type here...

Gender :

♀ ♂

Birthday:

DD / MM / YYYY

Submit

Name : Ali
Role : Buyer
Contact No. : 0123456789
Email : abc@email.com
Address : Lot xx, Jalan xx

Hi Ali, what'd you like to do today ?

TRACK PACKAGE

ORDER HISTORY

// Buyer's first function

TRACK PACKAGE

Enter your tracking no. 🔍

Below is your item's

Condition	Location	Delivery man

Captured at DD / MM / YYYY
00 : 00
Hub #1

Captured at DD / MM / YYYY
00 : 00
Hub #2

Done

TRACK PACKAGE

Enter your tracking no. 🔍

Below is your item's

Condition	Location	**Delivery man**

Name : Abu
Contact number : 012-3456789
Company : XXXX's Delivery

➕ Add notes
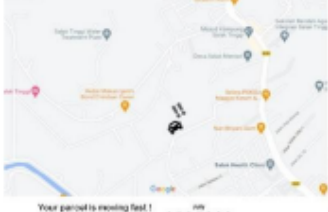
📞 Contact

Done

TRACK PACKAGE

Enter your tracking no. 🔍

Below is your item's

Condition	**Location**	Delivery man

Your parcel is moving fast !
Estimated arrival time :

Done

// Buyer's second function

ORDER HISTORY

Tracking no #1 ✓ Done reviewing

Tracking no #2 ❗ Review now !

Tracking no #3 ❗ Review now !

Done

Tracking no #

Arrived on DD / MM / YYYY, 00 : 00 .
Delivery Company : XXXX's Delivery
Details :

Captured at DD / MM / YYYY
00 : 00
Hub #1

Captured at DD / MM / YYYY
00 : 00
Hub #2

Captured at DD / MM / YYYY
00 : 00
Hub #5

How'd you rate the services :

Speed / On-Time : ☆☆☆☆☆
Parcel Handling : ☆☆☆☆☆
Response Rate : ☆☆☆☆☆

Any special comments ?

Type here ...
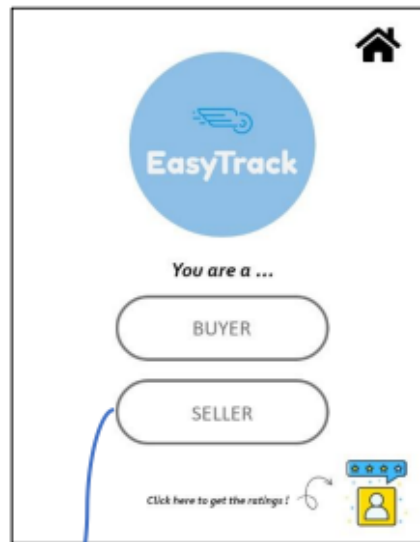
Submit

☺

Review submitted !
Thanks for choosing XXXX's Delivery.
Hope to see you again !

Done

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// Home Page

EasyTrack

You are a ...

BUYER

SELLER

Click here to get the ratings !

// Seller's Page

Hey SELLER,
Tell us who you are...

Email :

✉ abc@email.com

Password :

🔒 ••••••••••

Sign In

Don't have an account ? Sign Up now !
Click here
▸▸

Nice to meet you !

Role : Seller

Email :

✉ abc@email.com

Password :

🔒 ••••••••••

Sign Up

Back to Sign In

Glad to see you here !
Now tell us more about you by
completing the information below

Role : Seller

Name :
Name

Gender :
♀ ♂

Contact No. :
01x-xxxx-xxx

Birthday:
DD / MM / YYYY

Deliver Address :
Type here...

Submit

Name : Ali
Role : Seller
Contact No. : 0123456789
Email : abc@email.com
Address : Lot xx, Jalan xx

Hi Ali, what'd you like to do today ?

UPDATE PRODUCT

SEND PACKAGE

ORDER HISTORY

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// Seller's first function

UPDATE PRODUCT

Select your product code :

Option #1
Option #2
Option #3

Add amount of :

− 0 +

Confirm

Not in list ?
Create a new one !

Back   Create

Create

You are currently adding a new product :

Name :

Category :   ⊕

Amount :

− 0 +

Add

Back   Done

// Seller's second function

SEND PACKAGE

Below are your available products:

Category ▽

Code	Product	Stock	Choose a courier
			Assign
			Assign

Back

ASSIGN

Please choose a courier :

Option #3

Name : Option 3's name
Rating : Option 3's rating

You are sending an amount of :

− 0 +

Enter recipient's email :

✉ abc@email.com

☐ I confirmed that the email entered is correct.

Back   Send

SENDING INFO

😐 Order received !
Your buyer's tracking no is
xxx-xxxx-xxx

🖨 Print

Done

// Seller's third function

ORDER HISTORY

Below are your available products:

Category ▽

ID	Code	Product	Recipient	Delivery Status
1				Done ! ☑
2				On the way ✈
3				Pending ... ●

Done

// Home Page

EasyTrack

You are a ...

BUYER

SELLER

Click here to get the ratings !

// Rating system

Check out what our customers think about the service 😍😍

Rank	Company	Overall performance ▽	Comments
#1	(Name)	☆☆☆☆☆ (0.0 / 5.0)	View

Done

You are viewing Rank #1 Company :

#1

(Name)

Overall Performance : ☆☆☆☆☆
Speed / On-Time : ☆☆☆☆☆
Parcel Handling : ☆☆☆☆☆
Respond Rate : ☆☆☆☆☆

Comments:

Customer #1

Customer #2

Customer #3

Done

6.1 Prototype Description

In the home page, users have three options which are buyer, seller and rating. If the user selects 'buyer', he or she will have to sign in to continue the action or sign up by filling in the important information for delivery purpose. There are two functions for buyers: 'track package' and 'order history'. 'Track package' allows users to enter a tracking number to view the condition of parcels, the real time location of parcels and the contact info of the delivery man. While 'order history' enables the buyers to place their comments if they haven't.

In the seller's option, similar to the buyer, they will have a sign in and sign up function. There are three functions for sellers: 'update product', 'send package', and 'order history'. First is to update the product in the list.they can choose the product that they wish to update the stock amount, and if the product is new, they can create a new one into the list by filling in name, category, amount, and lastly the picture of product. Second function is that they can send the package using a different courier after reviewing the ratings from our system. By clicking assign, they can choose the courier and enter the recipient email, they need to double confirm the email is correct by clicking the box as all the information in the system can be accessed by email.they can after print the receipt. Last function of the seller is to check the order history, whether it has arrived to the buyer and the column on the rightmost shows the status of the specific parcel.

Lastly, in the rating system, it will showcase the comments and ratings of the buyers towards the performance of the delivery company by three categories: speed and on-time, response rate, and parcel handling. By clicking onto the 'view', sellers or buyer can view the comments of the specific delivery company.

7.0 Reflection

Creating a low fidelity prototype is a completely new experience for us and this has piqued our interest and become a motivation to complete the project as we can learn how to create a low fidelity prototype and implement our team's ideas on it. We have learned to work with others and listen to each other's opinions. With the ideas and opinions from all of the members in the group, we managed to produce a complete and creative low fidelity prototype and finish the project before the deadline.

In order to come out with a better tracking and management system compared to the market, we had brainstormed on what problem the user faced and the function that the user needed and also did research on how to improve this system. During this process, some of us realized that proposing brand new ideas and attractive functions of this system is a challenging problem because the most of the ideas we can think of are available in tracking and management systems in the market. Hence, we had done a lot of research to get some inspiration. Besides that, during the pandemic of covid-19, we can't meet with each other face-to-face to discuss the project but this problem did not affect us too much as we have solved this problem by holding a lot of online meetings to discuss this project.

After completing this project, our direction is to learn more new skills and knowledge to improve our knowledge so that we will have the opportunity to realize this system in the future. The improvement necessary for us to improve our potential in the industry is learning more soft skills like communication skills so that we can work well with others in a group and increase my productivity. Besides that, the improvement of hard skills such as the ability to use more software is also necessary for us to have the ability to complete complicated tasks and increase our efficiency during work. Other than that, creativity is something that we need to improve so that we are able to generate more useful and impactful ideas in terms of problem solving.

Overall, we have gained a lot of useful knowledge after completing this project together. We hope to further improve our understanding of prototypes and try to implement the skill in the near future.

8.0 Task for each member

Name	Toh Kang Kun	Wong Li Jie	Ng Qian Hui	Ng Keng Keat	Ng Jing Yi
Task	Interview & Brainstorming				
	Detailed steps related to the project	Low-fidelity Mock-ups	Business Flow	Detailed description related to the project & Video Editing	Introduction
		AWS Architecture Design			
	Reflection				

9.0 Video Link

https://youtu.be/2DvMnFHd9CA