DEVELOPING A COOKING GAS ORDERING AND DELIVERY MOBILE APPLICATION

BY

LOW PAH HUAT

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

In partial fulfilment of the requirements

For the degree of

BACHELOR OF COMPUTER SCIENCE (HONS)

Faculty of Information and Communication Technology

(Kampar Campus)

(MAY 2019)

UNIVERSITI TUNKU ABDUL RAHMAN

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DECLARATION OF ORIGINALITY

I declare that this report entitled "Developing a Cooking Gas Ordering and Delivery Mobile Application" is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

Signature :

Name : LOW PAH HUAT

Date : 23 August 2019

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I would like to express my sincere thanks and appreciation to my supervisor, Mr Lim Jit Theam. Mr Lim Jir Theam who has given me a lot of valuable and constructive suggestions during the planning and development of this cooking gas ordering and delivery project. I am very grateful to his for willingness to give and spend his time so generously for this project.

I would like to thank the following companies which is ‘Ban Hong Leong’ a cooking gas company for their assistance with the collection of data. Finally, I would also like to thanks to my parents and my family for their support, love, and continuous encouragement throughout the course.

ABSTRACT

This project is to develop a mobile application for cooking gas company that locate at Kampar to promote and expand their business and helps their customers order the cooking gas in more easy way. This mobile application is a cooking gas delivery mobile application named “Fast Gas Deliver 4U” and this mobile application will be developed on android platform. Cooking gas is the cheaper alternative to electric energy. This may be because more and more cooking electronics products are appeared on the market, and electronic products generally use electric power and the electric power is unlimited, so we can think that cooking electronics will slowly replace the use of cooking gas for cooking. Furthermore, all of the cooking gas companies that locate at Kampar are apply the old way of operation to manage their business which is receive phone call and walking in. Sometime their customers cannot contact the cooking gas supplier and this cause bad service experiences on customers. These problems need to be solved before a greater problem arise such as low sales performance and customers no longer supports. This mobile application can solve the problems by allow their customers make the ordering cooking gas in easier way. They only need to click few buttons to make an order. The customers can select type and quantity of cooking gas and then set a delivery date and decide the time to deliver cooking gas. For a better customers experience. The customers able to check their order status and tracking their order location. The location will be show to the customer through an google map and able to know the estimated time that the order will be reach their doorstep. The cooking gas delivery drives can plan more proper route and do appropriate arrangement for delivery by simply pick the order. For improve the business for cooking gas company, this application will track and calculate the estimated date about which customer are almost use up their cooking gas and want to exchange new cooking gas tank and then send a notification to ask and inform their customers to purchase cooking gas. The estimated date is calculated and then computed based on the data retrieved from database.

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LIST OF ABBREVIATIONS

GPS	Global Positioning System
LPG	Liquefied Petroleum Gas
SMS	Short Message Service
AVD	Android Virtual Device
IDE	Integrated Development Environment
AMOLED	Active Matrix Organic Light Emitting Diode

1.1 Problem Statement

The traditional ways of the cooking gas company to operate their business are receive phone call order or walk in order by the customers. However, there are always some problems faces by clients and cooking gas providers. In the past trend, if a client needs a cooking gas delivery service. Customers always need make a phone call to the cooking gas supplier to request and make appointment for cooking gas delivery service. Sometimes, customers are difficult to contact the cooking gas supplier because the phone number may be invalid or the staff busy on doing another task and no time to answer their phone call. These situations will cause customers feel impatient and disappointed with the services they provide.

For the company, they also face some problems such as low sales performances. One of the reasons cause the low sales performances is short operation hour. For example, the operation hour of cooking gas shop at Kampar is from 9 am to 6.30 pm. Besides that, the company sales performance is limited due to the limited order methods for customers to request cooking gas, which is by phone call order or walk in order. In addition, when the company receive order from phone call or walk in, there are many drawback and limitation faced such as efficiency and flexibility issues. The employee needs to record down order on paper when receiving order. This may lead to some consequences. For example, the company goodwill will be tainted if the employee record wrongly the customers' request which causes the customers cannot get their desired services.

Moreover, problems are always happened during phone calling section, for instances, the request made via phone call may be unclear due to the communication problems between customers and cooking gas supplier. As stated by *Adrien Joly (2015)*, the decision make via phone conversation leaves no trace and it is difficult to prove it. Therefore, the cooking gas supplier may need to recall back customers to clarify their requests. Furthermore, the business information such as order record is hard to be tracked and managed as it is stored on paper and backup issues may become a problem which may lead to serious consequences such as loss of information. Try to imagine, if a customer makes an order via phone call, but the staff was forgot to record down and forget to arrange delivery cooking gas services for that customers, what that customers will think and feel about the company. That customer will feel angry, and it is possible they will lose their customer trust and support.

Besides that, a lot of student facing problems in purchase or exchange their gas cylinder. This is because most of the students they are unfamiliar to the place they stay because they are come from other state and part of students are come from foreign. As the cooking gas is very importance for every people use on their daily life for domestic purpose and everyday there might be have people who in need of the cooking gas delivery services, but they may not know the cooking gas company's contact number. Therefore, the supply and delivery processes of the cooking gas delivery must be satisfied to the customers because most customers prefer cooking gas delivery to their doorstep, especially those customers who are busy. However, they are always facing problems in unreliable delivery and may be pay for extra delivery charges, this kind of charges can vary depending on the customers' location. According to the seehua news, the current price of a barrel of cooking gas is RM28 purchased at the store, if it is delivered to the door, it is RM30, and if it is delivered to the first floor of the apartment, it will charge RM1, and if it is above the second floor, it will be RM2.40.*(Seehua news, 2018)*

1.2 Motivation

In recent years, there are many cooking electronics products are appeared on the market and try to alternate the traditional cooking method which means using cooking gas to cook. But for now, there are still many people who are using cooking gas to cook, especially some restaurant chefs and some older housewives, because gas is more economical than ordinary electric stoves, and many chefs think that cooking gas is better to control the heat compare to electric stoves, so they can cook more delicious dishes. There exists some mobile application for delivery cooking gas in Malaysia such as Gas2U, Ks Gas, GetMeGas, GrabGas and so on. However, these applications just include some feature. For example, request cooking gas delivery services, check order history and feedback features. These mobile applications still can be improved and provides better user experience to their customers. The end product in this project will improve the existing cooking gas delivery mobile application and includes some new features like tracking the current location of the delivery drives, send notification to the customers required he or she to make regular delivery cooking gas request.

1.3 Project Scope

This project is focus on develop and create a mobile application that related to cooking gas ordering system which could help in improve the approach for ordering and delivering cooking gas for customers and cooking gas company and make ordering cooking gas more efficient and easier in just a few clicks. This project is developed based on the android platform. This mobile application is target to the resident who live in Kampar area and the users of this mobile application are categorized into three groups which is customers, cooking gas company and cooking gas delivery driver in where the customers can use the features such as order the cooking gas, tracking the delivery order and for the payment method we only consider pay on delivery while the cooking gas company are able to view the sum of business for every month, accept order, send notification message to the customers and so on. Furthermore, delivery drivers can share his/her location to the system to let the system broadcast it location to the customers, view delivery history and check their performance. This system should be able to:

I. Allow users to sign up as a customer or cooking gas delivery driver.

II. Allow users to log in as customer or cooking gas delivery driver.

III. Allow users log in by using social media.

IV. Allow customers to make an order request.

V. Allow customers to request for the different type of cooking gas.

VI. Allow customers to set a delivery date and delivery time for cooking gas delivery service.

VII. Allow customers to tracking their order thought google map.

VIII. Allow customers to pay by cash on delivery.

IX. Allow cooking gas delivery drivers to share their location.

X. Allow cooking gas delivery drivers to view delivery history.

XI. Allow cooking gas delivery drivers check their performance for each month.

XII. Update and broadcast cooking gas delivery drivers' location to the customers.

XIV. Calculate the estimated time that the order will be reach the destination.

XV. Track the customer location using GPS.

XVII. Allow users save their personal information.

XVIII. Allow customer to view the order history.

XIX. Allow customer provide feedback.

XX. Allow cooking gas delivery driver to accept and pick customers' order.

XXI. Allow cooking gas company admin send notification to the customers.

XXII. Allow cooking gas company admin to view the sum of business for each month.

XXIII. Allow cooking gas company admin to check the performance of delivery drivers.

1.4 Project Objective

To help customers contact the seller of cooking gas easily when they use up their cooking gas. After the cooking gas company receive the order, they can arrange to delivery cooking gas for the customers. By using this application, customers can place their order within few clicks in order to save their time on keep calling to the cooking gas seller when those staff no answering their phone call.

To let customers tracks the location of delivery order, the position of the order is determined and broadcasted to the customers through a google map inside the application. The customers can view and check the current location of the delivery order.

To help cooking gas supplier manage and boost their business. Therefore, they able to stand out from the competition of the others cooking gas supplier.

To enable cooking gas supplier to know the actual needs of their customers and to let them improve their service through getting feedback from customers. So that, they can provide better service to their customers.

1.5 Impact, significance and contribution

This cooking gas delivery system mobile application can improve the user experience of the cooking gas delivery services. Customers can exchange or buy a new cooking gas tank in a more convenient way with the aid of this mobile application. For example, a housewife does not need to make a phone call to the cooking gas supplier or walk in to the cooking gas shop to buy cooking gas cylinder. He or she can contact cooking gas supplier to make an order in just a few clicks.

This application provides a platform for the customers to look for an honest, dependable, and affordable cooking gas supplier and then the customers will be satisfied with the supply and delivery processes of the cooking gas delivery services.

Besides, this application can solve the problems of the cooking gas company in low sales performance. By using this application, the cooking gas company can keep track their customers' consumption capacity. Therefore, cooking gas company can visit their customers frequently by sending the notification message to remind them buy cooking gas.

1.6 Background Information

Cooking Gas was common used for every family, not only for housewife, students who student abroad or live outside and part of the worker also will use cooking gas when they want to cook. Although, we have electric stoves that can be used as an alternative tools of gas stoves. However, there are still a lot of people prefer to use gas stoves more than electric stoves. *(t00,2008)* Most of these people have been face the problems while cooking halfway and the cooking gas is over or finish suddenly due to the design of the cylinder is hard to tell them when the cylinder will be empty. Furthermore, for student who are study abroad often encounter cylinder out of cooking gas, they do not know who to call for exchange the cooking gas. So that, they chosen a one-time silicon cooking gas, and throw it away when cooking gas used up. A mobile application for cooking gas delivery system will be created at the end of this project to make ordering cooking gas more efficient.

The target user of this project is those people who live in Kampar. Kampar is a place that have large student population due to there are many campuses build such as Tunku Abdul

Rahman University college (TAR UC) and University Tunku Abdul Rahman (UTAR). The mobile application will help the users to order cooking gas in Kampar area in a more convenient way. The application provides the basic information of cooking gas cylinder such as price, brands and type of cylinder.

In order to improve the user experience, the mobile application includes features such as delivery tracking, this tracking feature requires GPS in the mobile device. So that, the location of the deliver cooking gas is tracked by using GPS and the information will share to the people who order cooking gas thought this application. This process will only be possible when the application is allowing to access to the internet. The internet is needed for the application to access and retrieve the data from the firebase. The estimated time will be calculated according to the speed and distance of the delivery.

This mobile application allows users to make the order of cooking gas by select the type and fill in quantity of cylinder needed and then the order will be broadcast to the cooking gas company and let the delivery drives to pick up the order request. After the cooking gas company accepted the requests of the user, user will be notified with the gas delivery driver details and they order will be arranged and deliver the cooking gas immediacy. Furthermore, the user is allowed make a request by setting a delivery date and time for the cooking gas delivery driver to deliver their order.

In this project, some technique and skill are needed to perform and develop the project. All these techniques are used to fulfill the objectives of the project. Therefore, some literature review has been done after studies and review previous work of other researcher. These reviews include similar mobile application, technique on tracking location and so on.

2.1 Similar Mobile Application

In this session, several similar mobile applications have been studied and compare with to find out their advantage and disadvantage.

2.1.1 Gas2u

Gas2u is a mobile application with a concept that anyone could be the customers and cooking gas delivery driver. The service of this application is only available for major cities in Peninsula Malaysia such as Cheras, Kuala Lumpur, Shah Alam, Kajang, Bangi and so on and the developer of this application are planned to expand their application to other regions in Peninsula Malaysia and East Malaysia on the new version. A user can register to be a cooking gas delivery driver with some detail like which brand of cooking gas they supply to delivery and which city their preferred to drive in, information of vehicle they use and some personal details. The identity of the particular driver is verified before approving the driver's profile to avoid unexpected event occur.

When a user wants to order cooking gas, he/she must sign in first and then set the delivery address. After that, customers need to select type of product, the type of product are categories to 2 type which is 'New' or 'Replace' and the brand of cylinder is Liquefied Petroleum Gas (LPG) only, and then confirm their order. They are allowing to select 'Delivery now' or 'Schedule an Order' depend on they prefer. Furthermore, the total amount is shown at the right bottom of this application and the amount included the delivery charges and then customer is required process to make payment. This application allows customer pay by credit card, debit card and cash on spot. The order processing and delivery time is from 8am to 6 pm on Monday to Saturday. Moreover, customers are allowed to request safety check for cooking gas installment thought this application. Customers can view their order history from the orders list.

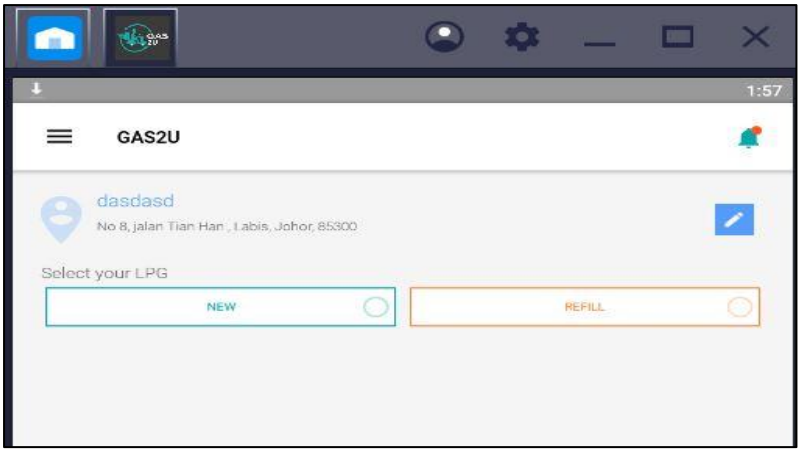


Figure 2.1.1.1 : Interface of Gas2u.

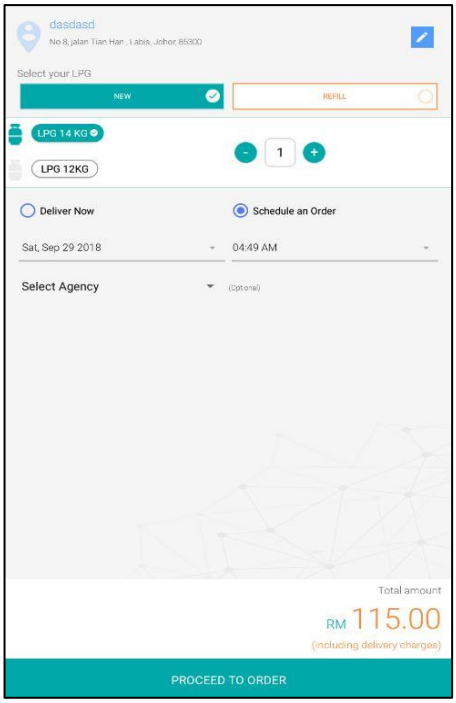


Figure 2.1.1.2 : Order session.

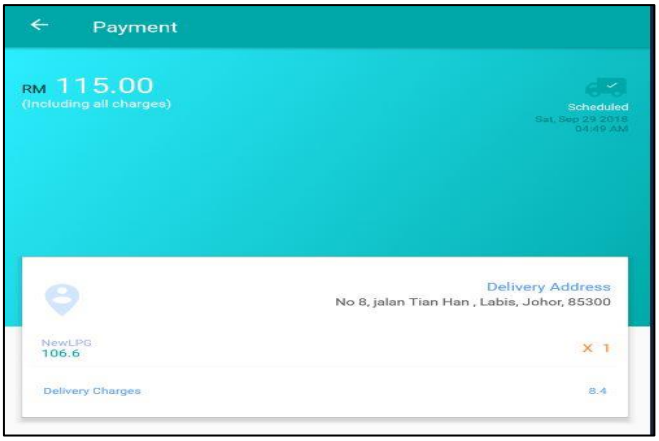


Figure 2.1.1.3 : payment.

Figure 2.1.1.4 : Order Tracking.

2.1.2 CariGas

CariGas is a mobile application that offer online gas booking service and cooking gas delivery service in Johor Bahru of Malaysia. The areas include Gelang Patah, Tampoi, Kempas, Skudai, Pasir Gudang and so on. CariGas is an online platform for users to book their cooking gas with just a click and users will need to fill their address and the quantity of cooking gas they need to submit their booking and then the cooking gas booking request will be sent to the nearest available Gas Man. The concept of this application same with Gas2u it allows user sign in as a delivery driver called Gas Man or customer because they are seeking for more partners to join Carigas platform to help them cope with increasing gas delivery order received through

Carigas platform. So that, some user can use their leisure time to earn easy part time income. User can register as a delivery driver thought fill in the Carigas partner application form on their website.

Furthermore, users are required login by using their facebook account or gmail before submits their order. Moreover, this application has not provided any selection related with the type of cylinder, this may cause confusion of the users because users are not sure the order their make is for buy a new cylinder or refill the cylinder and also brand of the cylinder has not mentioned advance. Due to this reason, customers are not allowed to book the brand of cylinder they prefer. After submitted the order, an order ID will be show to the customer to let user tracking their order whether their order have been accepted by Gas Man and check the status of their order. Cancelation of the order only can be made after 10 minutes of the time of order.

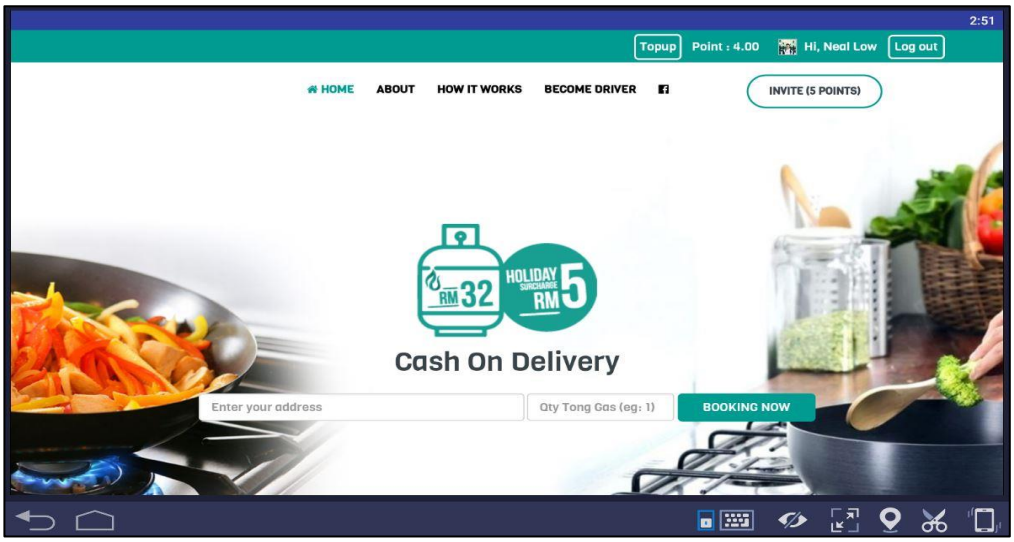


Figure 2.1.2.1 : Interface of CariGas.

Figure 2.1.2.2 : Booking.

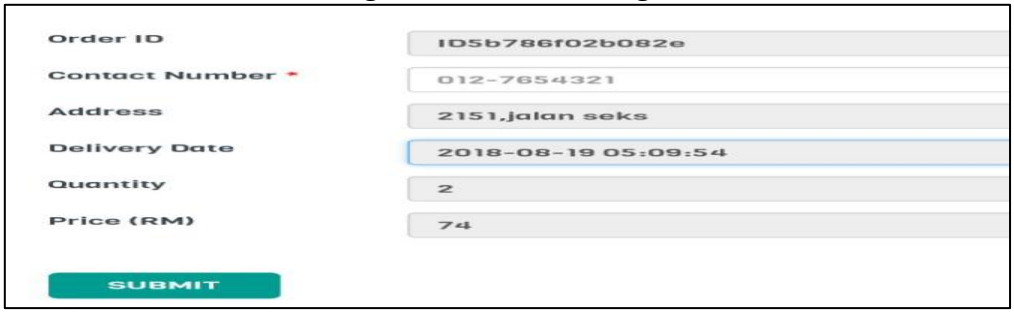


Figure 2.1.2.3 : Confirm Order.

2.1.3 GetMeGas

GetMeGas is a cooking gas ordering platform for the customers who stay within Sri Lanka to place the cooking gas orders and get cooking gas delivery to their doorstep. The customer must login with their phone number before using this application. After customers login in, they can start to make their request by selecting the weight of gas cylinder and quantity needed and then the system will send a verification code to the customer's phone to confirm the order with customers. After that, customers are required to fill in the address and they request are success. Customers must reenter their address for every time purchase cooking gas. This application will broadcast the delivery driver's detail to the customers to let customers contact delivery driver easily. This application has not any payment method for the customers due to all the transaction are pay on delivery.

Besides that, this application not have any feature that can to detect the location of the customers. So that, the cooking gas delivery driver must call customer by himself to ensure the customer's address is correct. This may slow down the delivery time and affect the goodwill of company indirectly. Moreover, this application not allows customers to view their order history. Therefore, customers are difficult to estimate a time to purchase cooking gas.

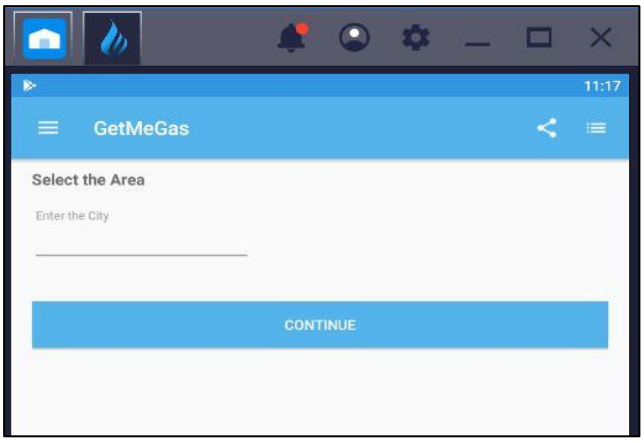


Figure 2.1.3.1 : Interface of GetMeGas.

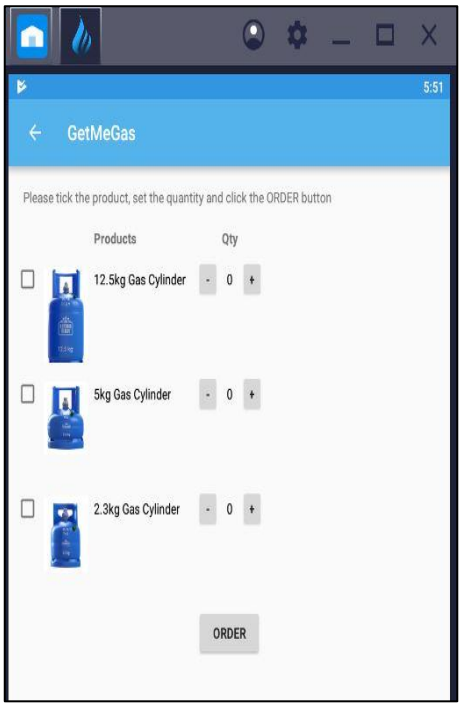


Figure 2.1.3.2 : Booking session.

2.1.4 High Speed Gas

High Speed Gas provides a simple and efficient next day gas delivery service to the user. Therefore, this application is not suitable for those who need to use cooking gas urgently when they are cooking halfway, and the cooking gas is use up. This application require user to sign in by fill in their personal detail before using this application and the customers are not allows to login using social media such as Facebook or Instagram. After that, the customers can start to make their order request, they are required to select the quantity of gas cylinder needed and then the systems will process to the payment part. For the brand of cylinder, there are only one brand available for the customers to purchase. Furthermore, this application allows 2 type of payment method which is cash on delivery and other is pay with debit or credit card.

This application is using google map to allocate the location of customers. However, the customer is required to enter their address also. All the information enters during order session before will not be save automatically. So that, every time must reenter the required information. Moreover, user can view their history purchase order from 'Order history'.

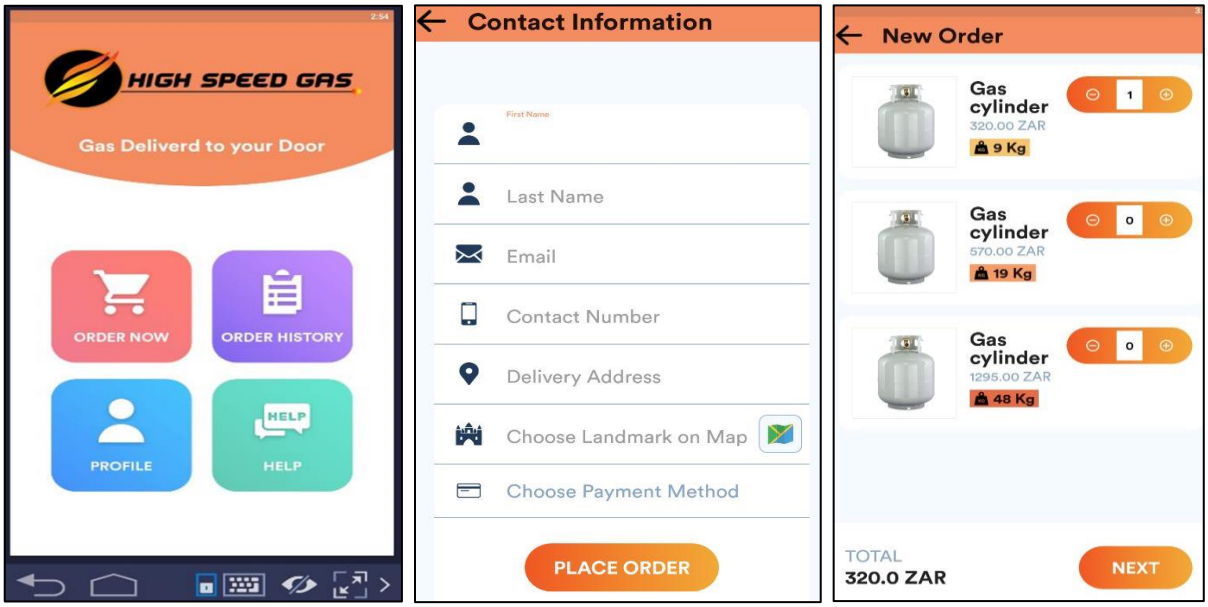


Figure 2.1.4.1 : Fill in information and Booking interface of High Speed Gas.

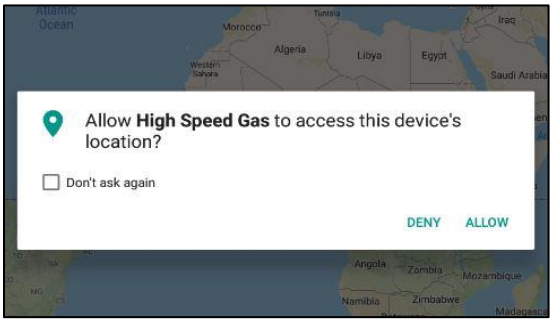


Figure 2.1.4.2 : Detect location.

2.1.5 KS HomeGas

KS HomeGas provide cooking gas delivery service within short period to the customer. This application has cooperated with many cooking gas suppliers in Kedah area. However, this application is still undertesting and some fundamental feature are not implemented like cooking gas cancellation and payment method, so all the payment are cash on delivery.

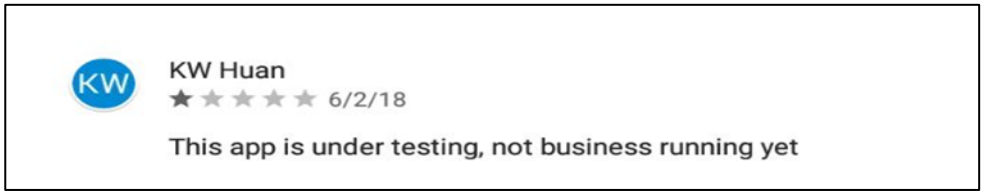


Figure 2.1.5.1 : User's comment.

Besides that, KS HomeGas have poor interface design. This application is required user sign up and log in by using their phone number and a verification message will send to the customers' phone during verification step to ensure the contact number provided by the customers are validated. So that, the dealer can confirm the customers' order by calling the customer. Besides that, user is allowed sign in as a dealer to start their business. So, customers no need to worry about not one will pick up their order and also no need to depend in only one supplier. This application provided 6 difference brand of cooking gas cylinder selection for the customer to select.

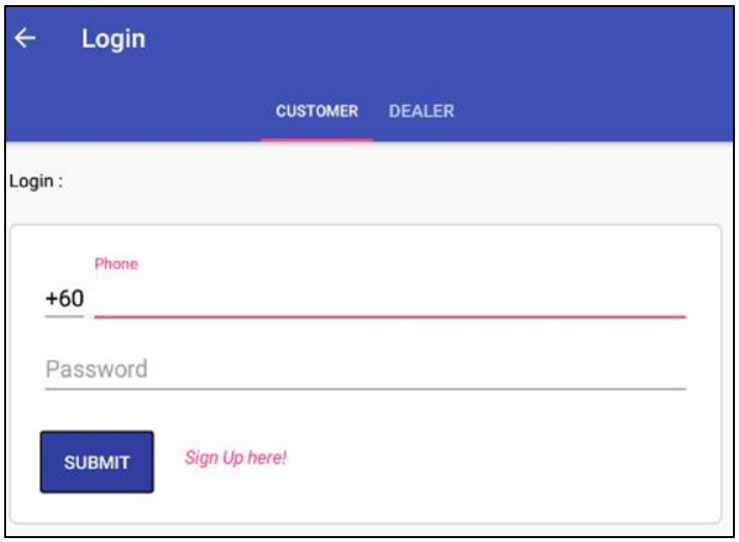


Figure 2.1.5.2 : Login page.

Figure 2.1.5.3 : Interface of KS HomeGas.

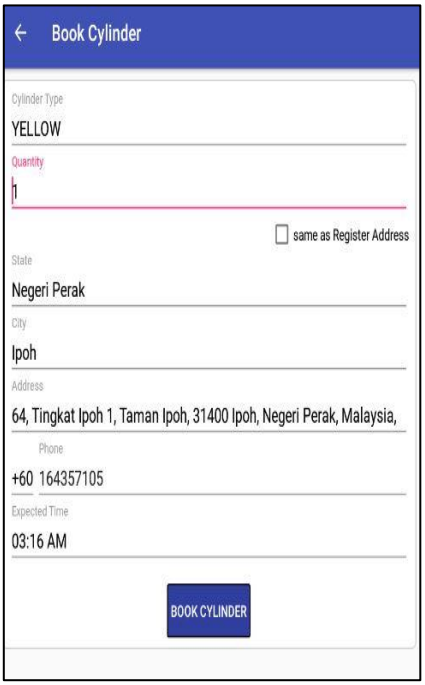


Figure 2.1.5.4 : Booking session.

Figure 2.1.5.5 : Booking History.

2.1.6 Online Booking Portal

Online Booking Portal is a web-based application that allow cooking gas supplier post their contact number on their website. The cooking gas suppler must sign up and fill in all the information such as kind of cylinder them provide, which state or city they stay, their phone number and so on. The service of this application is only available for major cities in Indian. Customers can press the 'Book your cylinder' button to search the contact number of the cooking gas supplier. On the 'Book your cylinder' page, this application has provided few types of method to let customer contact with cooking gas supplier which is through online booking, SMS, phone call, mobile app for the Android and iPhone. The mobile application mention at here is called Indane. By using SMS and phone call method to book cylinder, a list of contact number with the supplier's name and the city they stay will be shown to the customers and then customer must call to the supplier by themselves.

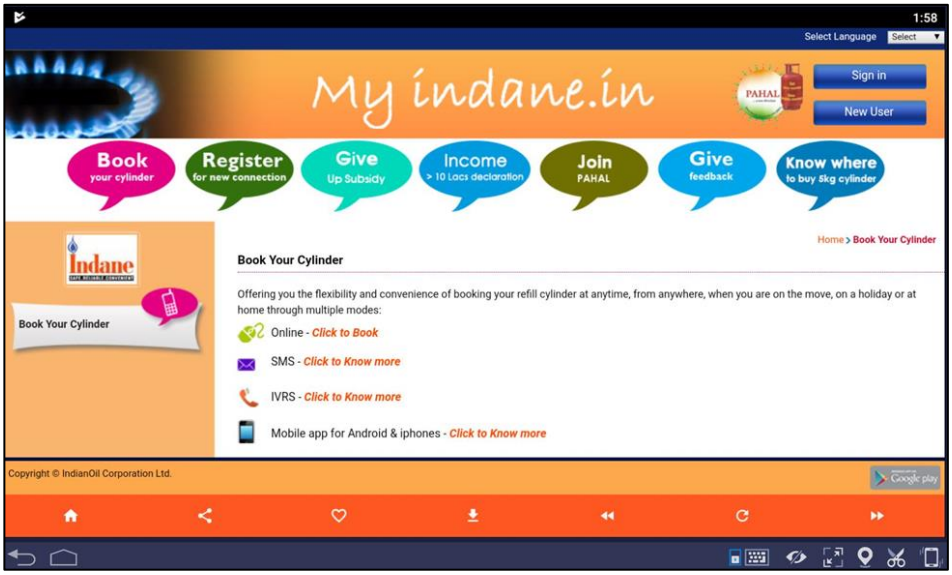


Figure 2.1.6.1 : Interface of Online Booking Portal.

How to book Refill ?

After Distributor and Customer number are identified properly, then the system will ask for the option of refill booking and for other services. Pl note the options Press 1 for Refill booking, Press 2 for Complaint, Press 3 for Enquiry of last booking . Once option for refill booking is given refill booking will be taken and booking reference number will be prompted and SMS will be sent to your mobile number.

The IVRS/SMS numbers applicable for each state are below. Check for your city :

State	City	IVRS Number
	Anantapur	9848824365
	Chittoor	9848824365
	Kalyandurg	9848824365
	Kowthalam	9848824365
	Kurnool	9848824365
Andhra Pradesh	Tirupathi	9848824365
	Tuggali	9848824365

Figure 2.1.6.2 : Book by phone call method.

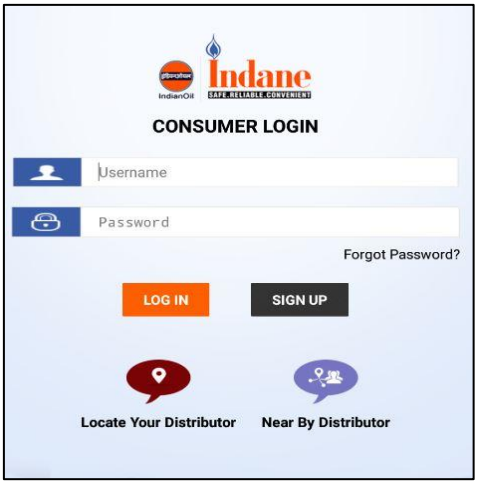


Figure 2.1.6.3 : Book by mobile application(Indane).

2.1.7 Wellawatte Gas Centre

Wellawatte Gas Centre is a mobile application that provide cooking gas home delivery service for Colombo city include Wellawatte, Bambalapitiya, Kollupitiya and so on. This application is managed by one of the appointed dealers of Litro GasLanka Ltd. Litro GasLanka is the member of world LPG association. Customers are assured of prompt delivery within 10 minutes after they make the order by using this application. When the order is submitted to their company, their staff will contact customer to confirm the order first and then their professional staff will carry their duties efficiently to deliver the ordered cooking gas cylinder to the customer's location. Furthermore, they have provided safety check as an extract free service to their customers when cooking gas are delivered to attract customers use their application.

This application performs a form as the application interface to let customer fill in the detail such as customer's name, phone number, address, weight of cylinder and then customer can send their order to the dealer company. Besides that, customer can make a phone call by pressing the 'Phone' icon on the left bottom side of this application to make the order if they are lazy to fill in the detail. In conclusion, this is a mobile application that allow customer direct contact to the gas dealer company to order cooking gas.

Figure 2.1.7.1 : Interface of Wellawatte Gas Centre.

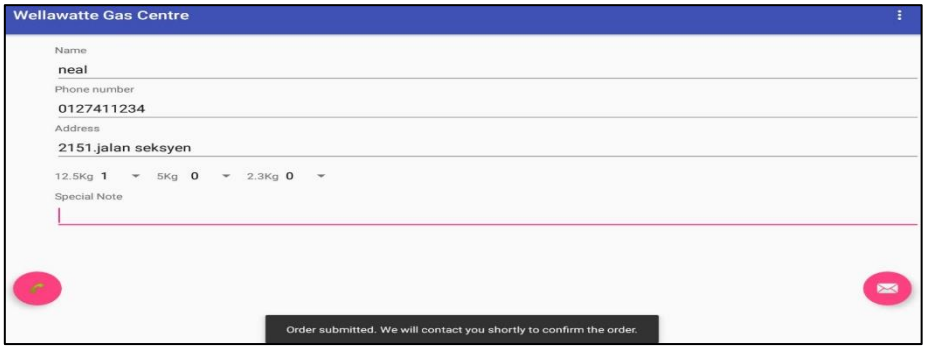


Figure 2.1.7.2 : Booking session

2.2 Comparison of similar Applications

	Gas2u	CariGas	GetMeGas	High Speed Gas	KS HomeGas	Online booking portal	Wellawatte Gas Centre	Proposed Application
Login & Sign up	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Login using Social Media	No	Yes	No	No	No	No	No	Yes
Cash on Delivery	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Order History	Yes	Yes	No	Yes	No	No	No	Yes
Traking Order	No	Yes	No	Yes	Yes	No	No	Yes
Track products' location	No	No	No	No	No	No	No	Yes
Set Time for delivery	Yes	No	No	No	No	No	No	Yes

	Gas2u	**CariGas**	**GetMeGas**	**High Speed Gas**	**KS HomeGas**	**Online booking portal**	**Wellawatte Gas Centre**	**Proposed Application**
Save Personal Information	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Feedback system	No	Yes	No	Yes	No	Yes	Yes	Yes
Strength	-Extra safety check for cooking gas installment -Users allows to Schedule an order. -Users allow to sign in as drivers or customers.	- Order ID convinient customers to track their order. -Allows users earn part time income as a delivery drivers.	-Brodcast delivery driver's detail to the customers. -Send verification code to customers to comfirm order.	-Easy to use due to good design. -Using google map to allocate the customers location.	-Send a verification message to the customers' phone to ensure the phone number provided are validated.	-Provides different language for their users. -Provides cooking gas supplier's contact number for difference area.	-Provided satefy check as an extract free service. -Link to the cooking gas company hotline by pressing'Phone button' automatically.	-Customers are allows to check their ordered cylinder's location. - Customers can scheduls a time to ask for cooking gas delivery service.

	Gas2u	**CariGas**	**GetMeGas**	**High Speed Gas**	**KS HomeGas**	**Online booking portal**	**Wellawatte Gas Centre**	**Proposed Application**
Weakness	-Delivery drivers inactive on weekend. -Cancelation only can be made after 10 minutes of the time of order.	-Delivery drivers inactive on weekend. -No provides type of Cylinder	-Not have location detect feature. -Customers must reenter personal detail for everytime purchase.	-The order will be send on next day. -The contact information enter during order session will not be save automatically.	-No allows customers to cancel their order via this application. -Drivers may inactive on weekend.	-Too many advertisement and these advertisement prompt up frequenly. -Customers must call the cooking gas supplier by themselve.	-Customers must to enter the required information for everytime to make an order. -No provides option for type of cylinder.	-No provides debit, credit card payment method.

Table 2.2.1 : Comparison of similar applications.

3.1 System Overview

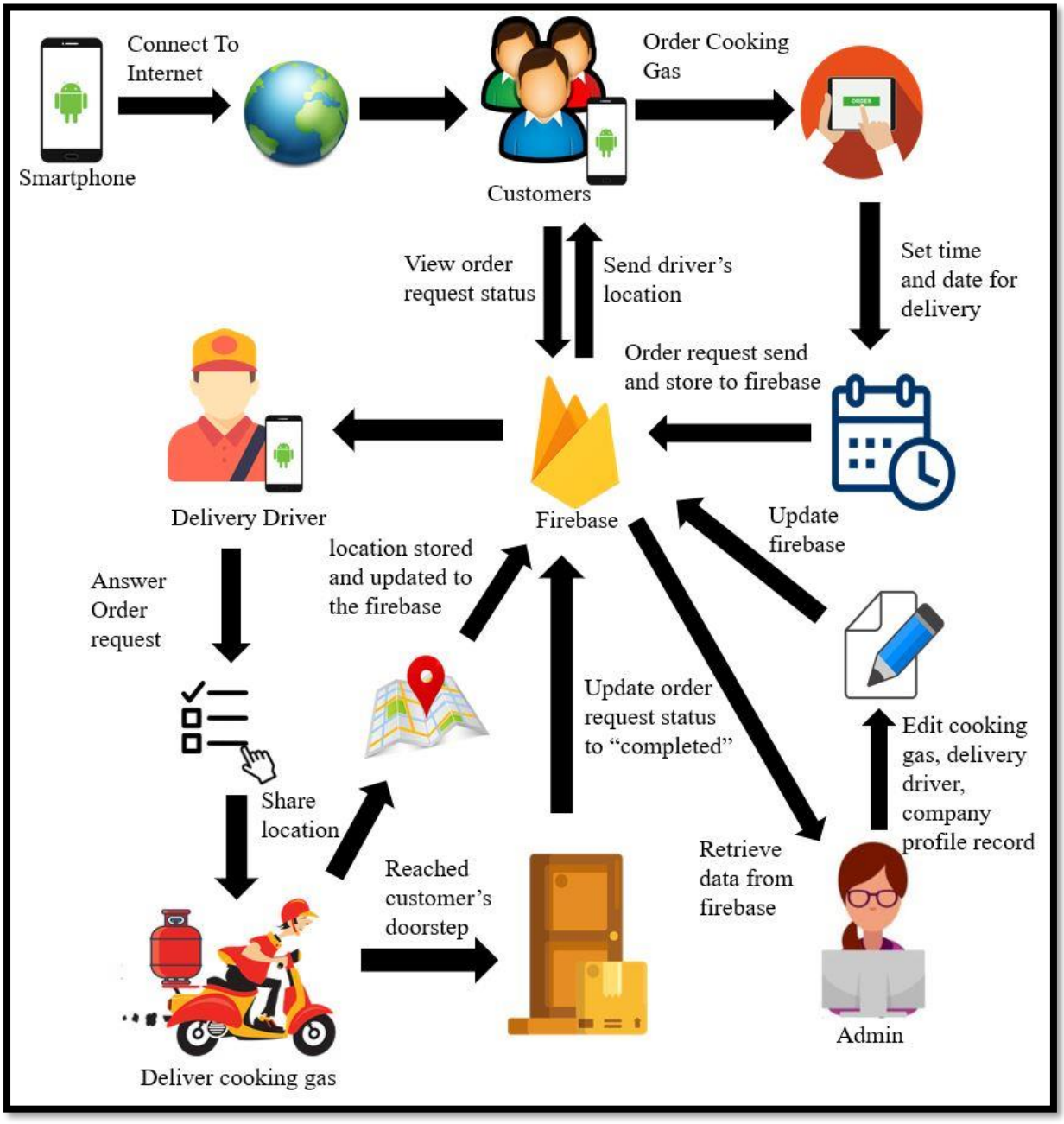


Figure 3.1.1 : Block Diagram

The users of cooking gas delivery system will be category into 3 types which is customers, delivery drivers, and admin. The users are required to approve the permission for the system to access the user location and the internet in order to use this mobile application. The customers are allowed to place their cooking gas delivery order request through select the type and quantity of the cooking gas and set the delivery date and delivery time. The order will be sent and store to the firebase after customers place their order request, and then the cooking gas order request list will be retrieved from the firebase and display on the delivery drivers/company staffs smartphone. Drivers can now begin to answer those order request and then confirm the selected order request. The status of the customer order request will be updated to the In-progress. The delivery drivers select one of the order requests to deliver and at the same time they need to share their location. The location stored and updated to the firebase periodically. The system will then retrieve the location of the delivery driver and send to the customer in order to let them track the location of the delivery driver. When customer's order reached the customer doorstep, the payment is paid on spot then the status of the order will be updated to the completed. For the cooking gas company admin, they can set the notification message that sends to the customer based on the estimated time of the regular order request. Furthermore, cooking gas company admin can manage the cooking gas record, delivery driver record, and their company profile. The data will be sent and store on the firebase after editing.

3.1.1 Use Case Diagram

Figure 3.1.1.1 : Use Case Diagram for Cooking Gas Ordering and Delivery System

3.1.2 Use Case Description

Use Case ID	UC001	Version	1.0
Use Case	Login		
Purpose	To allow user login to access the feature inside mobile application		
Actor	Customer, Delivery Driver		
Trigger	User open application.		
Precondition	The application is at sign in page and there is internet connection.		
Scenario Name	Step	Action	
Main Flow	1	User enters email address and password.	
	2	User clicks "Sign in" button.	
	3	Systems verifies the user identify.	
	4	If user's detail is valid, then display login successful message.	
	5	User loggedd in to main page based on user type.	
Alternate Flow - Sign up	2.1	Use clicks "Sign up" button.	
	2.2	System directs user to sign up page.	
Alternate Flow - User not exists	4.1	System display error message.	
	4.2	Back to Step 1.	
Author	Low Pah Huat		

Table 3.1.2.1 : Use Case 001 - Login.

Use Case ID	UC002	Version	1.0
Use Case	Sign up		
Purpose	To allow user sign up an account		
Actor	Customer, Delivery Driver		
Trigger	User clicks sign up button in the login page.		
Precondition	The application is at login page and there is internet connection.		
Scenario Name	Step	Action	
Main Flow	1	User clicks 'Create a new account' or 'Want to join us' in the login page.	
	2	User enter required information.	
	3	User clicks "Register" button.	
	4	System validates user input.	
	5	If the user enters valid input, system check the existences of user from database.	
	6	If user not exits, register successful.	
	7	System display sign up successful message.	
	8	System direct to login page.	
Alternate Flow - Back to login page	1.1	User clicks back button.	
	1.2	System direct to login page.	
Alternate Flow - Invalid Input	5.1	If the user enters Invalid input, system display error message.	
	5.2	Back to Step 3	
Alternate Flow - User exists	6.1	If user exists, register fail.	
	6.2	System display error message.	
	6.3	Back to Step 3	
Author	Low Pah Huat		

Table 3.1.2.2 : Use Case 002 - Sign up.

Use Case ID	UC003	Version	1.0
Use Case	Log out		
Purpose	To allow user to log out account.		
Actor	Passenger, Driver		
Trigger	User clicks log out button in the user profile page.		
Precondition	The application is at profile page and users have login an account.		
Scenario	Step	Action	
Main Flow	1	User clicks log out button in the user profile page.	
	2	System display logout successful message.	
	3	System direct to home page.	
Author	Low Pah Huat		

Table 3.1.2.3 : Use Case 003 - Log out.

Use Case ID	UC004	Version	1.0
Use Case	Manage personal information		
Purpose	To allow user edit personal information.		
Actor	Customer, Delivery Driver		
Trigger	User clicks profile button at home page.		
Precondition	The application is at home page and there is internet connection.		
Scenario Name	Step	Action	
Main Flow	1	User clicks profile button at home page.	
	2	User edit personal detail.	
	3	System validate user input.	
	4	If user enter valid input, update database.	
	5	System display update successful message.	
Alternate Flow - Invalid User Input	4.1	If user enter Invalid input, update database fail.	
	4.2	System display error message.	
	4.3	Back to Step 2	
Author	Low Pah Huat		

Table 3.1.2.4 : Use Case 004 - Manage personal information.

Use Case ID	UC005	Version	1.0
Use Case	Provide Feedback		
Purpose	To allow user provide feedback toward mobile application.		
Actor	Customer, Delivery Driver		
Trigger	User clicks back button in the home page.		
Precondition	The application is at home page and there is internet connection.		
Scenario Name	Step	Action.	
Main Flow	1	User clicks back button in the home page.	
	2	System direct user to a google form.	
	3	User answer question and enter feedback.	
	4	User send feedback.	
	5	System direct to home page.	
Author	Low Pah Huat		

Table 3.1.2.5 : Use Case 005 - Provide Feedback.

Use Case ID	UC006	Version	1.0
Use Case	Make cooking gas order request		
Purpose	To allow customer order cooking gas.		
Actor	Customer		
Trigger	User clicks order button in the home page.		
Precondition	User logged in as customer, the application is at home page and there is internet connection.		
Scenario Name	Step	Action	
Main Flow	1	User clicks order button in the home page.	
	2	User select quantity and cooking gas.	
	3	User press next button.	
	4	System display selected cooking gas and quantity.	
	5	User press next button.	
	6	System display personal information and delivery detail.	
	7	User enter delivery date and time	
	8	User enter delivery address.	
	9	User confirm order.	
	10	System direct to home page.	
Alternate Flow - No Enter Delivery Date and Time	7.1	If user no enter delivery date and time, system use current date and time for delivery request.	
Alternate Flow - No Enter Delivery Address	8.1	If user no enter delivery address, system use default address as delivery address.	
Author	Low Pah Huat		

Table 3.1.2.6 : Use Case 006 - Make Cooking Gas Order Request.

Use Case ID	UC007	Version	1.0
Use Case	View order history		
Purpose	To allow user to view order history, keep track their order status and then keep track delivery driver location.		
Actor	Customer		
Trigger	User clicks order history button in the home page.		
Precondition	User logged in as customer and the application is at home page.		
Scenario Name	Step	Action	
Main Flow	1	User clicks order history button in the home page.	
	3	User select 'On the way' order.	
	5	System display order detail.	
	6	User clicks track driver button.	
	7	System display a google map.	
Alternate Flow - Select Complete Order	3.1	User select complete order.	
	3.2	System display order detail.	
Author	Low Pah Huat		

Table 3.1.2.7 : Use Case 007 - View order history.

Use Case ID	UC008	Version	1.0
Use Case	Pick order		
Purpose	To allow user to pick cooking gas delivery request.		
Actor	Delivery Driver		
Trigger	User clicks pick order button in the home page.		
Precondition	User logged in as delivery driver, the application is at home page and there is internet connection.		
Scenario Name	Step	Action	
Main Flow	1	User clicks pick order button in the home page.	
	2	System display order request list.	
	3	User clicks the checkbox to pick order.	
	4	System direct to delivery history page (In pending list)	
	5	User select order to deliver.	
	6	User press the deliver button to share location.	
	7	System display a google map.	
	8	User clicks complete button to close order request.	
Author	Low Pah Huat		

Table 3.1.2.8 : Use Case 008 - Pick Order.

Use Case ID	UC009	Version	1.0
Use Case	View delivery history		
Purpose	To allow user view delivery history and manage delivery request.		
Actor	Delivery Driver		
Trigger	User clicks delivery history button in the pending order page.		
Precondition	User logged in as delivery driver, the application is at pending order page and there is internet connection.		
Scenario Name	Step	Action	
Main Flow	1	User clicks delivery history button in the pending order page.	
	2	User enter date range.	
	3	System display all the order based on date range and total order within the date range.	
	4	User select record.	
	5	System display record detail.	
Alternate Flow - Select In-Pending Order.	4.1	User select a delivery request.	
	4.2	System display order detail.	
Author	Low Pah Huat		

Table 3.1.2.9 : Use Case 009 - View delivery history.

3.1.3 Activity Diagram

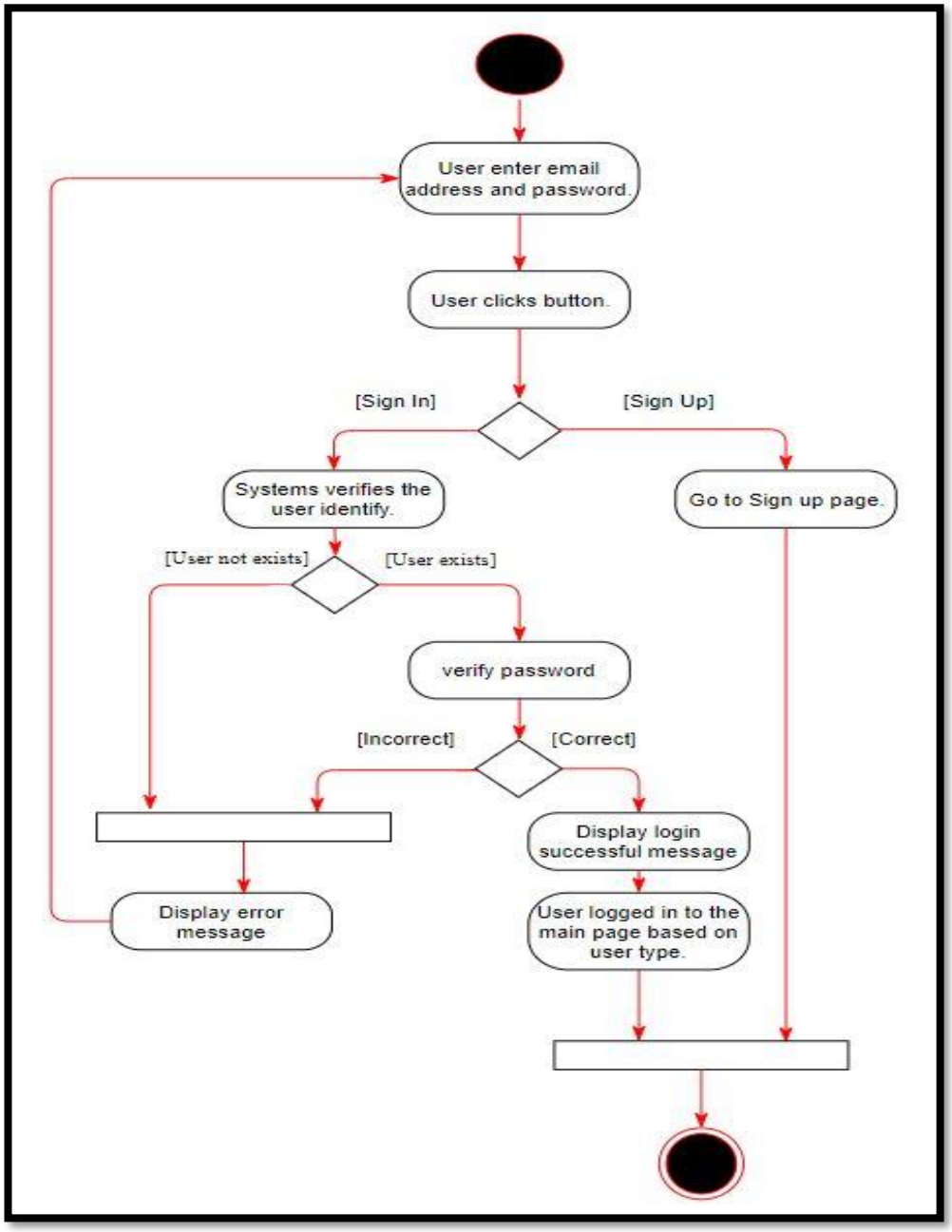


Figure 3.1.3.1 : Activity Diagram - Login.

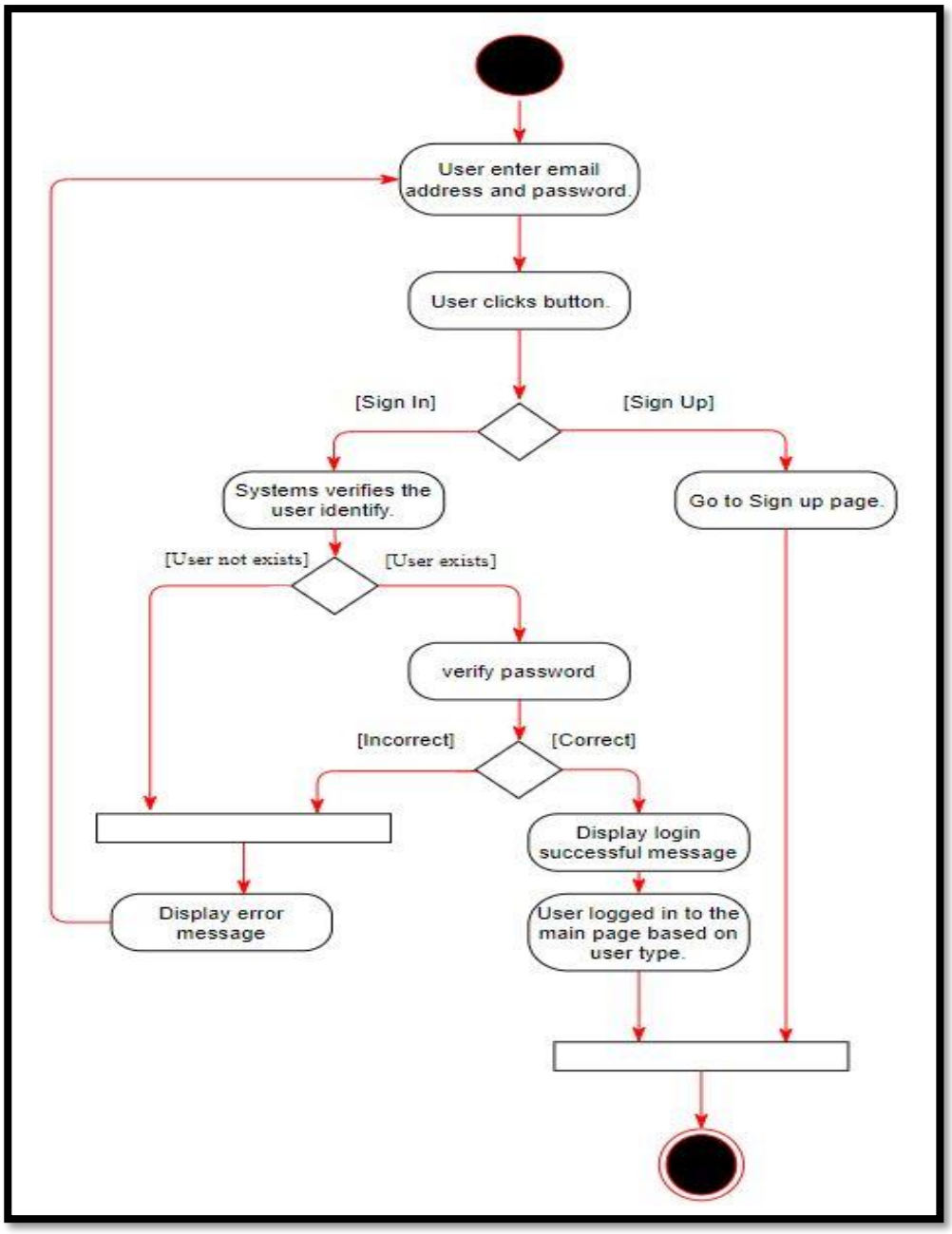


Figure 3.1.3.2 : Activity Diagram - Sign Up.

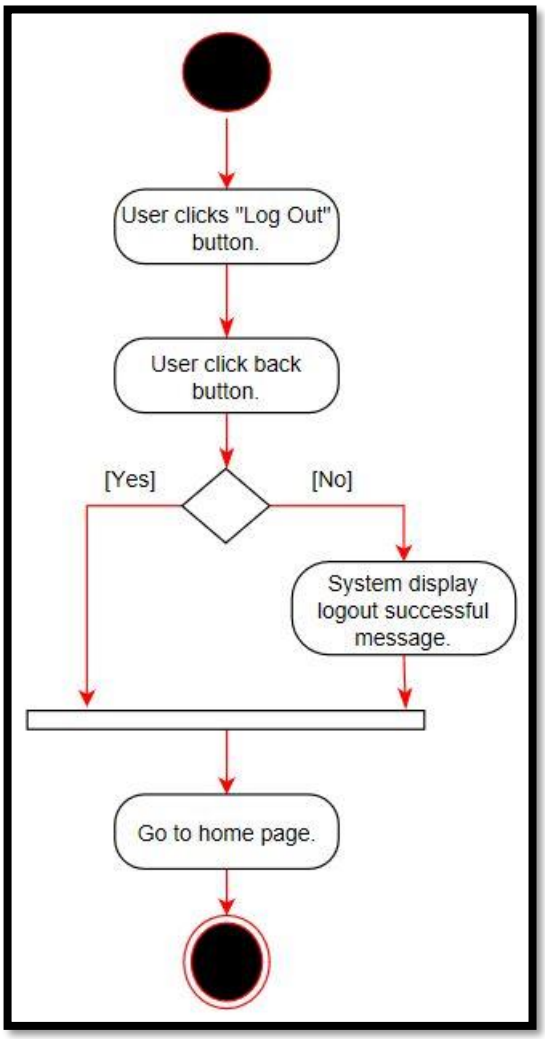


Figure 3.1.3.3 : Activity Diagram - Log Out.

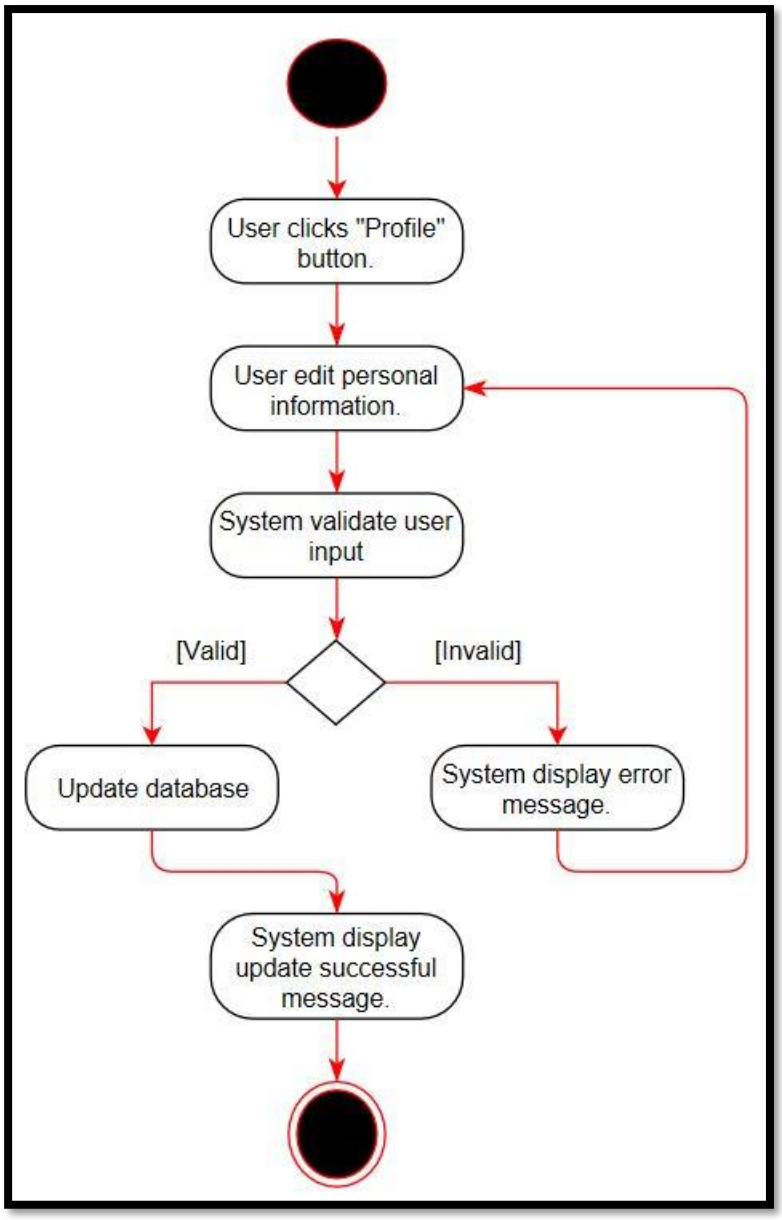


Figure 3.1.3.4 : Activity Diagram - Manage Personal Information.

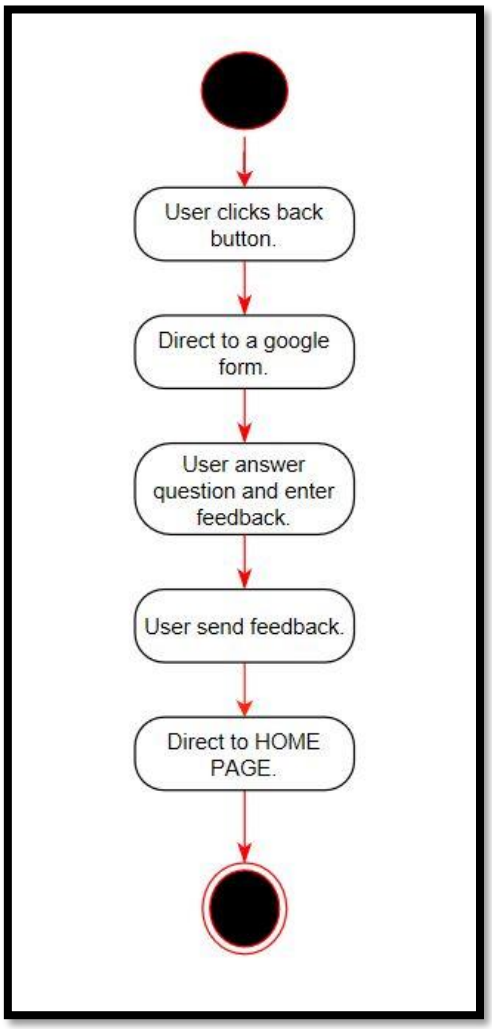


Figure 3.1.3.5 : Activity Diagram - Provide Feedback.

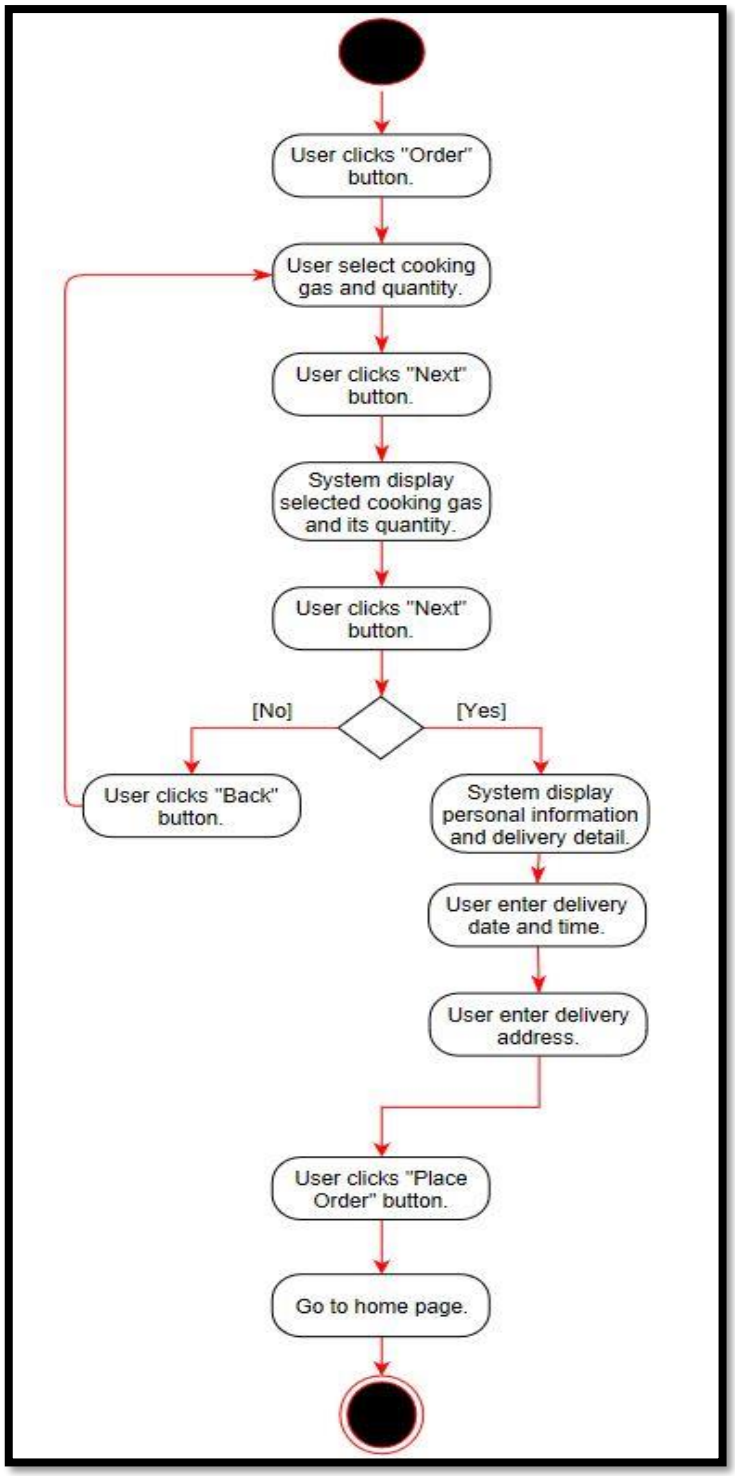


Figure 3.1.3.6 : Activity Diagram - Make Cooking Gas Order Request.

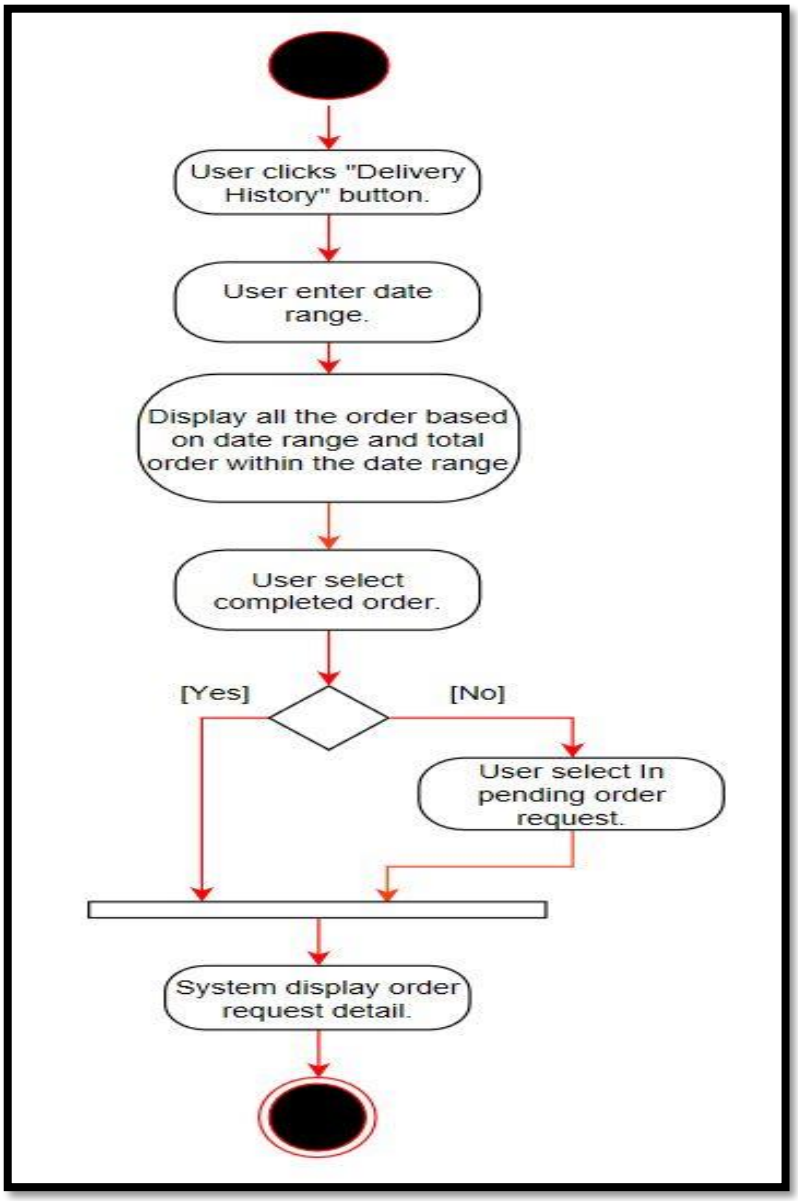


Figure 3.1.3.7 : Activity Diagram - View Order History.

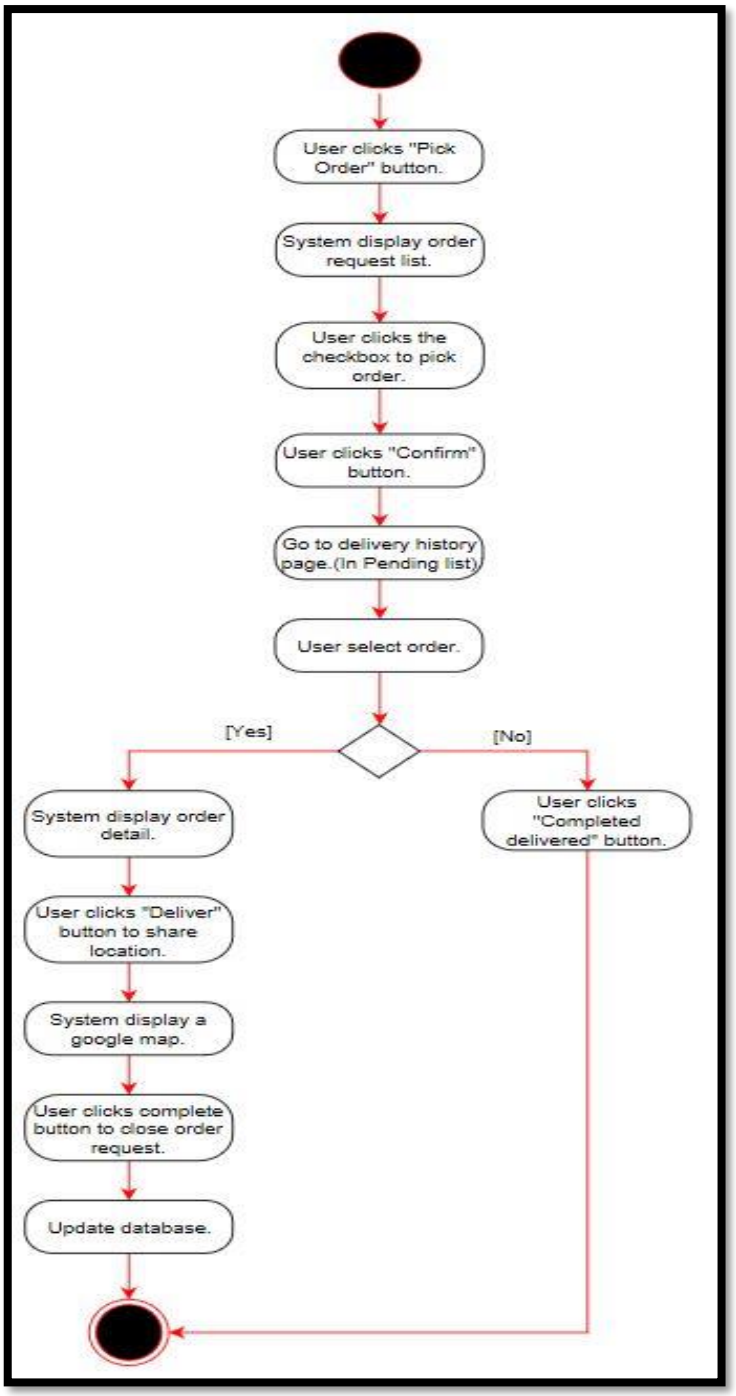


Figure 3.1.3.8 : Activity Diagram - Pick Order.

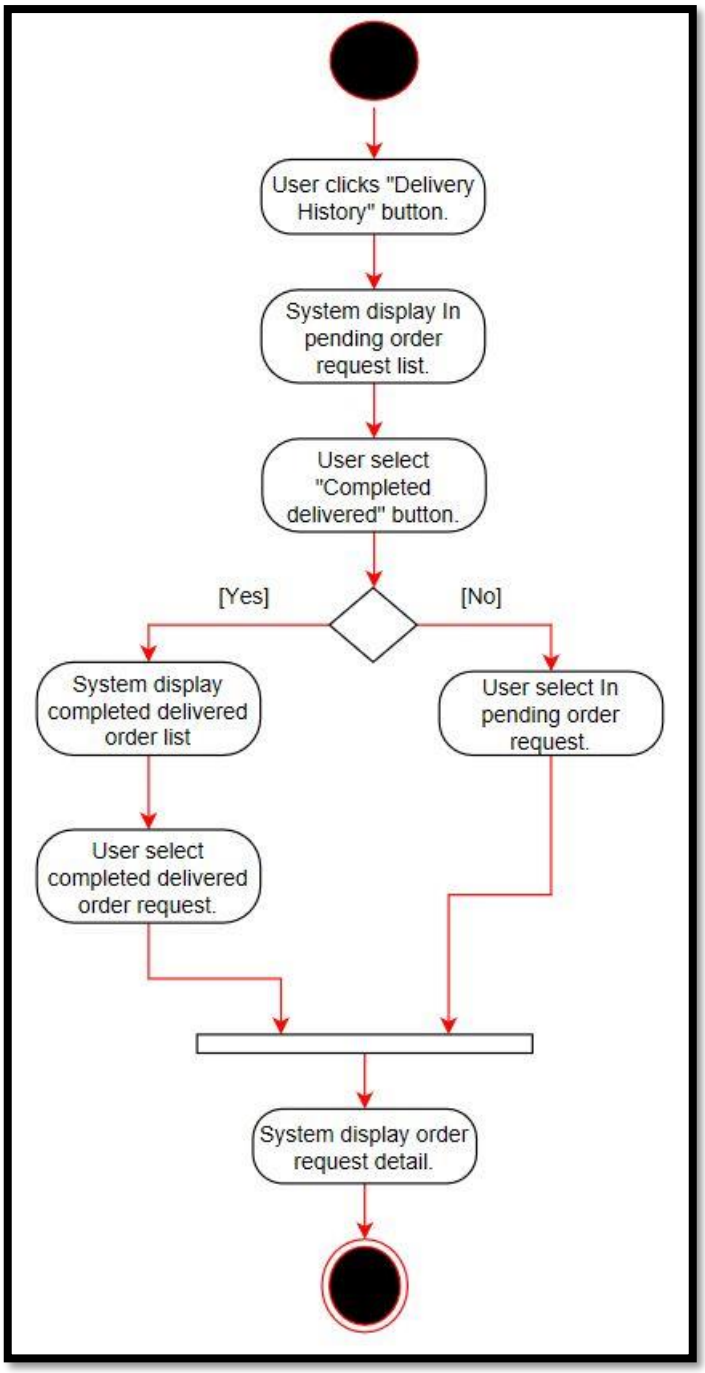


Figure 3.1.3.9 : Activity Diagram - View Delivery History.

3.2 SYSTEM FUNCTIONALITY OF OLD VERSION

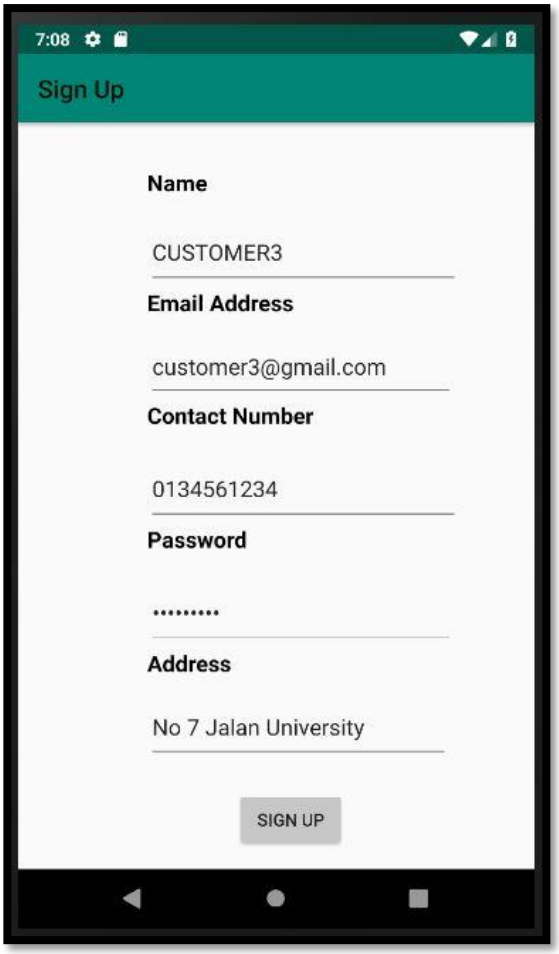


Figure 3.2.1： Customer Sign Up Page.

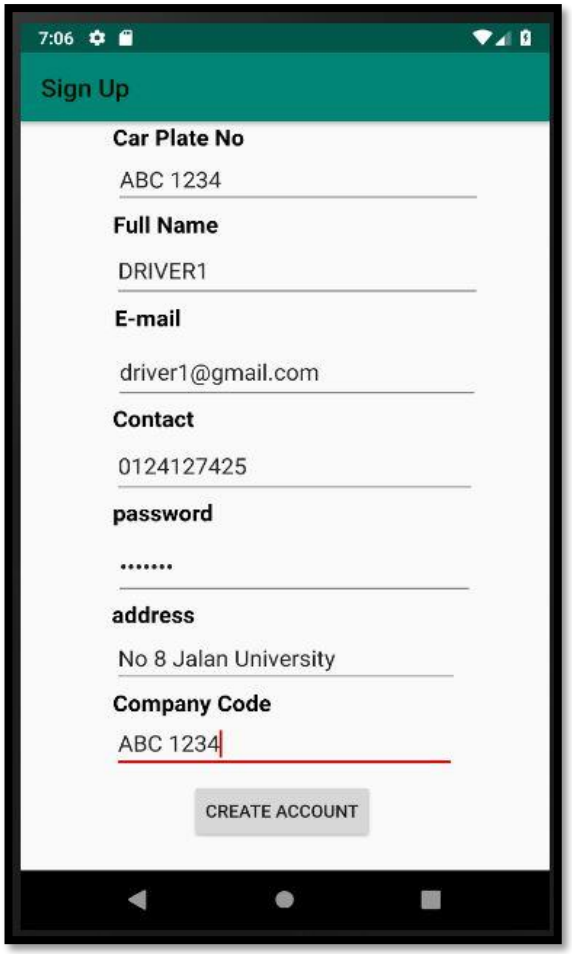


Figure 3.2.2： Delivery Driver Sign Up Page.

The above figure shown the sign up page interface for customers role. User needs to enter personal information including username, email address, contact number, password and address to create a new customer account. After user clicks the sign up button the page will direct users to the login page.	The above figure shown the sign up page interface for delivery drivers role. User needs to provide some basic personal information including username, email address, contact number, password and address, car plate number and company code to create a new customer account. User must get the company code from the cooking gas company.

Figure 3.2.3： Login Page.

Figure 3.2.4： Customer Home Page.

Above figure is the sign in page for Ban Hong Leong Gas Centre mobile application. User need to enter correct email address and password in order to signing in to the system. An error message would be shown when user enter incorrect email address or password. The “Customer” button here will direct user to sign up page as customer role and the “Driver” button direct user to sign up page of delivery driver.

This is the page shown when user signs in as a customer successfully. On this page, there are four feature which is order now, order history, profile, and help.

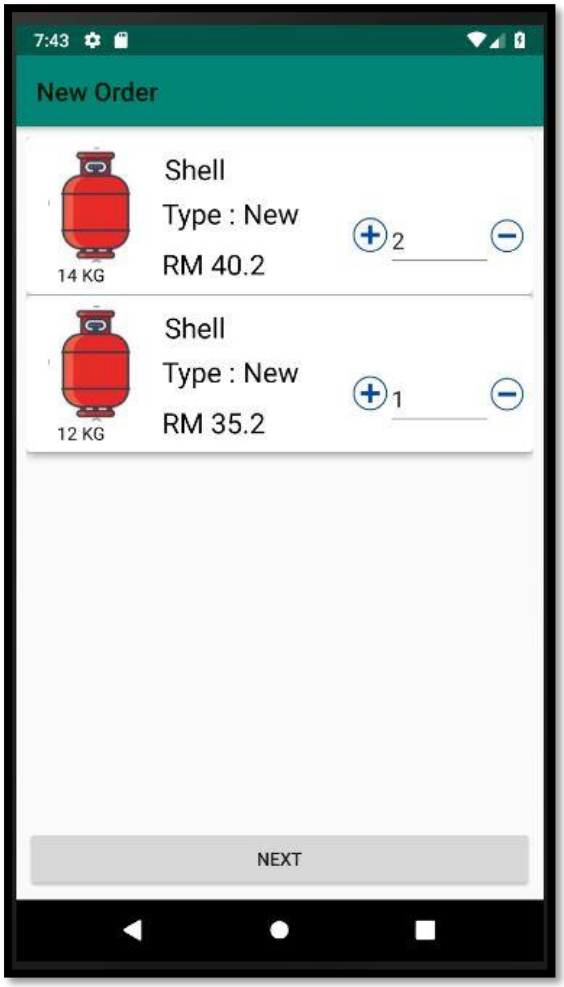


Figure 3.2.5： Order Page.

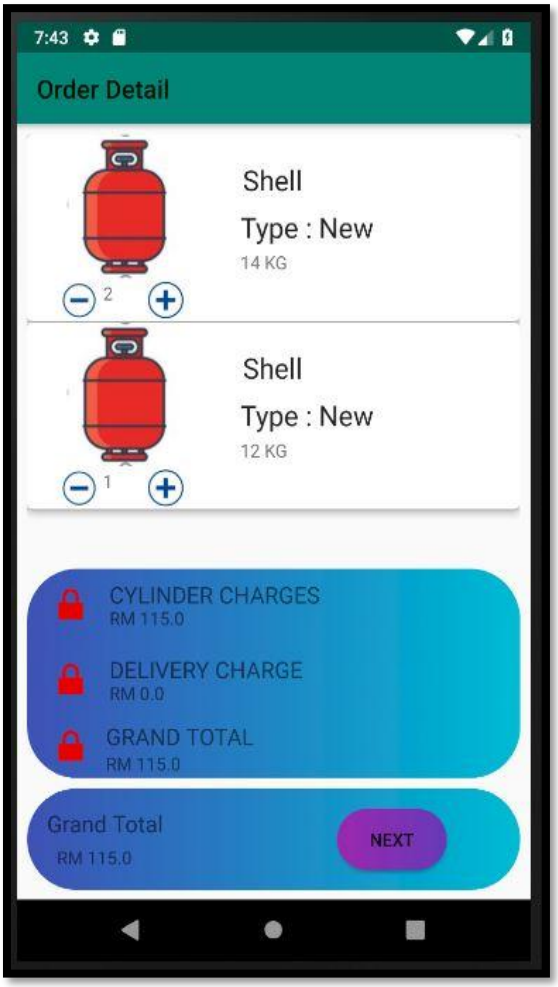


Figure 3.2.6： Order Information.

The user can accept this page though login as customer role and clicks the “Order Now” button. The cooking gas record would be retrieved from firebase and show to the customer. The customers are required to select type of cooking gas and enter the quantity needed in order process into next page though click the “Next” button locate at the bottom.

The above figure shown the selected cooking gas and quantity needed for customer. The below shown the total amount and delivery charge for the order request.

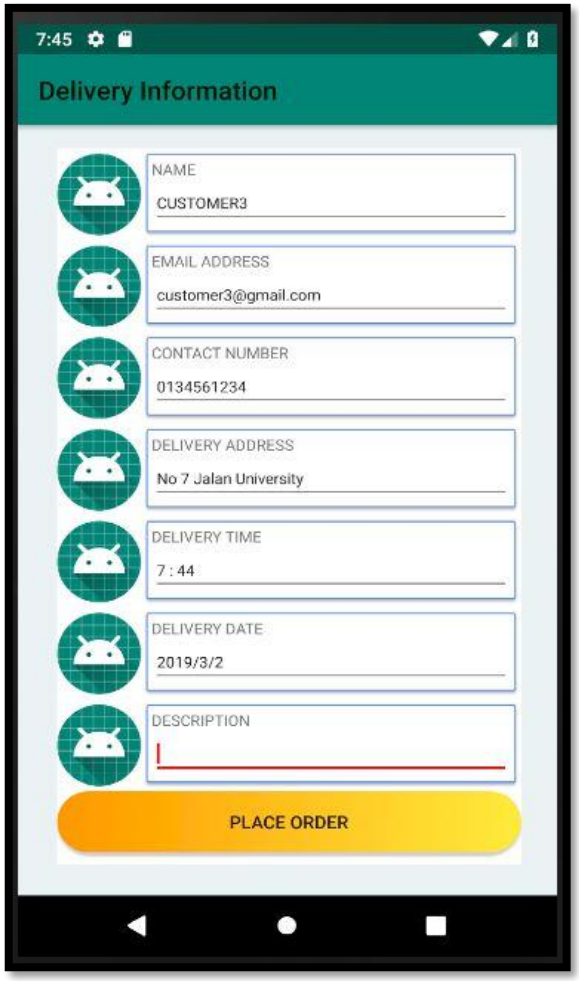


Figure 3.2.7： Confirm Delivery Information.

Figure 3.2.8： Set Delivery Time.

This page shown the delivery information for the order request. Customers are required to confirm the delivery information. The description field are allowed customer to enter some information to make it easier for drivers to find their location.

The customers are allowed to select delivery time for their order request. If they don't set the delivery time, the default delivery time would be current time.

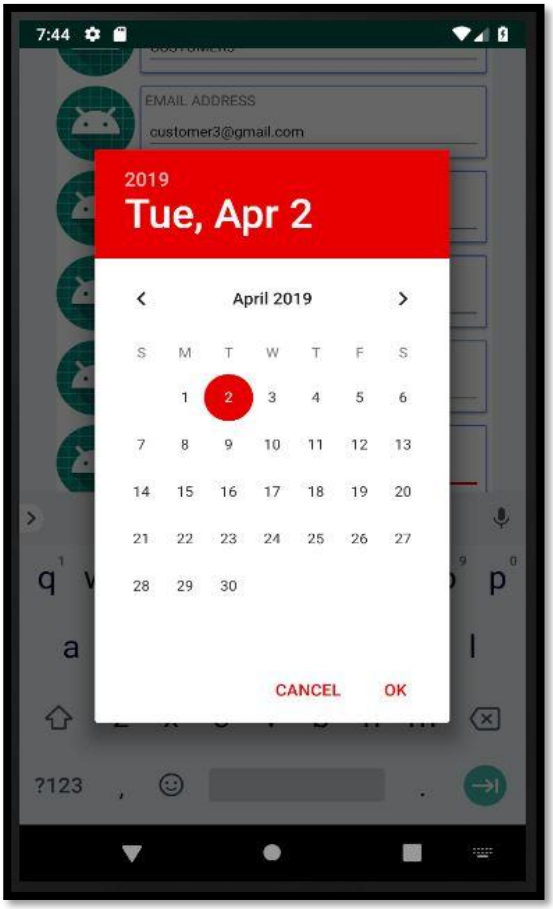


Figure 3.2.9： Set Delivery Date.

Figure 3.2.10： Customer Profile Page.

The customers are allowed to select delivery date for their order request. If they don't set the delivery date, the default delivery date would be that day.

The screenshots above show the customer profile. When customer clicks the profile button at the customer home page, the page would direct user to this page. The page would direct to the sign in page if there is not user logged. The customer allowed to edit their profile. The customer's information would be saved when user clicks submit button.

Figure 3.2.11： Delivery Driver Home Page.

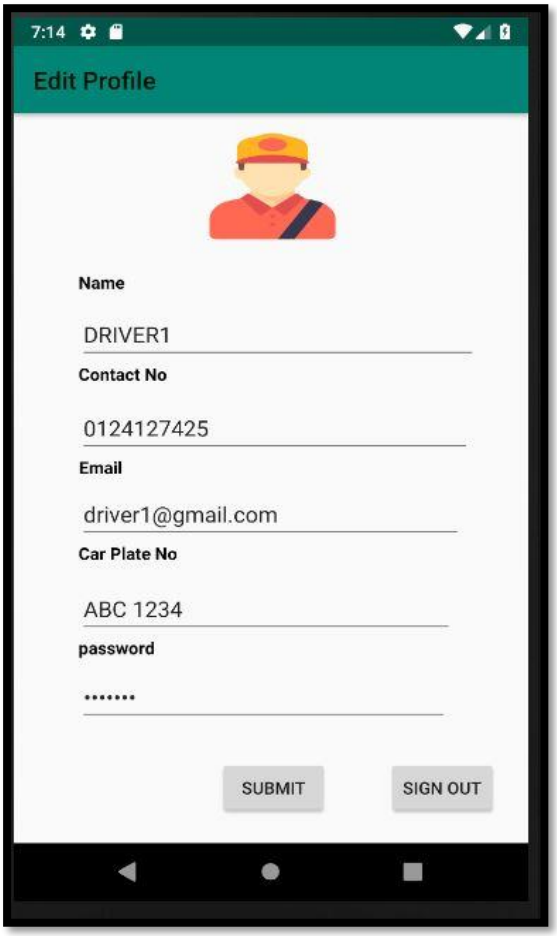


Figure 3.2.12： Delivery Driver Profile Page.

This is the page shown when user signs in as a delivery driver successfully. On this page there are same different with the customer home page. This page including pick order button, delivery history button, profile button, and help button.

The page will direct user to this profile page when user sign in as delivery role and clicks the profile button at the home page. The delivery driver's information would be saved when user clicks submit button.

3.3 SYSTEM FUNCTIONALITY OF LATEST VERSION

Cooking gas ordering and delivery system functionality shows every function and feature of the mobile application with given some examples and photo to let users to understand deeply about this mobile application. Besides, this mobile application have been build in two difference language which is English and Chinese.

3.3.1 APPLICATION STARTUP AND ACCOUNT SIGN UP

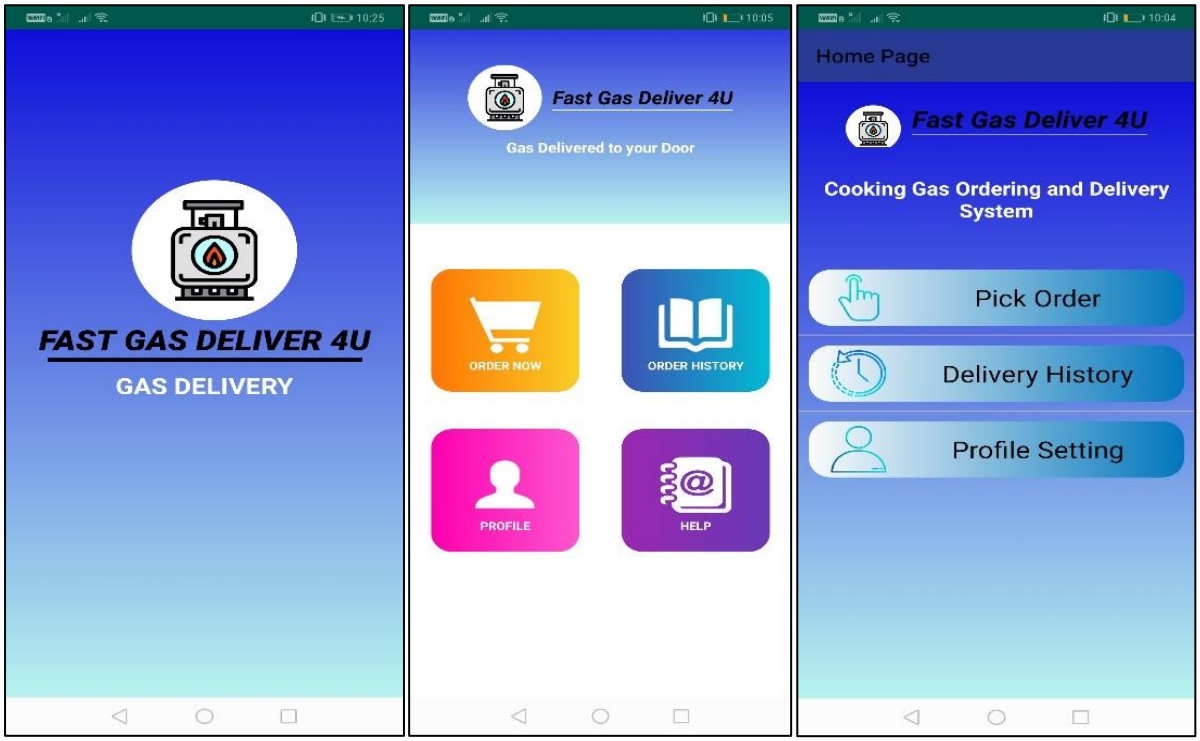


Figure 3.3.1.1 : Splash Screen and User Home Page.

The first picture is the splash screen of 'Fast Gas Deliver 4U' that will appear when the mobile application is lanched and start up. This splash screen will stay a duration of 2 seconds. The second and third picture will come after the splash screen based on the type of user login. The second picture is the home page for customer while the third picture is for shipper or driver.

3.3.2 User registration

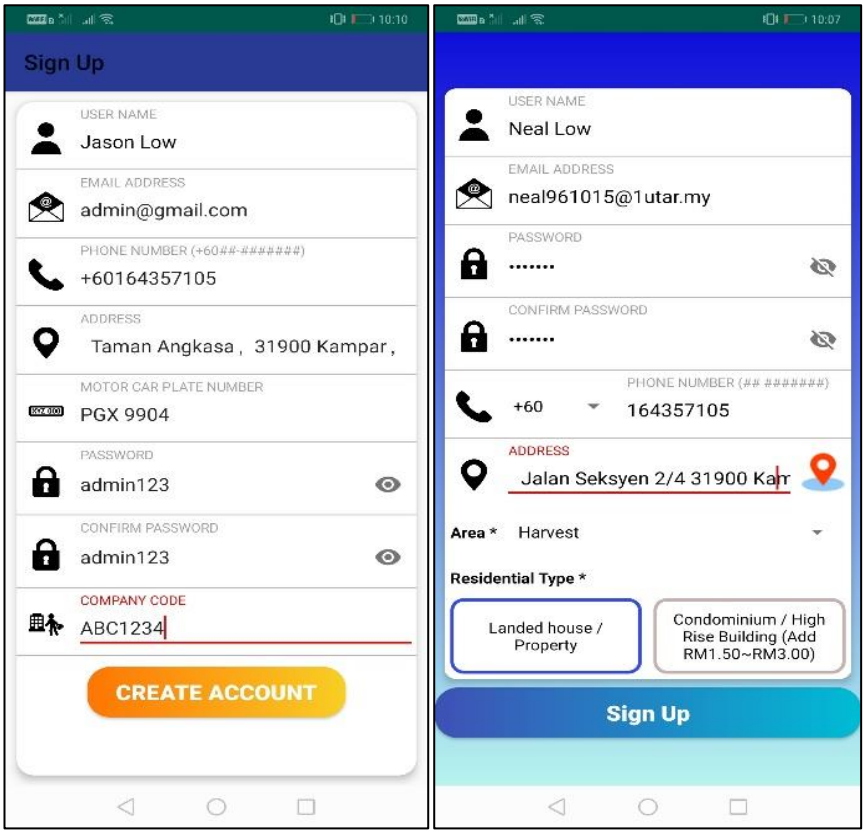


Figure 3.3.2.1 : User Sign Up Page.

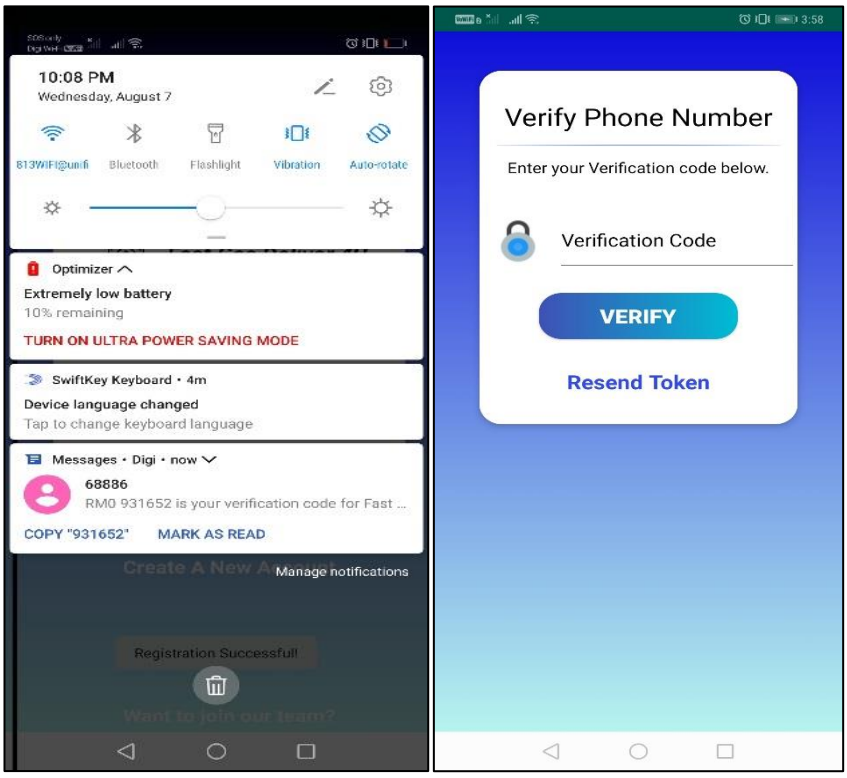


Figure 3.3.2.2 : Phone Number Verification Page.

Once the users have lanched mobile application successfully, the users are able to make a user registration to enjoy the app features. The users are allowd to register as a customer or delivery driver. For register as a customer, the users should press the ‘Create A New Account’ on the login page and then the page will be direct to the customer registration page. The users should enter valid information to hava an authorised access to the application. After fill in all the information and press the ‘Sign Up’ button, the phone verification page will appear and a verificaction code will be send to the users phone. Based on the forth picture above, the users have receive a verificaction code succeffully. For register as a shipper or delivery driver, the users should click the ‘Want to join Us’ at the bottom of login page. Before register as a driver, the users should get the company code from the particular cooking gas company first.

3.3.3 User Login

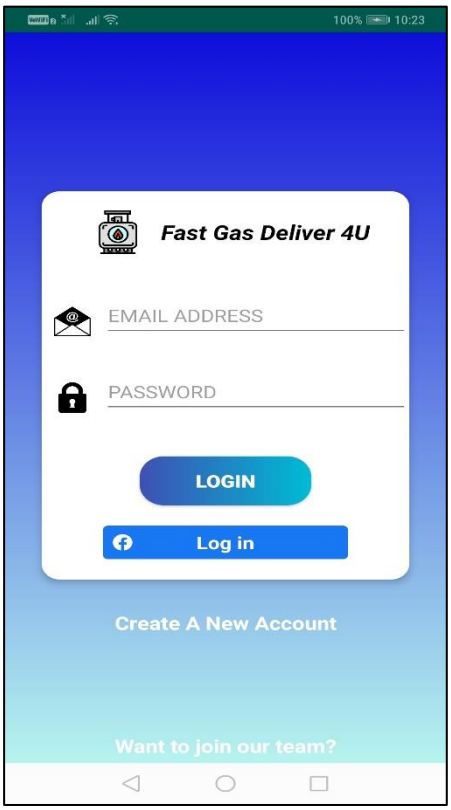


Figure 3.3.3.1 : User Login

Login is the process to hava a valid access to the ‘Fast Gas Derliver 4U’ mobile application by identifying an authenticationg the users. If the user is existing, the page will be direct to the different home page based on the type of register user whether is customer or delivery driver. After login, the user are allowed to access to their own personal information and data such as name, email address, password, address, residential type and so on.

3.3.4 Manage Personal Information and Sign Out

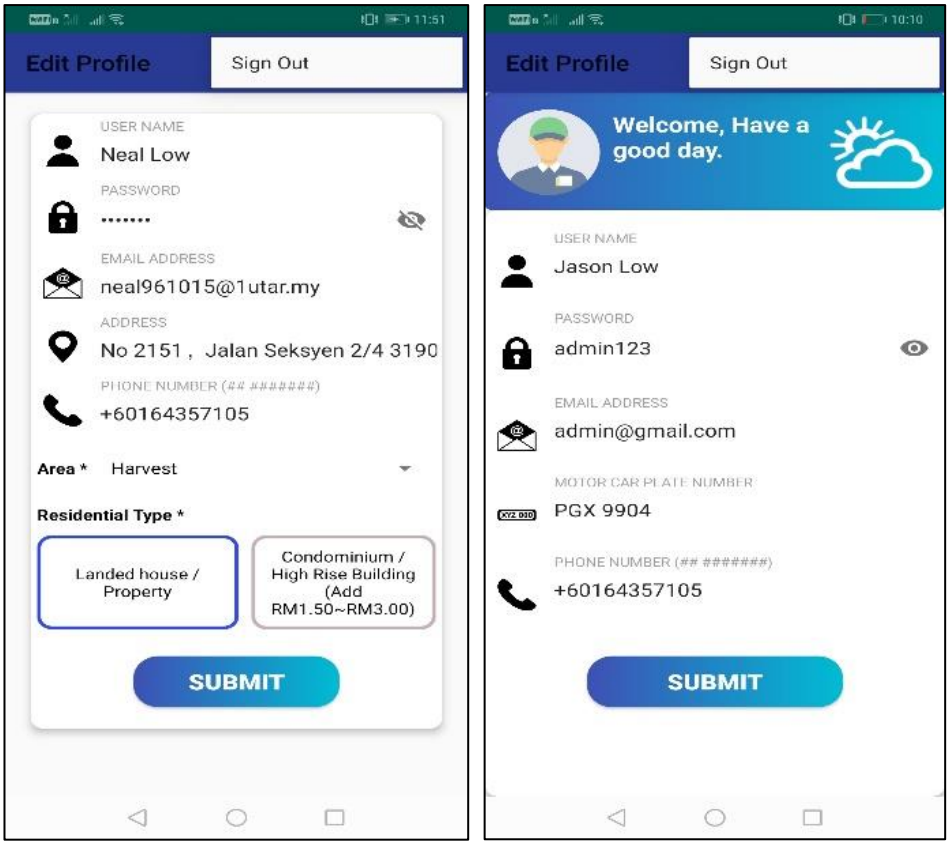


Figure 3.3.4 1 : User Profile.

When the users click the ‘Profile’ button at the main page after successfully login, the mobile application will brings them to the user profile page that are allow users to edit their personal information. After done editing and press the ‘SUBMIT’ button, the personal information will change in real time where the Firebase will handle the updated data in the backend. The above left hand side picture is the customer profile page while the right hand side is the delivery driver profile page. The pop up menu at the top side have an option which is ‘Sign Out’. The users are allowed to sign out their account through click this ‘Sign Out’ option.

3.3.5 Make a Cooking Gas Delivery Request.

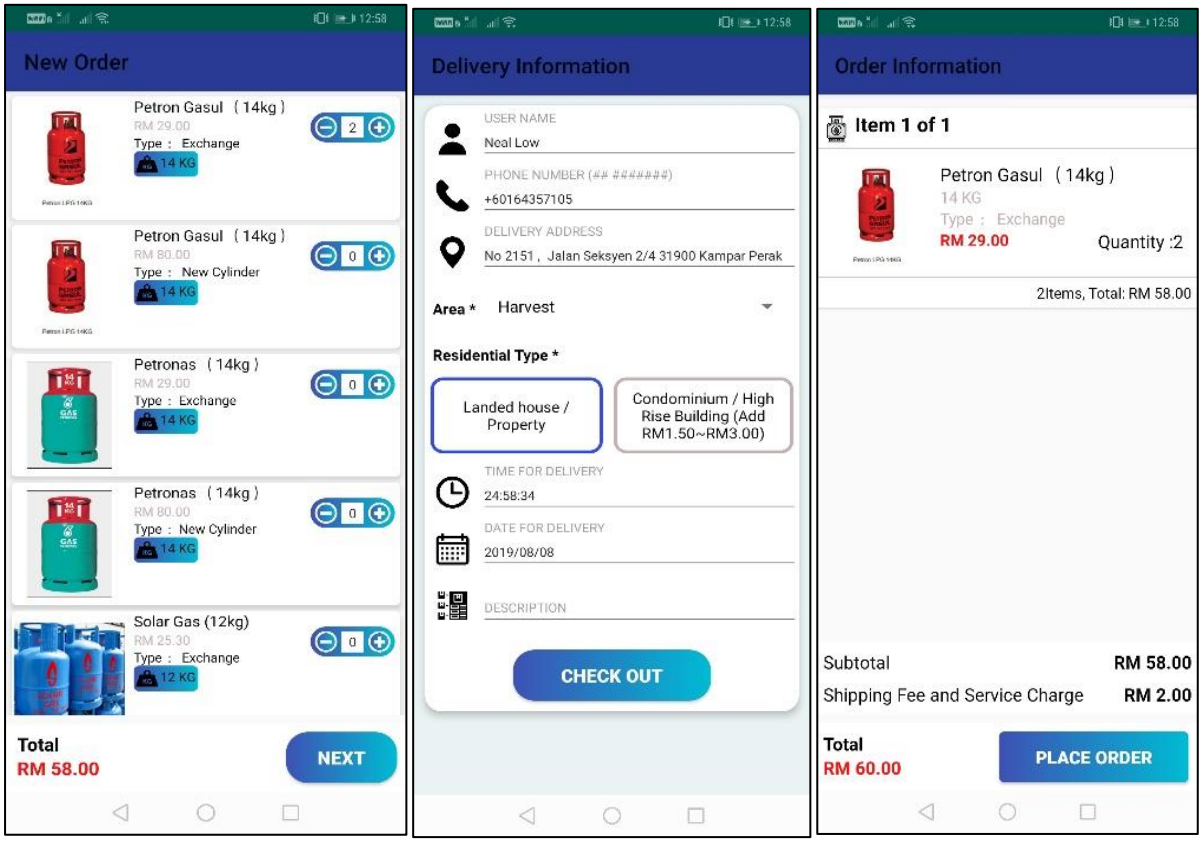


Figure 3.3.5.1 : Order Cooking Gas.

After user login as a customer, the user can access to the 'Order Now' feature. The first step of this feature is to select the type of cylinder and quantity needed. The user must select at least one cylinder for process to the check out page. On check out page, all the default delivery information will be display and the user allowed to schedule a delivery date and time for deliver. Some extra charge will be add into the total amount if the residential type is condominium or high rise building. After click the 'CHECK OUT' button at the check out page, the user will be direct to the order information page. On this page, the user are able to comfirm and place their order. The home page appear after placed order successfully.

3.3.6 View Order History

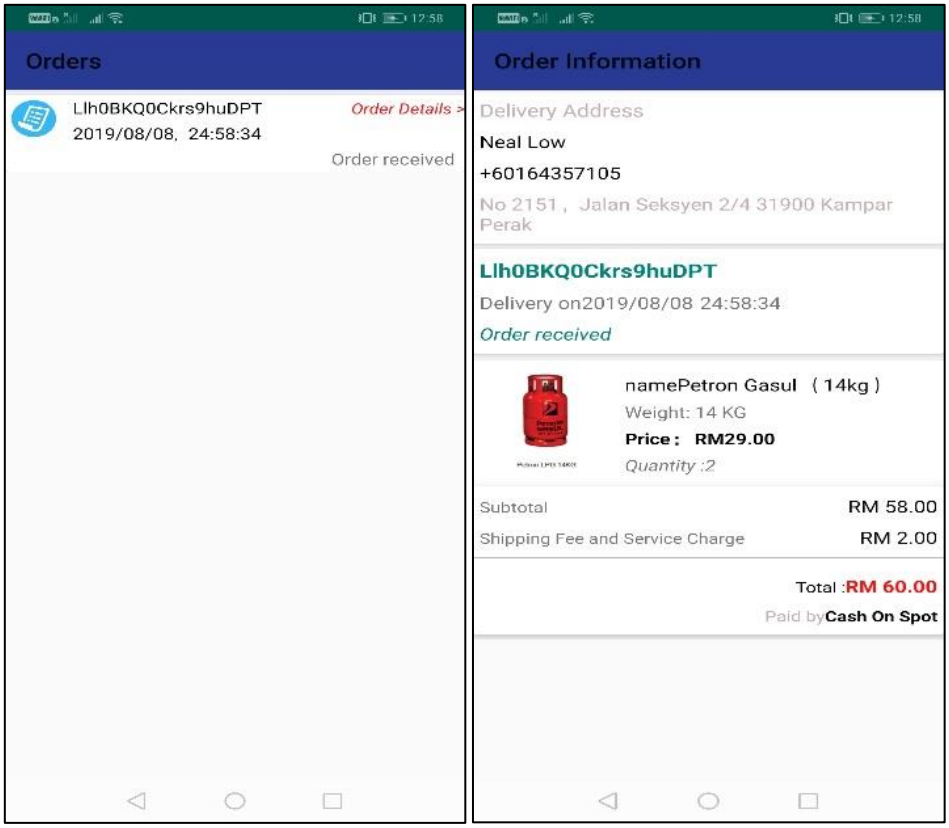
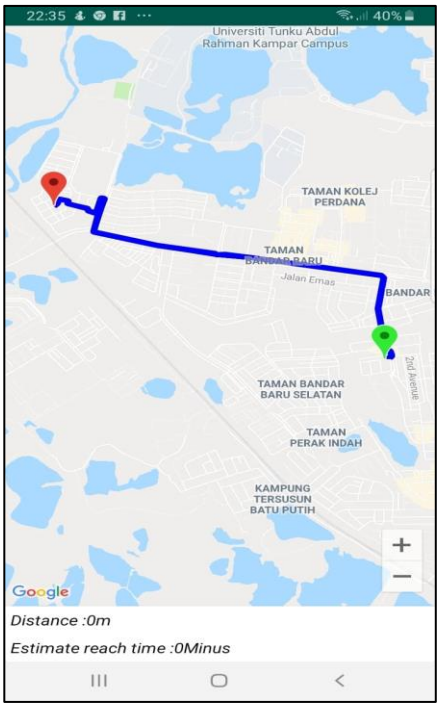


Figure 3.3.6.1 : Orders History.

Once the order have been placed, the users are allowed to view their order history through click the ‘Order History’ button at the home page. Based on the figure above, it shows all the order that the user made and some simple information such as order id, delivery date, delivery time and the status of each order. The status of order have separed into 4 type, which is ‘Order received’, ‘Pending to deliver’, ‘On the way’,and ‘Completed’. The users are allowed to select any order to view futher order information. When the order status is on the way, the delivery driver information and two button will be show at the bottom of order informatuion page. Those buttons is ‘Track Order’ button and ‘Call’ button. The purpose of ‘Track Order’ button is to track the real time location of the cooking gas order and the ‘Call’ button is let user to contact the delivery driver.

3.3.7 Order Tracking



When the users click the 'Traking Order' button in the order information page, they are able to track their order current location by the marker in the google map. Besides, the users are able to know the estimate reaching time and who are the delivery driver to send their order. This realtime traking feature is the additional feature compare to the existing cooking gas ordering and delivery application.

Figure 3.3.7.1 : Google Map (Current Order Location).

3.3.8 Contact Cooking Gas Company

When the users click the 'Help' button at the home page, the mobile appication will request permission for the users to make a phone call to the cooking gas company. Once the users have allowed access to the permission, they are able to contact cooking gas company admin for further help such as cancel order, modify placed order detail or direct make a cooking gas delivery order.

Figure 3.3.8.1 : Contact Cooking Gas Company.

3.3.9 Answer Order Request

If the users is successfully login as a driver, they are able to access the pick order feature. This feature is to let delivery driver answer the cooking gas delivery requests. It will display all the received order request and when a delivery driver have pick an order, this page will updated in real time and displays to all the delivery drivers. The users are required to pick at least one order request. After press the 'Confirm' button, the users will be bring to the pending orders page.

Figure 3.3.9.1 : Pick Order.

3.3.10 View Answered Orders

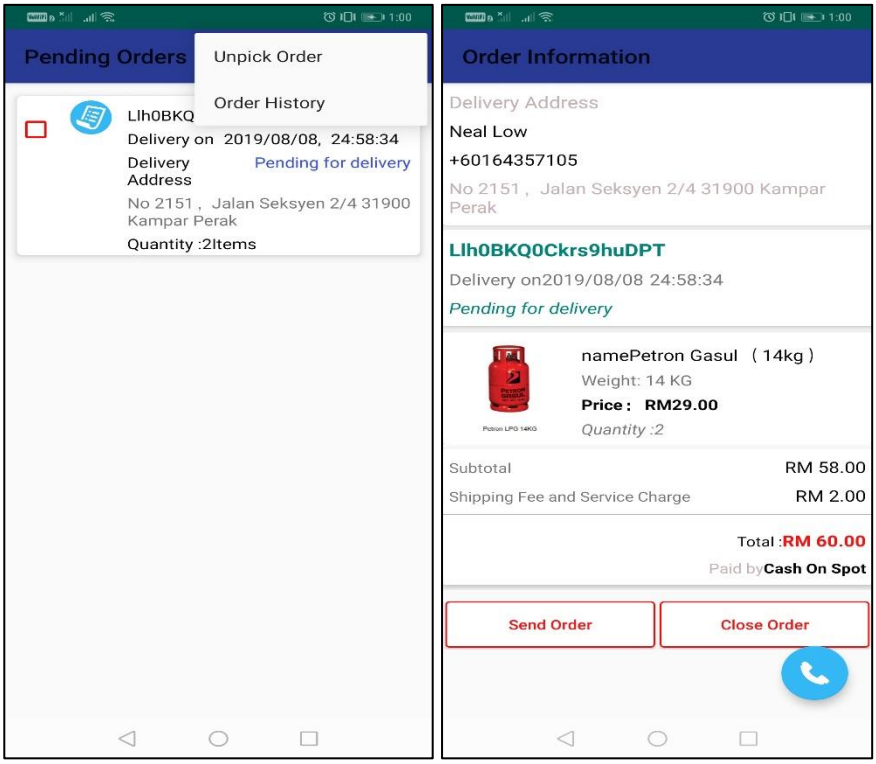


Figure 3.3.10.1 : Pending Orders.

This is the page shows all the orders pending for delivery. There have a menu at the action bar there with two options which is ‘Unpick Order’ and ‘Order History’. The ‘Unpick Order’ option is to let users unpick the wrong pick orders, and the ‘Order History’ is for the users to view their performance. The users should click the orders he or she want to deliver to view the order information. The users must press the ‘Send Order’ button on the order information page to send he or she current location to the customer. Therefore, the customer can track their order in real time. The phone icon at the order information page is to let the users contact customer when they cannot find the customer house. After the order reached the customer door step, the users must remember to click the ‘Close Order’ button to close the order and update order status to completed.

3.3.11 View Delivery Order History

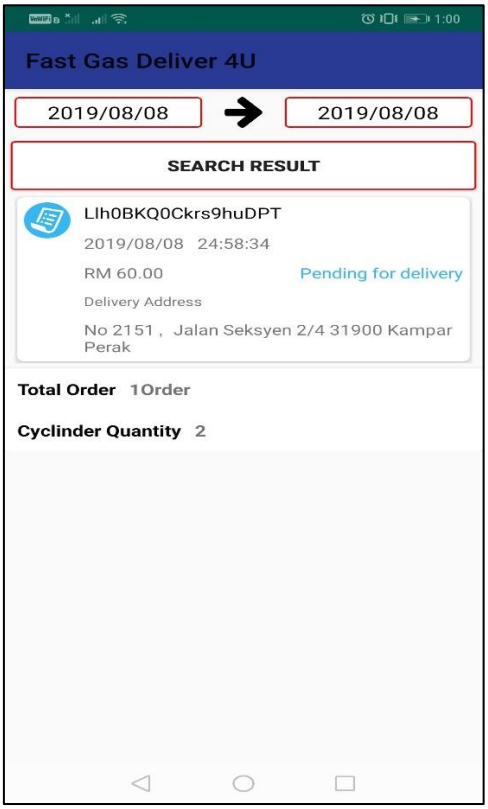


Figure 3.3.11.1 : Delivery Order History Records.

If the users is successfully login as a driver, they are able to access the view order history feature. The purpose of this feature is to let the users check their monthly performance. The users are required to enter the date range for search purpose. The total order and total cylinder have been send will be display based on the date range entered by the users. The default date range is current date.

3.4 COMPARISON BETWEEN SYSTEM FUNCTIONALITY OF LATEST AND OLD VERSION

Features and Functions	Latest Version	Oldest Version
1.Splash Screen	Yes	No
2.User Registration	Yes	Yes
3.Edit Personal Information	Yes	Yes
4.User Login	Yes	Yes
5.User Social Media Login	Yes	Yes
6.User Sign Out	Yes	Yes
7.User profile	Yes	Yes
8.View Order information	Yes	No
9.Phone Verification	Yes	No
10.Detect Current Location	Yes	No
11.Order Cooking Gas	Yes	Yes
12.Schedule Delivery Date and Delivery Time	Yes	Yes
13.View Order History	Yes	No
14.Tracking Order Location	Yes	No
15.Contact Cooking Gas Company	Yes	No
16.Contact Delivery Driver	Yes	No
17.Answer Order Request	Yes	No
18.Unpick Order Request	Yes	No
19.View Delivery Order History	Yes	No
20.View Monthly Performance	Yes	No
21.Send Delivery Driver Location to	Yes	No
22.Close Order	Yes	No
23.Contact Customer	Yes	No
24.Send Notification to Customer	Yes	No
25.Dual Language	Yes	No
26.Firebase Authentication	Yes	Yes
27.Firebase Realtime Database	Yes	Yes
28.Firebase Storage	Yes	No

Table 1.1.1 : Comparison betwwen System Functionality of Lastest and Old Version.

3.5 Web-Based Admin Management System

In this project, a management systen have been build to ease the admin's job of managing the database of the cooking gas ordering and delivery system.

Figure 3.5.1 : Web-based Management System Login Page.

The figure above shows the log in page of the web-based cooking gas ordering and delivery management system. An admin should log in using the correct email address and password before processding to manage the cooking gas ordering and delivery database.

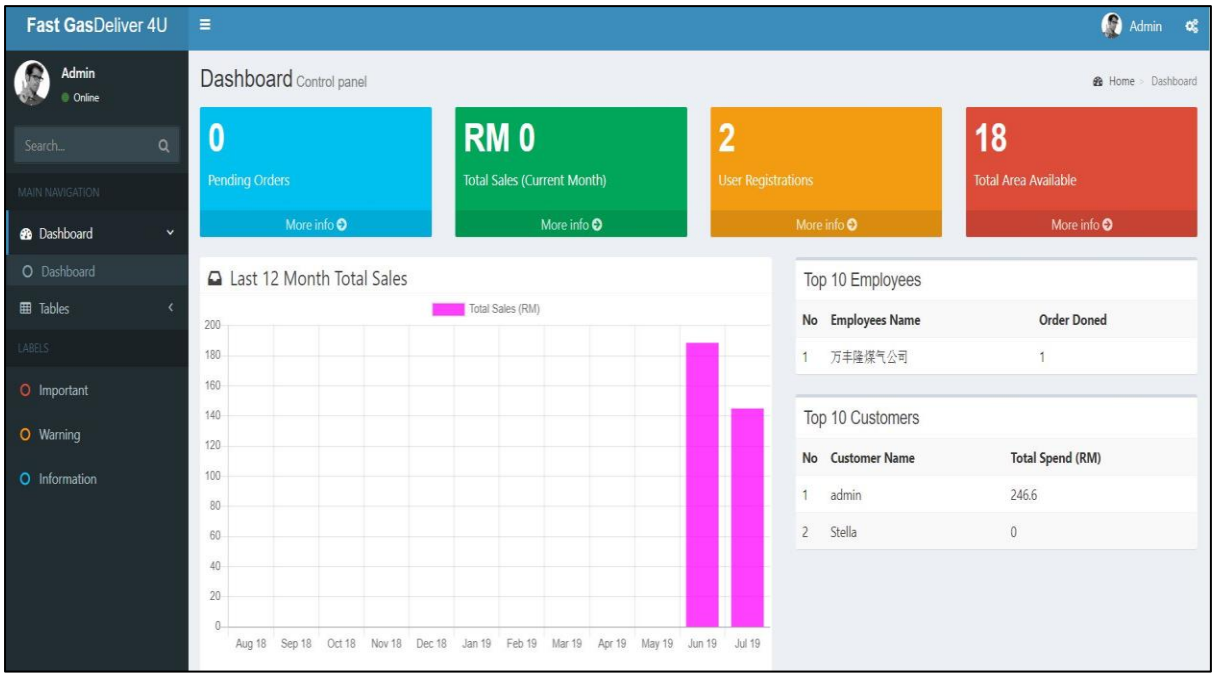


Figure 3.5.2 : Web-based Management System Dashboard Page.

The figure above shows the main page of the cooking gas ordering and delivery admin management system after admin logging in to the system. Some data analysis have calculated to let admin predict the customer trends and behaviours. Therefore, admin can make an effective decison-making to increase their business productivity throught analyse and deliver data in meaningful ways. The data analyse include total sales for previous last 12 months and current month, top 10 employees, top 10 customers, total users using 'Fast Gas Deliver 4U' mobile application and total available area which provide cooking gas delivery service.

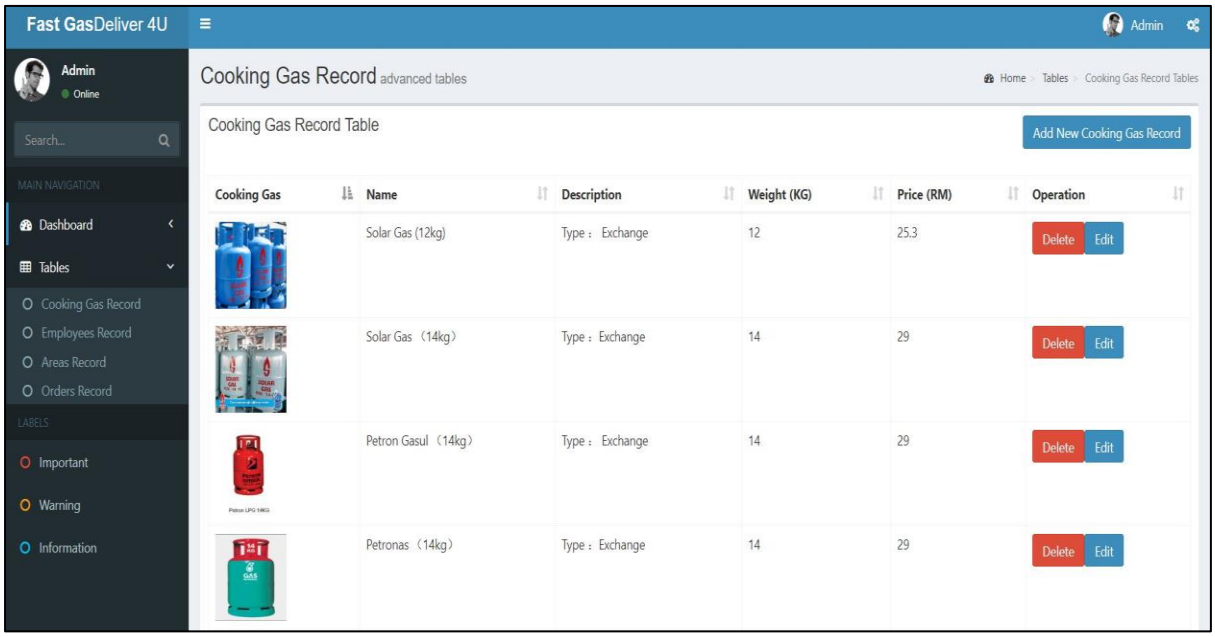


Figure 3.5.3 : Cooking Gas Record Management.

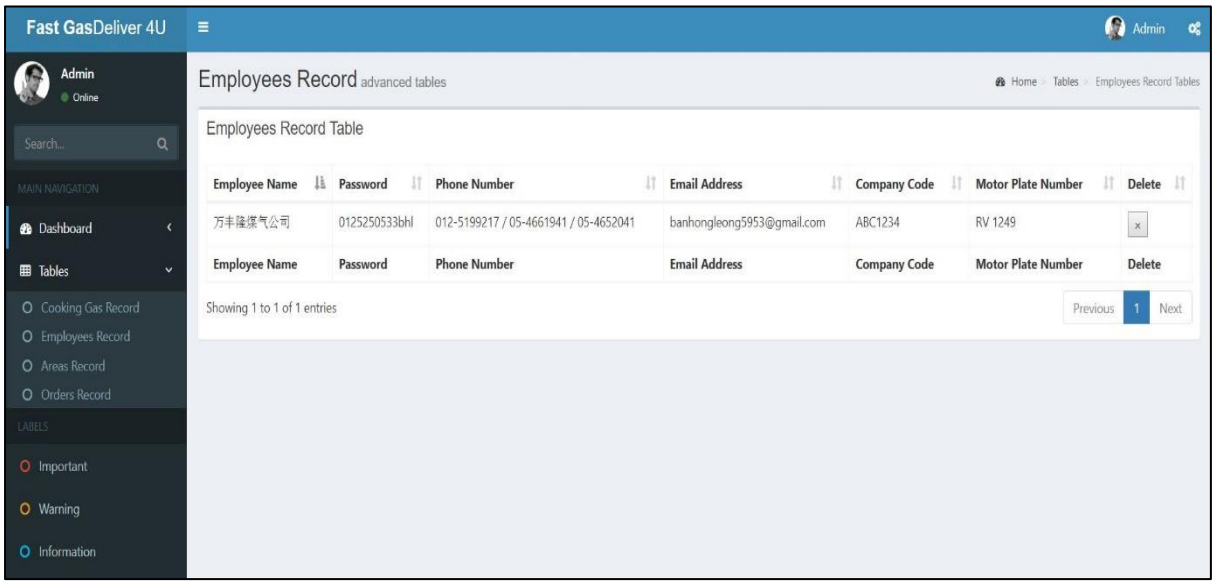


Figure 3.5.4 : Employees Record Management.

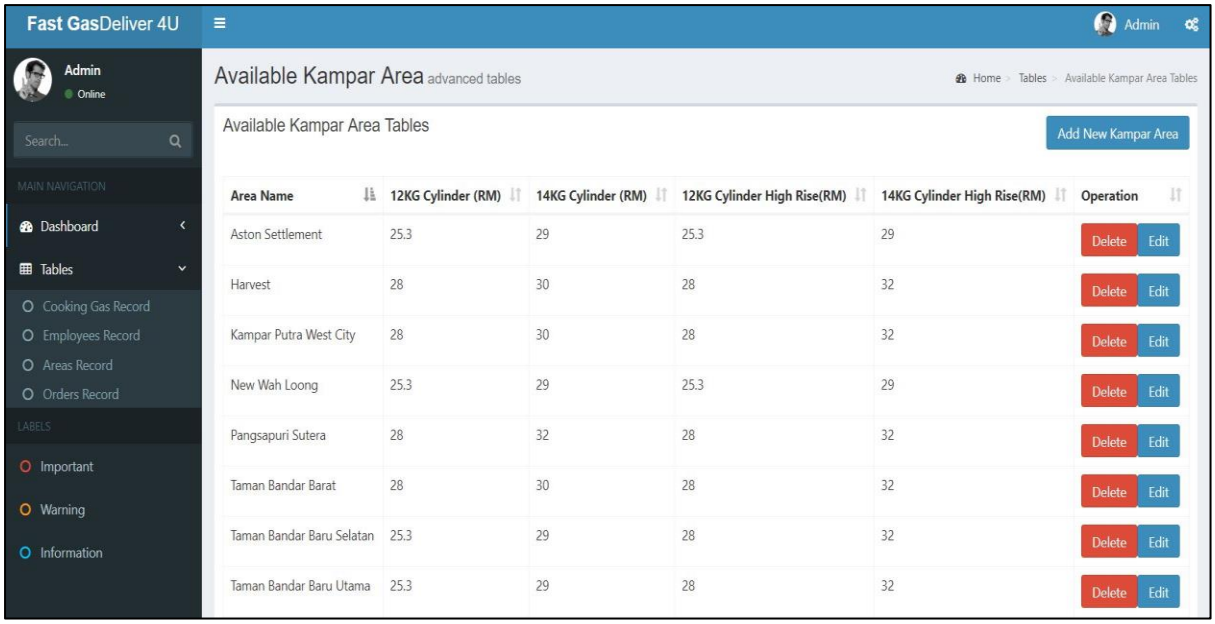


Figure 3.5.5 : Services Available Area Management.

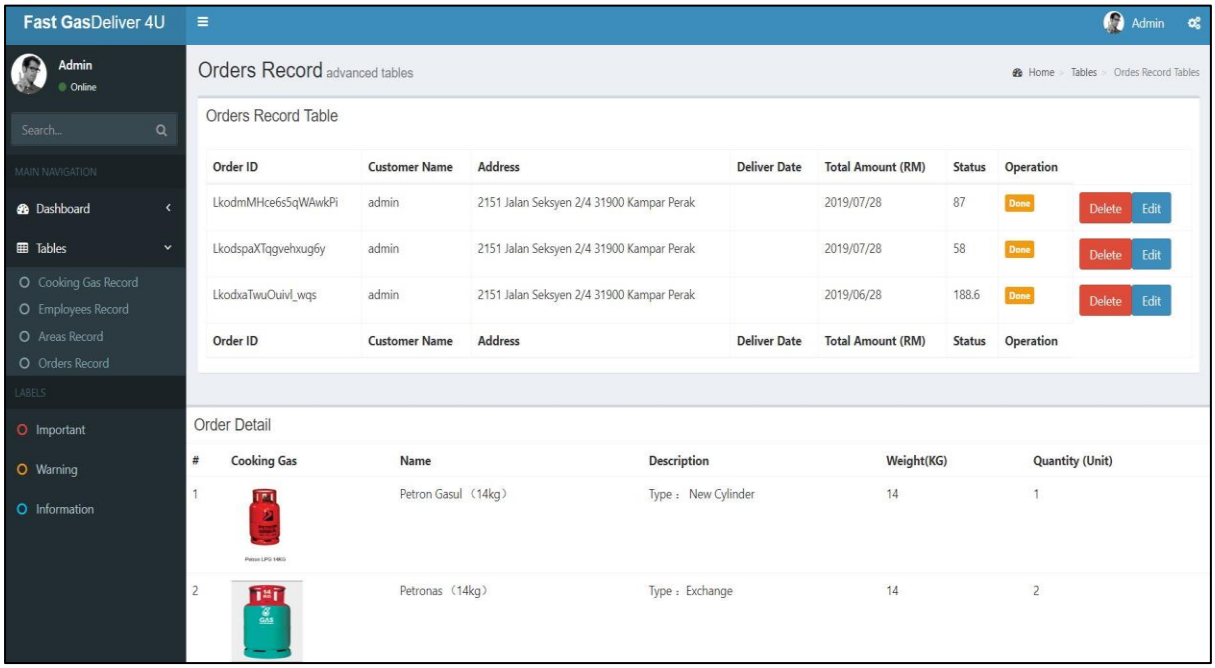


Figure 3.5.6 : Order Record Management.

There are 4 types of managements that an admin can perform on which is cooking gas record management, employees record management, services available areamanagement, order record management.

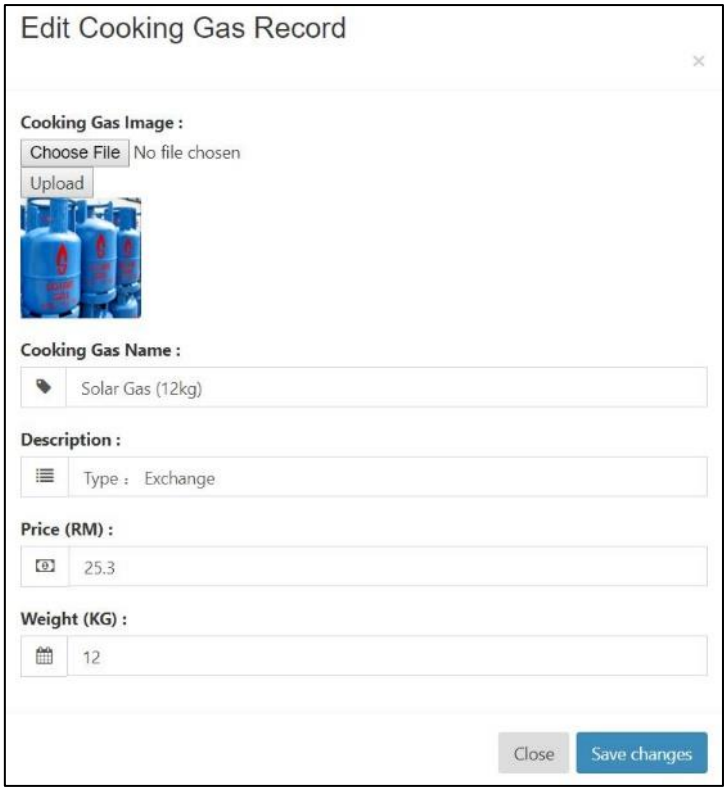


Figure 3.5.7 : Example of Modal for Edit Record.

All the add and edit operation are perform on a pop up modal. The admin are allowed to add a new record and edit existing record. The above figure is an example of modal for edit existing cooking gas record.

4.1 Methodology Throw-away Prototype

The methodology that I adopt is called throwaway prototyping. This methodology is a rapid development model and it uses minimum requirement analysis to create and build the prototypes. Prototype is an incomplete version of the systems that will send to the target user to evaluate and try out. Every prototype will require users provide their feedback and then the prototype will be thrown away. Throwaway prototyping allows us to develop our system with clear and better understanding of the actual needs of user. There are 5 phases involved on the throwaway prototyping model. The below figure shown the flow of throwaway prototyping model.

Throw-away Prototype

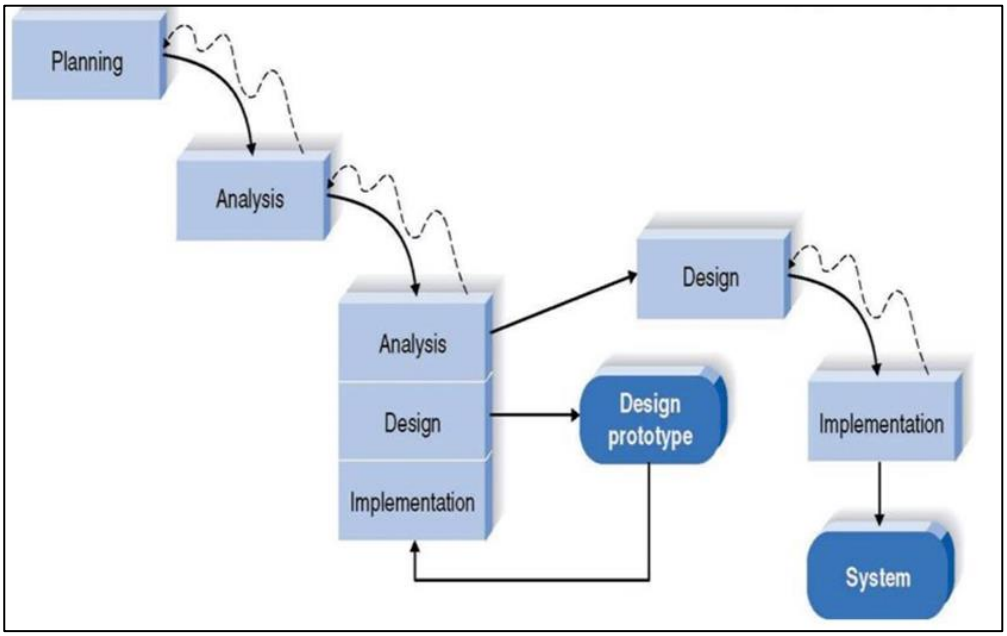


Figure 4.1.1 : Throwaway Prototyping *(J Wiley, 2013)*.

Planning Phase

In the planning phase, the problems and issues occur in the society today are evaluated and the problem statement and the estimate goal of the project are determined and then some documentations like a proposal are prepared. The activities that I will be done in this phase is to prepare a proposal that contain all the information. All the related information will be written into this proposal such as the problem statement, project objective, project scope, review similar application and so on will be mention clearly on proposal.

Analysis Phase

In the analysis phase, all the information and user requirement are gathered to develop the system concepts. On this step, I had make an interview to the target users which is residents Kampar and cooking gas company owner and then collect all the information to identify the user requirement.

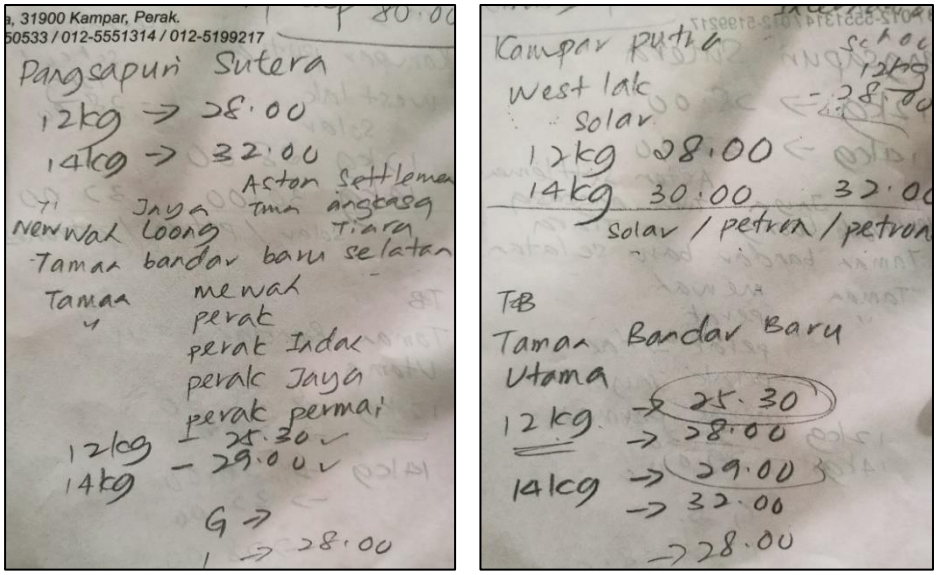


Figure 4.1.2 : Data collection.

Analysis Phase, Design Phase, Implementation Phase

Analysis phase, design phases and implementation phase are performed concurrently to create a design prototype. The design prototype will be implemented and let the users try out. After gathering the user's feedback, the prototype is discarded and thrown away. These phases are repeated in a cycle until the problems are resolved. At the design phases, I have determined the tools and programming language to used for develop the project . At the end for each cycle of these phases, I will create a design prototype let target user to try out and see whether this prototype have met their needs or not and for each prototype, the users are required provided their feedback for each prototype.

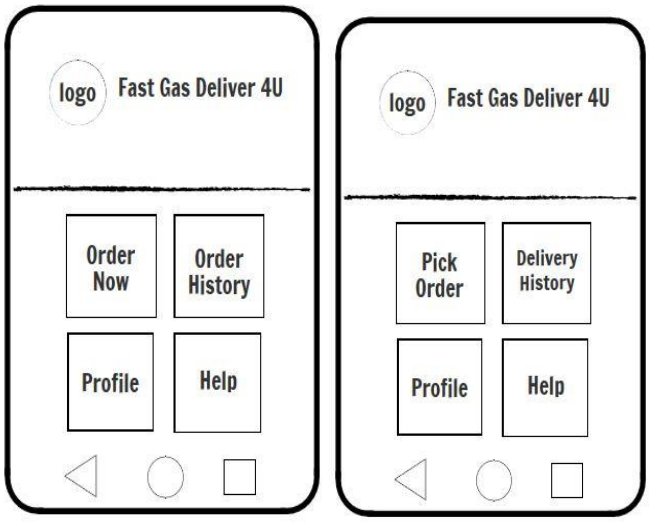


Figure 4.1.3 : UI of Customer Home Page and Driver Home Page.

Design Phase

Moreover, the process moves to the next phase which is design phase. In this phase, the final or actual user requirement are determined. I have gathering all the data from the survey feedback google form for first prototype and analyse those data collected to start design the new prototype or version by using difference approaches and methods such as change the user interface and add residential type selection on users profile.

Impementation Phase

The solution for the problems are designed and then the design model is implemented. Lastly, the system will be sent to the target market. I have upload this project to the google play store for the purpose of testing the usability, consistency, and functionality of the mobile application. Before upload to the google play store, I have add the google play store API key to my project for access the firebase phone verification feature. Therefore, the users can receive verification code successfully. After the users are using the mobile application, the users can direct provide their feedback towards the current version of mobile application throught the

survey feedback google form when the users exits the application. Lastly, I have come out some test cases to make sure whether the actual output meet the expected results.

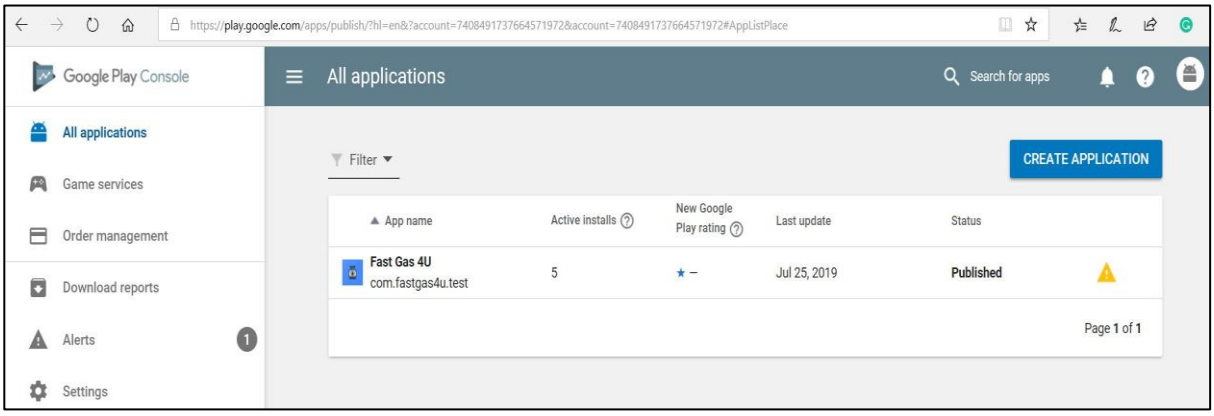


Figure 4.1.4 : Google Play Console.

The Advantage of Throwaway Prototyping

- Throwaway prototyping can detect and forecast possible problems in advance before implement to the target market due to this reason, we can save the cost on fixing problems by prevent these problems happen. *Chandra Vennapoosa(2013)*
- The project is complete quickly due to this methodology allows early detection of issues and make the transition from one step to the next step faster and smoother. so that, a complete system will be send to the user quickly. *Chandra Vennapoosa(2013).*
- The end result will be work for our customers and meet their need and requirements because it has been tested many times.
- Increase the involvement of user before implement to the target market. *Chandra Vennapoosa(2013)*
- User can get better understanding of the system because prototype have been displayed with a working model of the system.
- Quickly determined the real requirement of the user by evaluate the user feedback on every prototype.

The Disadvantage of Throwaway Prototyping

- All the process involved in prototyping is done in rapid speed, the probability to overlook some aspects is very high. So that, the end product maybe not the best solution. *Chandra Vennapoosa(2013)*
- Confusion on the prototypes and actual system may occur. *Chandra Vennapoosa(2013)*
- The effort spent in creating prototypes may be too much due to unproperly monitor.

However, the advantage still overweighs the disadvantage. By using throwaway prototype model, we can make sure all the things that need to be focused have been taken case during the process from the requirement collection, planning task, creation of prototypes and testing those prototypes by the target users.

4.2 Tools, Hardware and Software

With the development of computer technology and the increasing popularity of computer applications, the scale of software systems is getting larger and larger, and high-level programming languages are emerging one after another, and the application fields are expanding. Therefore, by using the right development tools can help us develop applications quickly. In this project, some popular development tools were used to develop mobile applications related to cooking gas delivery systems.

4.2.1 Interface Platform

Android

The cooking gas delivery mobile application will be developed based on the android platform. The reason why i choose android is because this platform is most famous for developer to develop their application and this platform are used on most of the smartphone nowadays. For example Samsung, Vivo, and Huawei. The cooking gas delivery mobile application is developed and test on AVD with a difference API. The minimum device specifications is 2GB RAM, 32GB Storage, 1.4GHz Speed, 8+ hour Battery life, 2MP for front camera, 8MP for rear camera, and 64-bit device architecture.

Figure 4.2.1.1 : Android Platform.

4.2.2 Programming Language

Java

Java is an object-oriented programming language that is fast, secure, reliable, and very useful. Java is everywhere, from laptops to data centers, from mobile phones to the Internet, from game consoles to scientific supercomputers. One of the goals of the Java is to let program developers compiled their java code and run on every platforms that support java without recompiling.

Figure 4.2.2.1 : Java Programming Language.

XML

Nowaday, many mobile application design were done through the design of an XML-based layout. The XML-based design is easy and simple to manage usually through drag and drop. By using XML-based design we can shorter the develoment time.

Figure 4.2.2.2 : XML File.

4.2.3 System Database

Firebase

Firebase have provides their own realtime database management API for their customers. The firebase is a package that allows their customers to build mobile applications and website and its is owned by google. Furthermore, firebase was noSQL database. Therefore, it is more faster than other SQL database.

Figure 4.2.3.1 : Firebase.

4.2.4 Development Software

Android Studio

Android Studio is an android application development tool that official supported IDE by Google for android application development. It supports development for all versions of Android. For my project, I will using this development tools to help me debug, compile, and run my coding. Furthermore, this development tools had provided some code templates to let their users build some common application features that have been done before. Moreover, this development tool is available for all operating system such as Windows, Linux, and Mac OS X. Therefore, I can use my favorite operating system to develop my proposed mobile application.

Figure 4.2.4.1 : Android Studio. *(Rajput, M., 2015)*

4.2.5 Development Hardware

Laptop

The following figure shown hardware specification and software specification of the laptops that I decide to used to develop the cooking gas delivery mobile application..

	Description
Processor	Intel® Core™ i7-6500U CPU @ 2.50GHz, 2601 MHz, 2 Cores, 4 Logical Processors
RAM	4.00 GB
Operating System	Windows 10 64-bit
Development Tool	Android Studio

Table 4.2.5.1 : Laptop Hardware Specification

Smartphone with Android OS (Huawei Mate 20 PRO)

This smartphone is used for testing and installation of the cooking gas delivery mobile application. Furthermore, this smartphone is also used to take photos and then those photos will be put in this report. This smartphone has meet all the minimum requirement which is the minimum SDK version must be 16 (Android 4.1) and above and at least 2 GB RAM.

	Description
Screen	6.39-inch display
RAM	6GB RAM
Operating System	Android 9.0 (Pie), EMUI 9.1
Battery	4200 mAh battery
Storage	128GB
Camera	40-megapixel main camera, 24-megapixel selfie camera

Table 4.2.5.2 : Smartphone Hardware Specificaction

4.3 Requirements

4.3.1 Functional Requirements

Sign up and Login

- The mobile application shall allow user sign up as customers role.
- The mobile application shall allow user to sign up as driver role.
- The mobile application shall validate and authenticate user for login.
- The mobile application shall allow user sign in through facebook account.

For Customers

- The mobile application shall allow user to login as a customer.
- The mobile application shall allow user to logout.
- The mobile application shall allow user to store and edit their personal information.
- The mobile application shall allow user to make cooking gas delivery request.
  - The mobile application shall allow user to select the type and quantity of cooking gas.
  - The mobile application shall calculate and display the total amount and delivery charge.
  - The mobile application shall allow user to set time and date for delivery.
  - The mobile application shall allow user to edit their delivery address.
  - The mobile application shall display the order detail.
  - The mobile application shall allow user to confirm order.
- The mobile application shall allow user to view order history.
  - The mobile application shall allow user to check order status.
  - The mobile application shall allow user to track in delivered order.
  - The mobile application shall display a map to keep track their order and driver location.
  - The mobile application shall display the estimated delivery time.
  - The mobile application shall display delivery driver detail.
- The mobile application shall allow user to provide feedback for application.

For Delivery Drivers / Company employees

- The mobile application shall allow user to login as delivery driver.
- The mobile application shall allow user to log out.
- The mobile application shall allow user to store and edit their personal information.
- The mobile application shall allow user to choose delivery requests.
  - The mobile application shall display a list that contain customers' order requests.
  - The mobile application shall allows users to manage the delivery request status.
  - The mobile application shall allows users share and detect the current location of the user.
  - The mobile application shall display a route map that point to delivery address.
  - The mobile application shall display and compute the estimated delivery time.
- The mobile application shall allow user to view delivery history.
  - The mobile application shall allow user to view the status of delivery request.
  - The mobile application shall compute total of complete delivered request.
  - The mobile application shall allow user to view delivery request detail.
  - The mobile application shall allow user to manage the delivery request.
- The mobile application shall allow user to provide feedback for application.

For Company Admin

- The website shall allow user to login as admin.
- The website shall allow user to log out.
- The website shall allow user to store and edit their company profile.
- The website shall allow user to perform cooking gas management.
  - The website shall allow user to view cooking gas detail.
  - The website shall allow user to add cooking gas detail.
  - The website shall allow user to edit cooking gas detail.
  - The website shall allow user to delete cooking gas detail.
- The website shall allow user to perform orders management.
  - The website shall allow user to view orders detail.
  - The website shall allow user to edit orders detail.
  - The website shall allow user to delete orders detail.
- The website shall allow user to perform delivery driver management.
  - The website shall allow user to view delivery driver record.
  - The website shall allow user to delete a delivery driver record.
- The website shall calculate the estimated time for customer make a regular order request.
- The website shall send notification to the user.

4.3.2 Non-Functional Requirements

- The mobile application shall be able to display error message about various invalid user input.
- The mobile application shall be able to display error message for internet problem.
- The mobile application shall be able to run on android platform.
- The mobile application shall be able to work when connect to the internet.
- The mobile application shall be able to work when GPS is open.

4.4 Timeline

No	Task	Start	Finish	Days
1	Review Preliminary Report	14/1/19	14/1/19	1D
2	Abstract	15/1/19	15/1/19	1D
3	Introduction	16/1/19	23/1/19	7D
4	Problem Statement	16/1/19	16/1/19	1D
5	Motivation	17/1/19	17/1/19	1D
6	Project Scope	18/1/19	18/1/19	1D
7	Project Objectives	21/1/19	21/1/19	1D
8	Impact, Significance and Contribution	22/1/19	22/1/19	1D
9	Project Background	23/1/19	23/1/19	1D
10	Literature Review	24/1/19	29/1/19	4D
11	Proposed Method/Approach	30/1/19	1/2/19	3D
12	Methodology	30/1/19	30/1/19	1D
13	Tools to Use	31/1/19	31/1/19	1D
14	User Requirements	1/2/19	1/2/19	1D
15	System Design/Overview	4/2/19	13/2/19	8D
16	Use Case Diagram	4/2/19	5/2/19	2D
17	Use Case Description	6/2/19	8/2/19	3D
18	Activity Diagram	11/2/19	12/2/19	2D
19	Implementation Issues and Challenges	13/2/19	13/2/19	1D
20	Preliminary Work	14/2/19	27/3/19	30D
21	Develop the Prototype	14/2/19	1/3/19	12D
22	Testing the Prototype	4/3/19	8/3/19	5D
23	Debugging the Prototype	11/3/19	22/3/19	10D
24	Finalize the Results	25/3/19	27/3/19	3D
25	Conclusion	28/3/19	28/3/19	1D
26	Design Poster	1/4/19	2/4/19	2D
27	FYP Report 1 Submission	5/4/19	5/4/19	1D
28	Preparation for Presentation	8/4/19	12/4/19	5D
29	Oral Presentation	15/4/19	15/4/19	1D

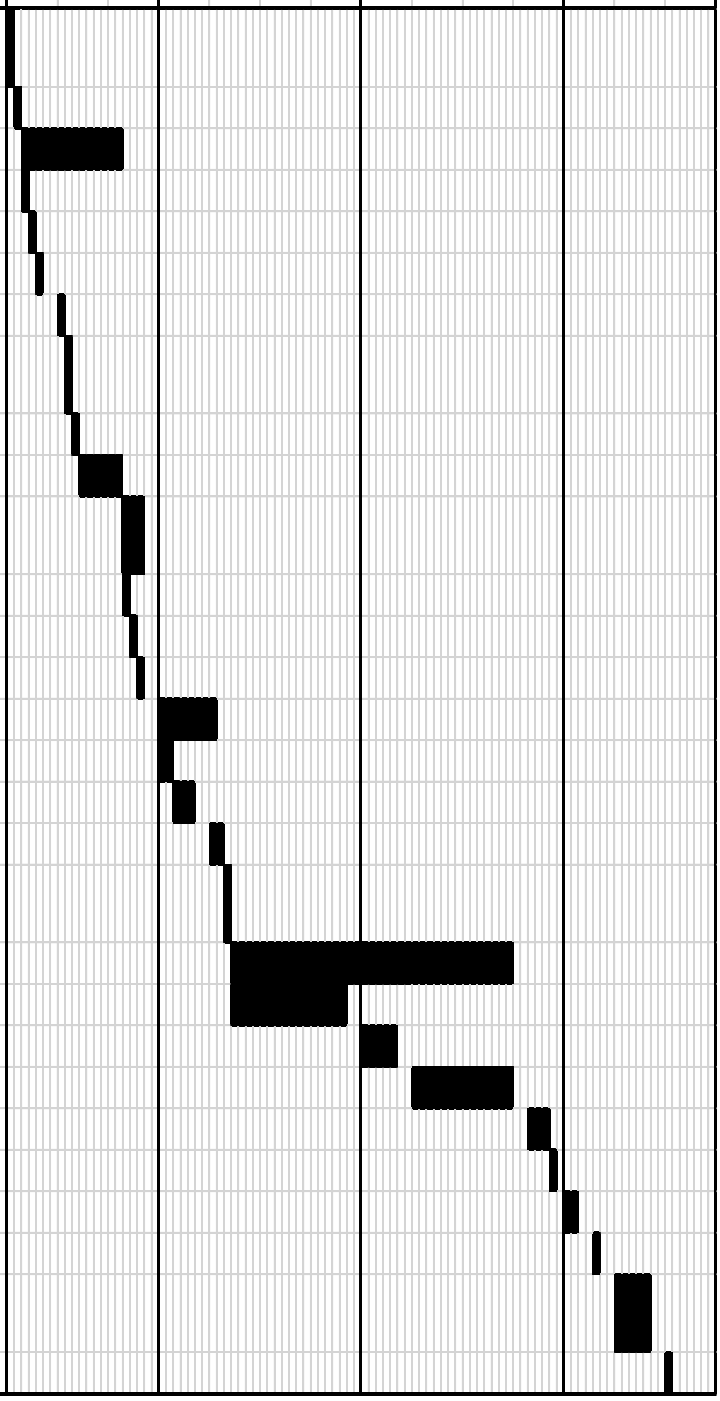


Figure 4.4.1 : FYP 1 Gantt Chart.

No	Task	Start	Finish	Days
1	Review FYP Report 1	29/5/19	29/5/19	1D
2	Design Second prototype	3/6/19	7/6/19	5D
3	Develop the Prototype	10/6/19	21/6/19	10D
4	Testing the Prototype	24/6/19	28/6/19	5D
5	Debugging the Prototype	1/7/19	11/7/19	9D
6	Submit Final Draft Repor	12/7/19	12/7/19	1D
7	Design Final Prototype	12/7/19	19/7/19	6D
8	Testing the Prototype	22/7/19	24/7/19	3D
9	Debugging the Prototype	25/7/19	2/8/19	7D
10	Finalize the Full FYP Report 2	5/8/19	9/8/19	5D
11	Design Poster	12/8/19	14/8/19	3D
12	FYP Report 2 Submission	16/8/19	16/8/19	1D
14	Preparation for Presentation	19/8/19	23/8/19	5D
13	Oral Presentation	26/8/19	26/8/19	1D

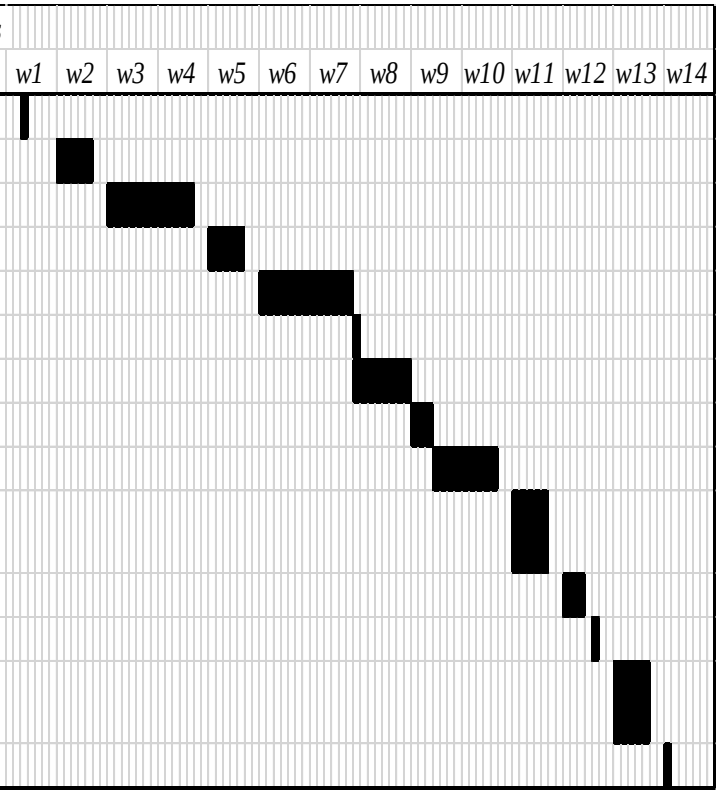


Figure 4.4.2 : FYP 2 Gantt Chart.

5.1 Implementation Issues and Challenges

The first issues is different screen size of mobile devices. Nowadays, mobile devices come in many different screen size and shape. Therefore, this may cause some problems in designing the user interface for different screen size of mobile phones. Furthermore, the second issues is performance and security of server. This is because firebase is the third-party NoSQL solution provided by Google. Thus, I cannot direct control of the internal structure of the firebase and cannot provide the performance guarantee of the firebase. The next challenge is related to the mobile content management. The low performance of the wireless network and frequent connection drops brought the difficulties to the developers on delivering rich content from servers to a local application even though the mobile application consumes a lot of bandwidth for it.

5.2 System Testing

In this project, various testing conducted to ensure all the user requirements have been met and to ensure the application is without any anomalies or bugs.

5.2.1 Test Cases

Test Case	Test Condition	Test Data	Expected Output	Actual Output
Login Use Case	Main Flow	Choose: Customer Email: neal961015@1utar.my Password: neallow	Login as a customer and direct to home page based on user type.	Login as a customer and direct to home page based on user type.
	Alternate Flow – Sign Up	Click on “Create a New Account” or “Want to Join us?” text fields	Go to sign up page.	Go to sign up page.
	Alternate Flow – User does not exist	Choose: Customer Email: edwin961015@gmail.com	Display error message.	Display error message.

		Password: neallow		

Table 5.2.1.1 : Login Use Case Testing.

Test Case	Test Condition	Test Data	Expected Output	Actual Output
Sign Up Use Case	Main Flow	Name: Neal Low Email: neal961015@1utar.my Password: neallow Phone: +60164357105 Address: No 2151, Jalan Seksyen 2/4 31900 Kampar, Perak.	User account successfully created and direct to login page.	User account successfully created and direct to login page.
	Alternate Flow – Back to Login Page	Click on “Back” button	Direct to login page.	Direct to login page.
	Alternate Flow – Invalid Input	Name: Neal Low Email: neal961015@1utarmy Password: neallow Phone: +60164357105 Address: No 2151, Jalan Seksyen 2/4 31900 Kampar, Perak.	Display error message.	Display error message.
	Alternate Flow – User Exists	Name: Neal Low Email: neal961015@1utar.my Password: neallow Phone: +60164357105 Address: No 2151, Jalan Seksyen 2/4 31900 Kampar, Perak.	Register fail and display error message.	Register fail and display error message.

Table 5.2.1.2 : Sign Up Use Case Testing.

Test Case	Test Condition	Test Data	Expected Output	Actual Output
Log Out Use Case	Main Flow	Click log out button in the profile page.	User log out successfully and direct to home page.	User log out successfully and direct to home page.

Table 5.2.1.3 : Log Out Use Case Testing.

Test Case	Test Condition	Test Data	Expected Output	Actual Output
Manage Personal Information Use Case	Main Flow	Name: Jason Low Phone: +60127782840	Update personal information successfully.	Update personal information successfully.
	Alternate Flow – Invalid User Input	Name: Neal Low Phone: 0127784	Update fail and display error message.	Update fail and display error message.

Table 5.2.1.4 : Manage Personal Information Use Case Testing.

Test Case	Test Condition	Test Data	Expected Output	Actual Output
Provide Feedback Use Case	Main Flow	Click ‘Back’ button in home page	Display google form survey questionnaire.	Display google form survey questionnaire.

Table 5.2.1.5 : Provide Feedback Use Case Testing.

Test Case	Test Condition	Test Data	Expected Output	Actual Output
Make Cooking Gas Order Request Use Case	Main Flow	Name: Petron Gasul (14kg) Quantity: 2 cylinders Time: 14:30:00 Date: 2019/8/10	Display order and delivery details. Place order successfully. Direct to home page.	Display order and delivery details. Place order successfully.

				Direct to home page.
	Alternate Flow – No Enter Delivery Date and Time	Date: Default Time: -Default	Current date and time as delivery date and time. Place order successfully.	Current date and time as delivery date and time. Place order successfully.
	Alternate Flow – No Enter Delivery Address	Address: Default	User default address as delivery address. Place order successfully.	User default address as delivery address. Place order successfully.

Table 5.2.1.6 : Make Cooking Gas Order Request Use Case Testing.

Test Case	**Test Condition**	**Test Data**	**Expected Output**	**Actual Output**
View Order History Use Case	Main Flow	Select ‘On the way’ order.	Display order detail and extra two button (Track Order, Call)	Display order detail and extra two button (Track Order, Call)
	Alternate Flow – Select Complete Order	Select ‘Completed’ Order.	Display order detail.	Display order detail.

Table 5.2.1.7 : View Order History Use Case Testing.

Test Case	Test Condition	Test Data	Expected Output	Actual Output
Pick Order use Case	Main Flow	Click checkbox on pick order page	Order picked and order's status updated to 2 (Pending to deliver)	Order Picked and order status updated to 2 (Pending to deliver)

Table 5.2.1.8 : Pick Order Use Case Testing.

Test Case	Test Condition	Test Data	Expected Output	Actual Output
View Delivery History Use Case	Main Flow	Date Range: 2019/7/30 – 2019/8/30	Display all the order, total cylinder and total order within date range.	Display all the order, total cylinder and total order within date range.
	Alternate Flow – Select In Pending Order	Select 'Pending to deliver' order	Display order detail and extra 2 button (Send Order, Close Order).	Display order detail and extra 2 button (Send Order, Close Order).

Table 5.2.1.9 : View Delivery History Use Case Testing.

5.3 Testing Questionnaire

Some user feedback has been collected through google form survey questionnaire. The survey contains two section. The first section is user behavior and second section are feedback toward the application. Below show all the analyses of collected data :

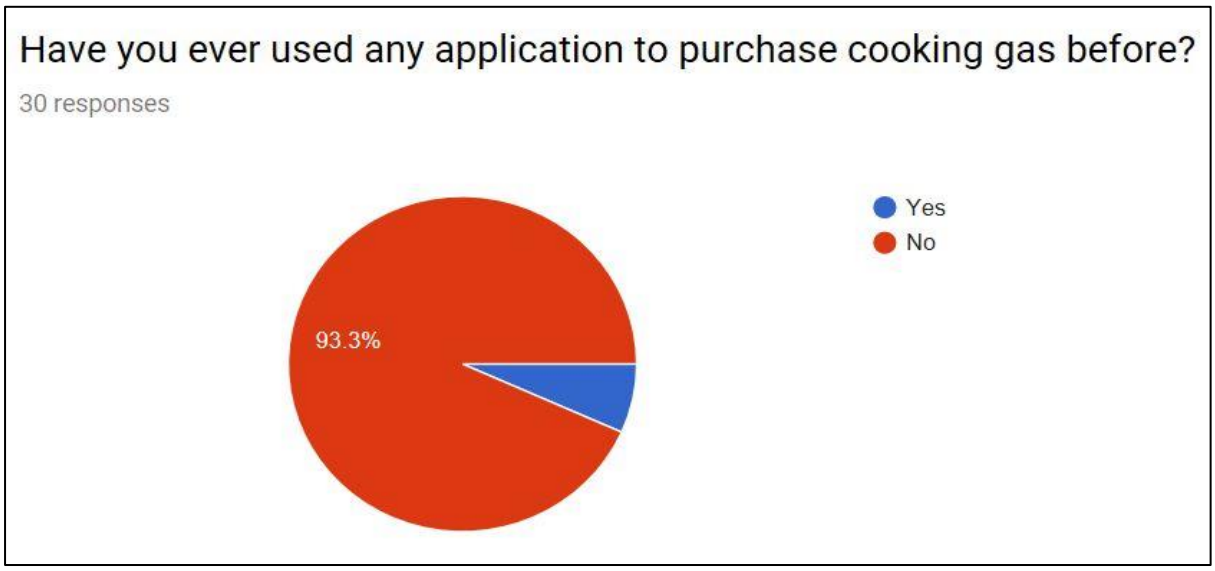


Figure 5.3.1 : User Behavior Question 1.

Based on the figure above, there are 93.3% of the users claimed that they have not used any application to purchase cooking gas before and only 6.7% of the users have used application to purchase cooking gas before. Therefore, we know that this market still hasn't been explored on Kampar Area yet.

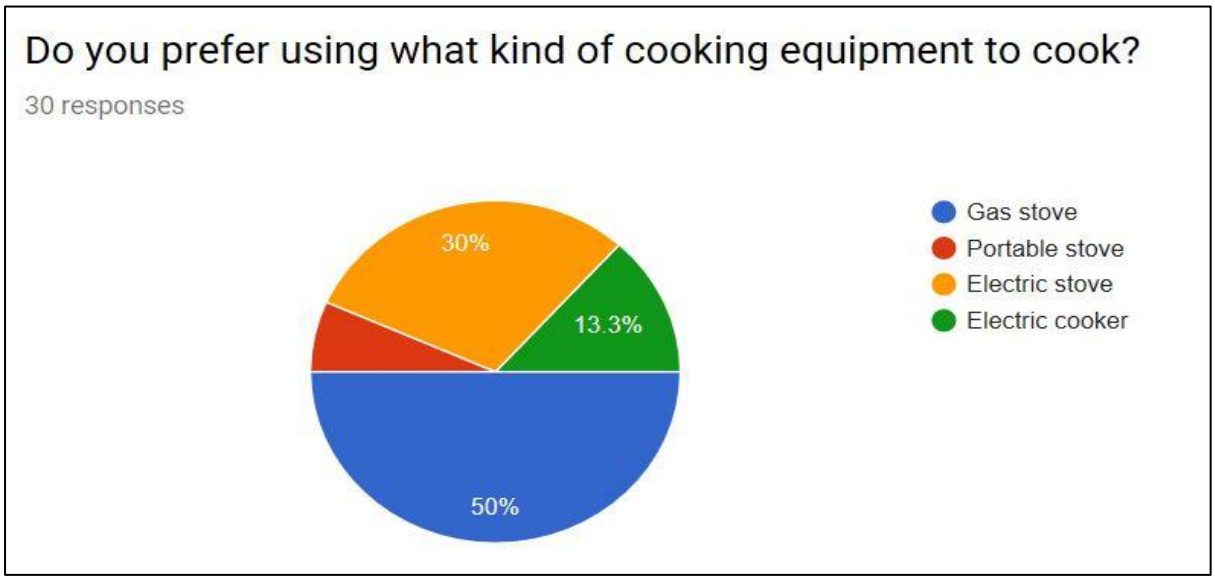


Figure 5.3.2 : User Behavior Question 2.

According to the figure 5.3.2, half of 30 responder are prefer using gas stove to cook, the second-high equipment is electric stove 30%. There are 13.3% and 6.7% of responder prefer using electric cooker and portable stove respectively. Therefore, it is necessary to think that the electric stove may be alternate the gas stove at the future. Most of the responder who choose the gas stove is food seller and Kampar residents. All responder who choose the portable stove is UTAR students and TAR UC students.

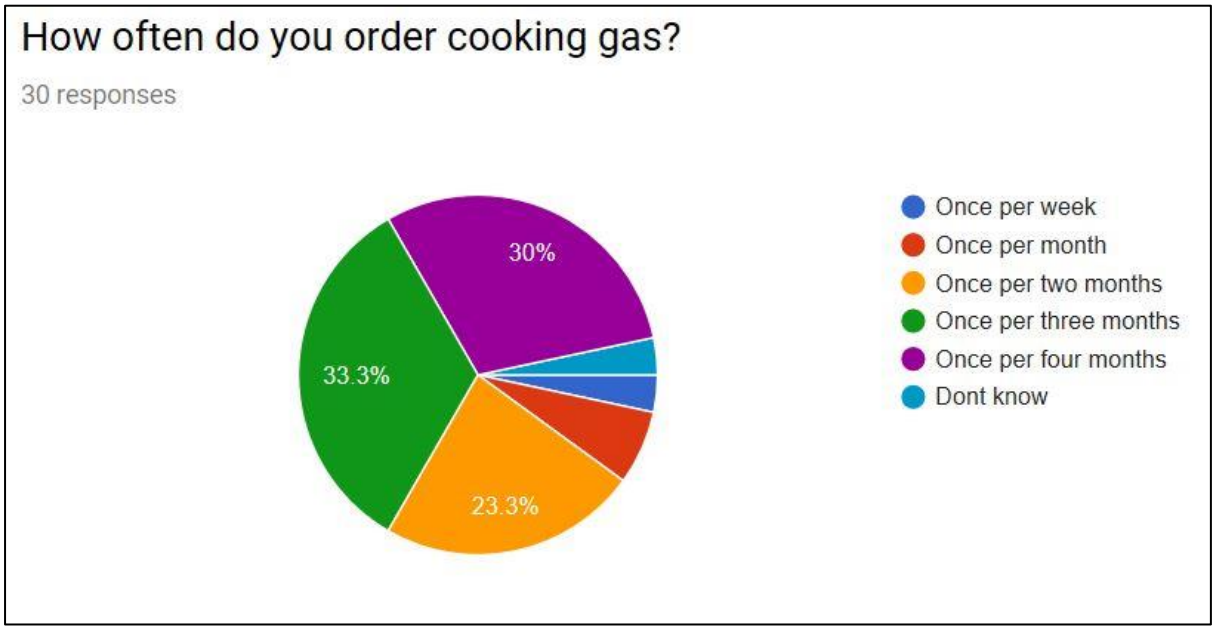


Figure 5.3.3 : User Behavior Question 3.

Above figure shows that, 33.3% of responder will order cooking gas every three months, 30 % and 23.3% of responder order their cooking gas once per four months and once per two months respectively. After finding out the fact, the average number of cooking gas purchases by Kampar residents is once per three months. Most of the responder have claims that they are not sure how long it will to make a cooking gas order. This may because they have at least one tank of cooking gas as a preparation usually.

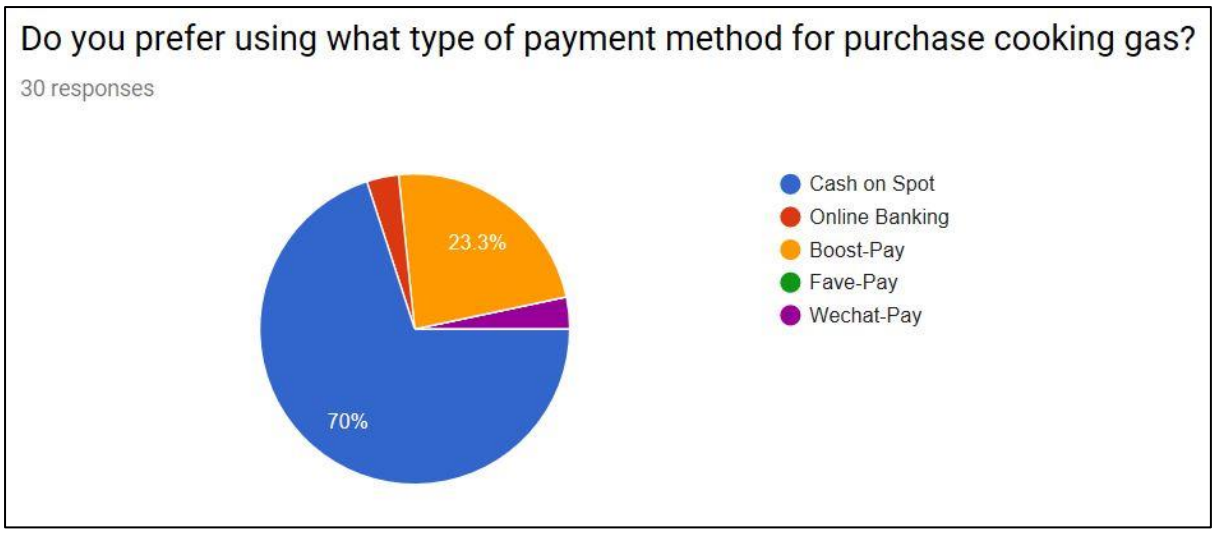


Figure 5.3.4 : User Behavior Question 4.

This question is to ask about what kind of payment method responder prefer for purchase cooking gas. Majority of the responders (70%) claimed that cash on spot is the best method and follow is boots pay which is 23.3%. This may because boost pay is fast and easy to use. The users only need to scan a QR code and key in 6digit PIN then the payment done. In other hand, online banking, fare pay, and Wechat pay were not popular with responder.

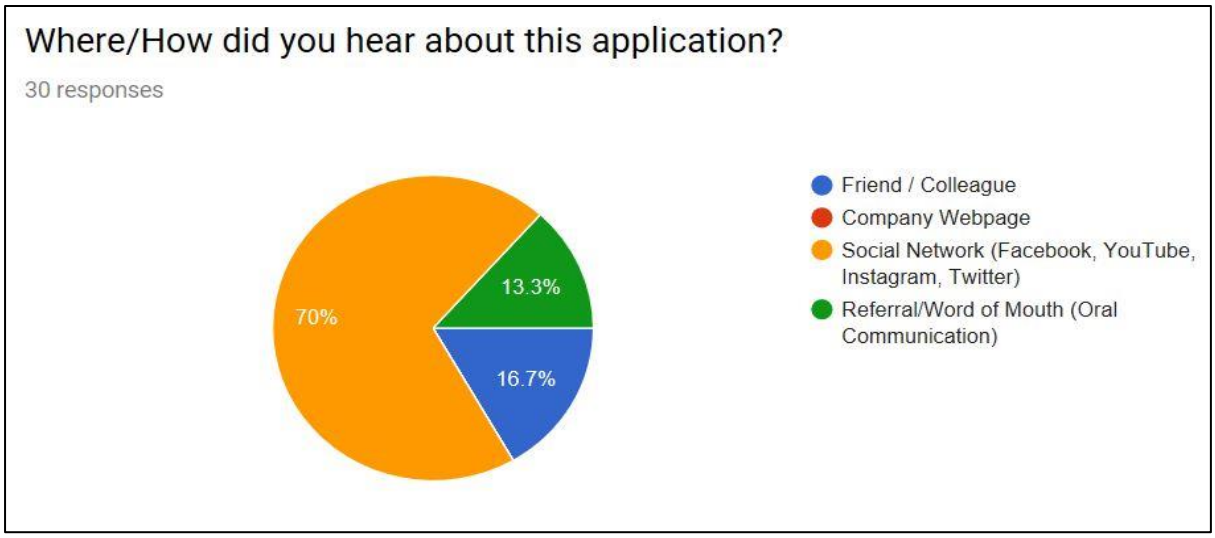


Figure 5.3.5 : Feedback Towards Application Question 1.

Based on figure above, 70% of responder har about this application from social network. The is because this application have been posted and do some promotion at the Kampar Facebook group such as Kampar Flea Market, UTAR & TARC FLEA MARKET, UTAR Kampar secondhand goods and accommodation, UTAR Kampar Free Market and so on. 13.3% of

responder are head from oral communication while 13.3% responder head this application from their friends or colleague.

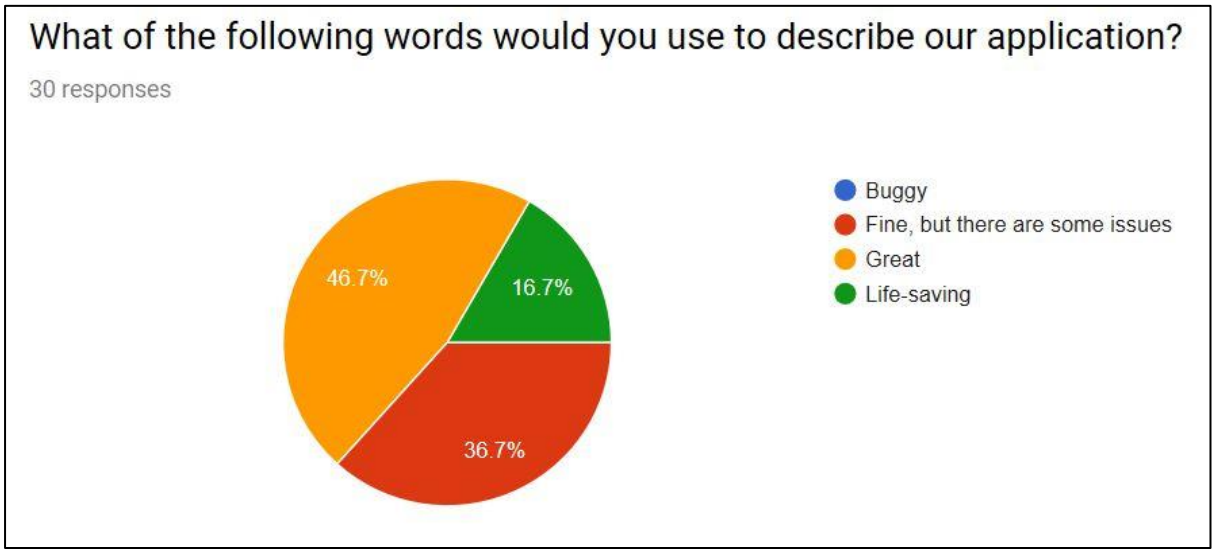


Figure 5.3.6 : Feedback Towards Application Question 2.

This purpose of this question is to view the overall performance of 'Fast Gas Deliver 4U' application. There are 46.7% of responder think that, this application is great. 36.7% of responder have think this application still got some issues. After finding the fact, we found there are typing error at the phone verification page, and the google map can't get the location and then display on the Huawei phone. This is because the Google have block Huawei for access their services.

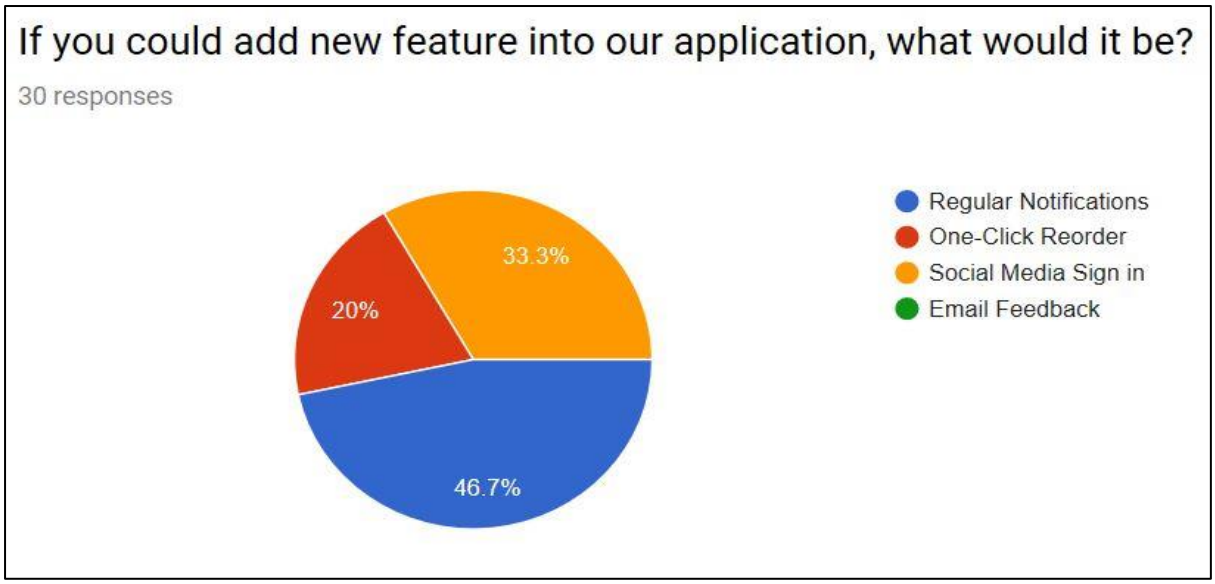


Figure 5.3.7 : Feedback Towards Application Question 3.

According to the figure 5.3.7, 46.7% of the responder suggested to add regular notification into this application. 33.3% of the responder suggested to implement social media sign in method into this application, and 20% of responder suggested adding one click reorder feature. This may because most of the responder don't know when the cooking gas will run out. Besides, the responder may also lazy to register an account, due to a lot of information need to fill in.

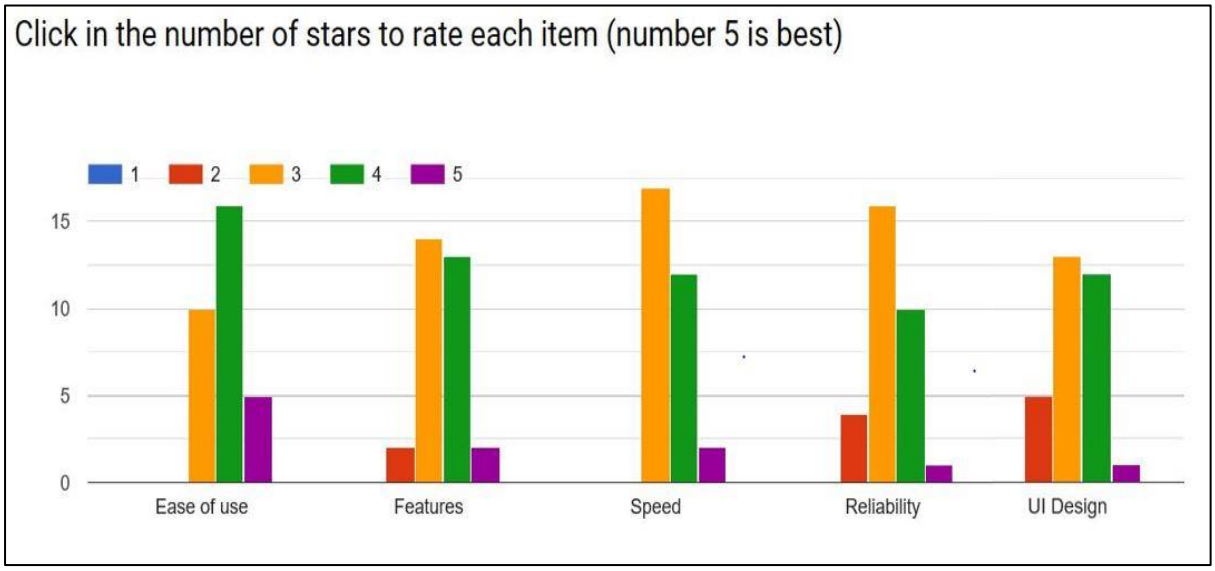


Figure 5.3.8 : Feedback Towards Application Question 4.

The above figure shows the rating for 5 options which is ease of use, features, speed, reliability and UI design. For ease of use, 4 responders are rated 5, 16 responders are rated 4, 9 responders are rated 3. For features, 2 responders are rated 5, 12 responders are rated 4, 14 responders are rated 3, and 2 responders are rated 2. For speed of application, 2 responders are rated 5, 11 responders are rated 4, and 17 responders are rated 3. For reliability, a responder is rated 5, 9 responders are rated 4, 16 responders are rated 3 and 4 responders are rated 2. For UI design, a responder is rated 5, 11 responders are rated 4, 13 responders are rated 3 and 5 responders are rated 2. Based on the analyses, the UI design should be improve first.

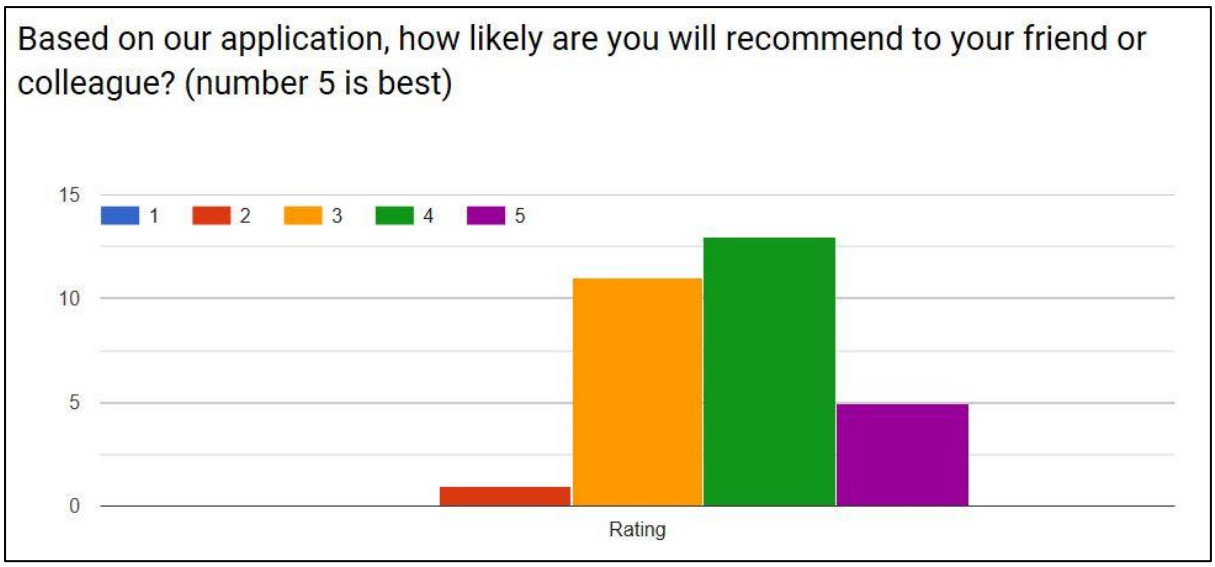


Figure 5.3.9 : Feedback Towards Application Question 5.

According to the above figure, 5 responders are highly recommending this application to their friends and colleague, 13 responders are rated 4 and 11 responders are rated 3. There is only a responder rated 2 for this question. Most of the responders are willing to share and recommend this application to their friends and colleague. This may because the features implemented on this application have provide some contribute to the social.

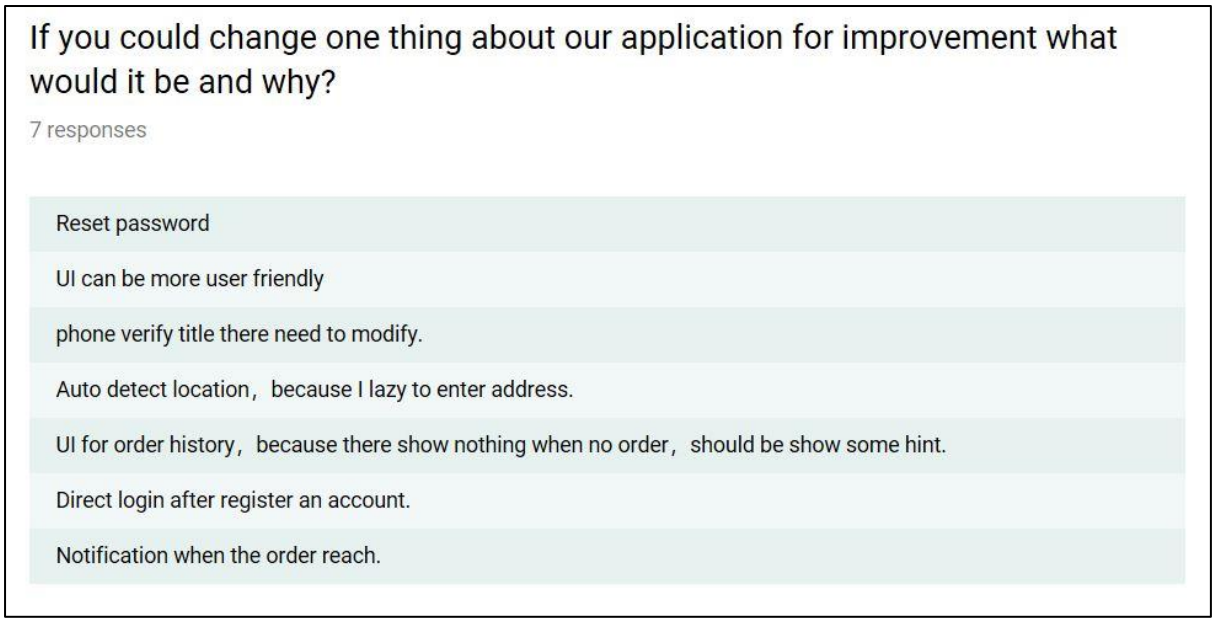


Figure 5.3.10 : Feedback Towards Application Question 6.

Based on the above figure, there are only 7 responders answer this question. The purpose of this question in to think as a customer and provide some suggestion and idea for this application

improvement. Based on the user feedback, some improvement has been done to make the mobile application more user friendly.

- Add residential type radio button and area selection on user profile page.

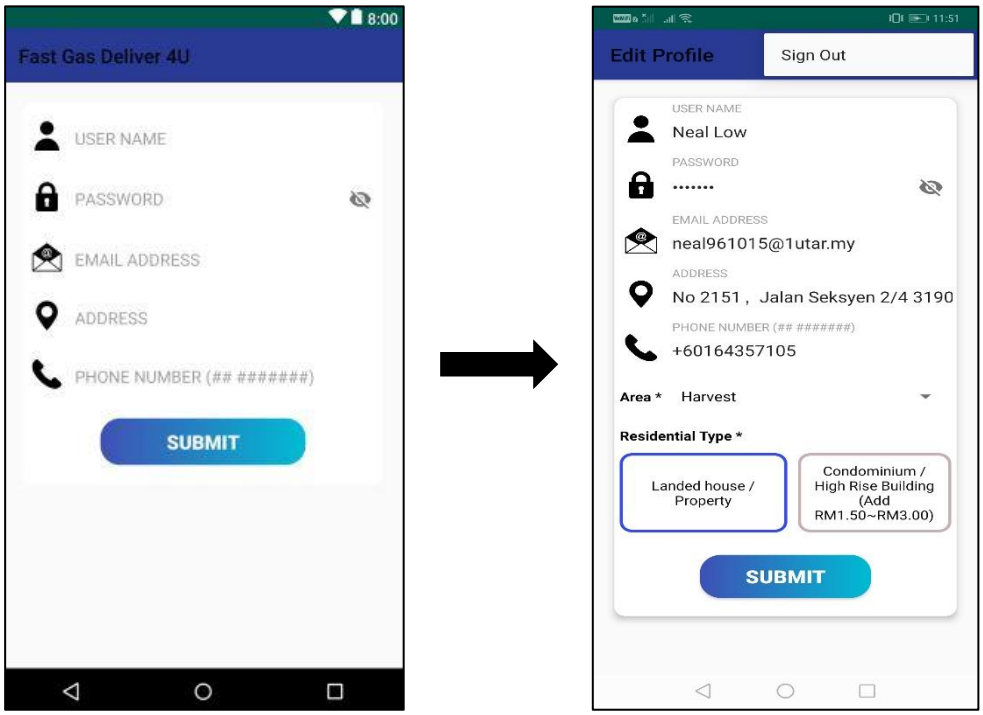


Figure 5.3.11 : User Profile Page Old Version and Latest Version.

- Add residential type radio button and area selection on delivery detail page.

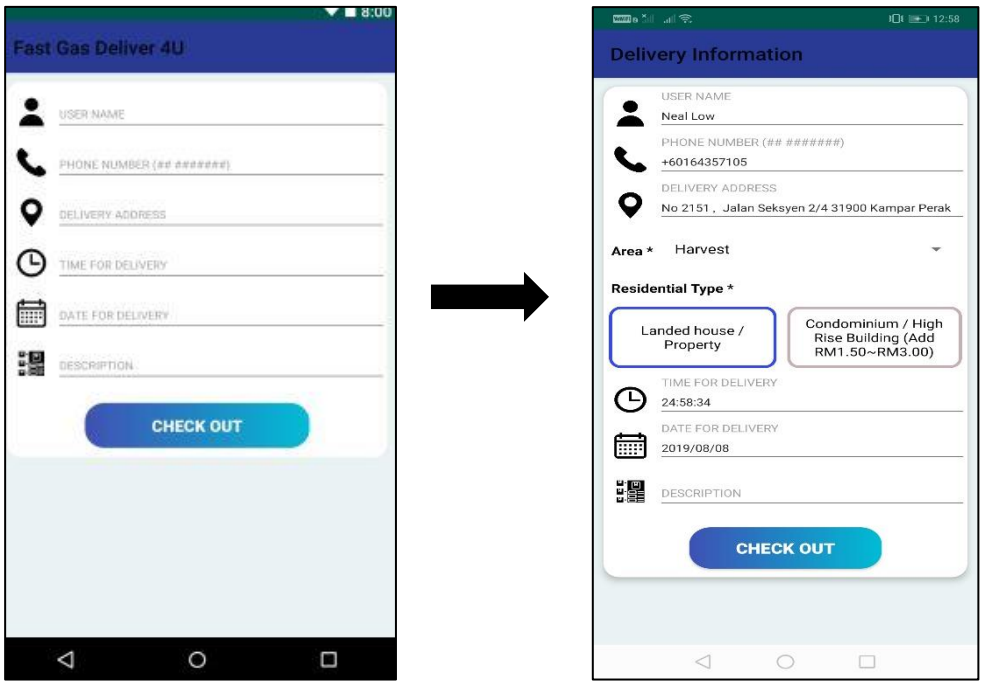


Figure 5.3.12 : Delivery Info Page Old Version and Latest Version.

- Facebook sign in feature.

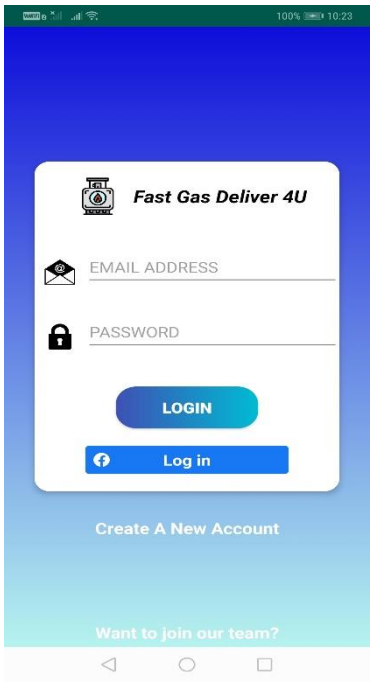


Figure 5.3.13 : Facebook Sign in.

- Change phone verification title.

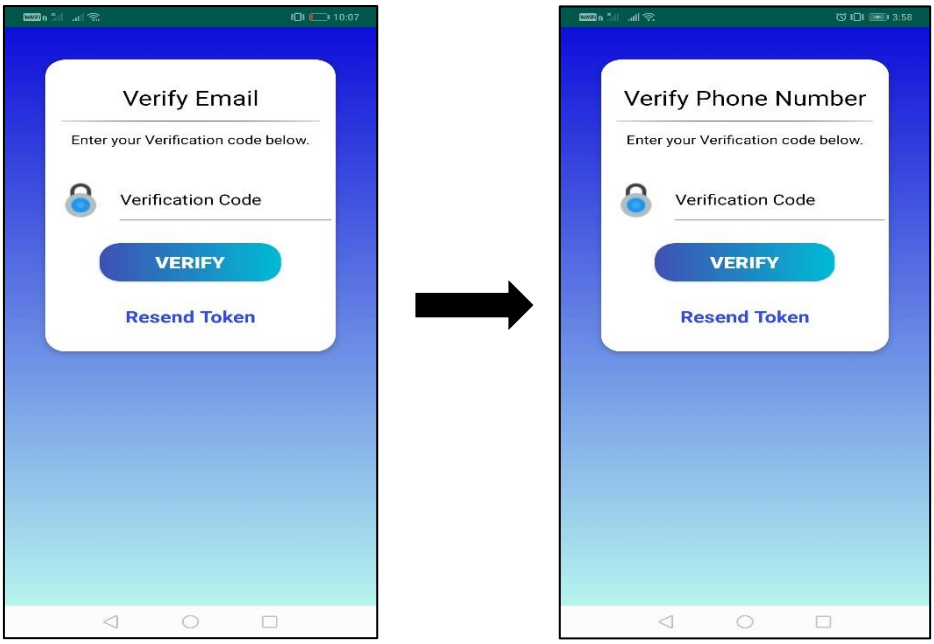


Figure 5.3.14 : Phone Verification Page Old Version and Latest Version.

- Add detect current location feature.

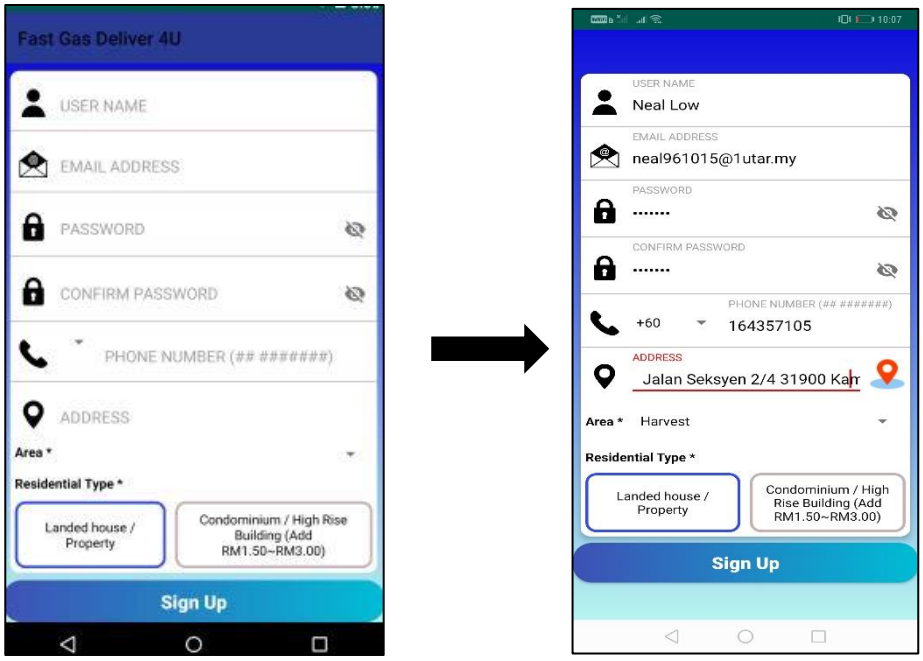


Figure 5.3.15 : Sign Up Page Old Version and Latest Version.

6.1 Project Review, Discussion and Conclusions

The smartphone is a popular and useful inventions. In today's era a lot of people rely on smartphones, it's normal for a smartphone to be used by everyone and even primary school students use a smartphone. According to Malaysia's third-quarter smartphone penetration rate released by the Malaysian Communications and Multimedia Commission (SKMM), Malaysia has reached 70% of the population used smartphone and many of them have multiple smartphones. (team, 2016) The smartphone makes things simple in many ways. Especially after the advent of mobile phones, communication becomes faster and easier. In short, the smartphone is so useful and helpful. At the end of this project, a mobile application for cooking gas delivery will be develop.

The biggest problems of cooking gas delivery service in Kampar nowadays is the ways of the cooking gas company to operate their business is low efficiency way which is receive phone call order or walk in by customers. This may cause some problems for both sides. For customer side, the staff at the cooking gas company may not be able to understand what exactly the customer's ordered over the phone. Sometimes the customer calls, the staff does not hear the phone ringing or the staff who are responsible for answering the phone is busy with other things. For cooking gas company side, they may face low sales performance and hard to stand out from other competitors.

The purpose of this project is to help cooking gas company boost their business, help customers to make cooking gas delivery services request in more easy way and let them know the estimate order and arrival time. Furthermore, this mobile application is able to let cooking gas company boost their business though send notification message based on their customer regular order request. In a nutshell, this project is focus on develop a mobile application for cooking gas delivery system that could help to improve the user experience of cooking gas ordering and delivery services through enhance the existing similar application. This project could bring benefit for the society in Kampar area.

6.2 Objective Achieved

After the mobile application development, ‘Fast Gas Deliver 4U’ mobile application has successfully achieved the objective that define in the planning stage of the project. The first objective is to develop a mobile application that could be used to help the resident who live in Kampar contact the cooking gas company easily. The resident who has used this mobile application are able to place their cooking gas delivery order within a few clicks. The second objective is to let the users who have make an order request to tracks their order current location in real time. This has been achieved since ‘Fast Gas Deliver 4U’ mobile application implemented some new feature compare to the other existing similar mobile application which is real time tracking by using google map API. The following objective is to help cooking gas company manage their store and boost their business. In this project, a web-based cooking gas ordering and delivery admin management system has been created. This web-based admin management system performs some analyze related to the sales of cooking gas company. Furthermore, the admin allowed to set the notification message and send the message through the mobile application to their customers for the purpose to mention their customers purchase cooking gas. Last but not least, the objective is to let the cooking gas company know the actual needs of their customers. The cooking gas company realize the market of cooking gas in Kampar area through using this mobile application. By using ‘Fast Gas Deliver 4U’, the users can simply make a cooking gas delivery order request even them don’t know the contact number of the cooking gas company.

6.3 Future Work

'Fast Gas Deliver 4U' is a mobile application that provides several useful functionality and features such as real time order tracking, make a cooking gas delivery request, send notification to the customers and social media login. The strength of this mobile application is to combine of these features into one mobile application that brings a lot of convenience to the Kampar citizens for purchase cooking gas in Kampar.

However, this mobile application still can be further improved by adding some advanced features such as cooking gas classification, cooking gas consumption notification and migration of Google Firebase real-time database to Cloud Firestore. The purpose of cooking gas classification feature is to let the users know what type of cooking gas is suitable for them through use the phone camera point to a cooking gas cylinder and all the cooking gas information will be display to the users.

Furthermore, the cooking gas consumption notification is able to send a notification to the users when their cooking gas is almost use up or under 10%. Last but not least, Google Cloud Firestore should be used for hosting and storing data of cooking gas ordering and delivery system. Google Cloud Firestore provides a lot of new features that the Firebase real-time database cannot access. It processes on delivers the web content may faster compare to the real-time database and also the backend coding which may improve the performance of the mobile application. Lastly, the user interface of this mobile application should be designed as user-friendly as possible.

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APPENDIX POSTER

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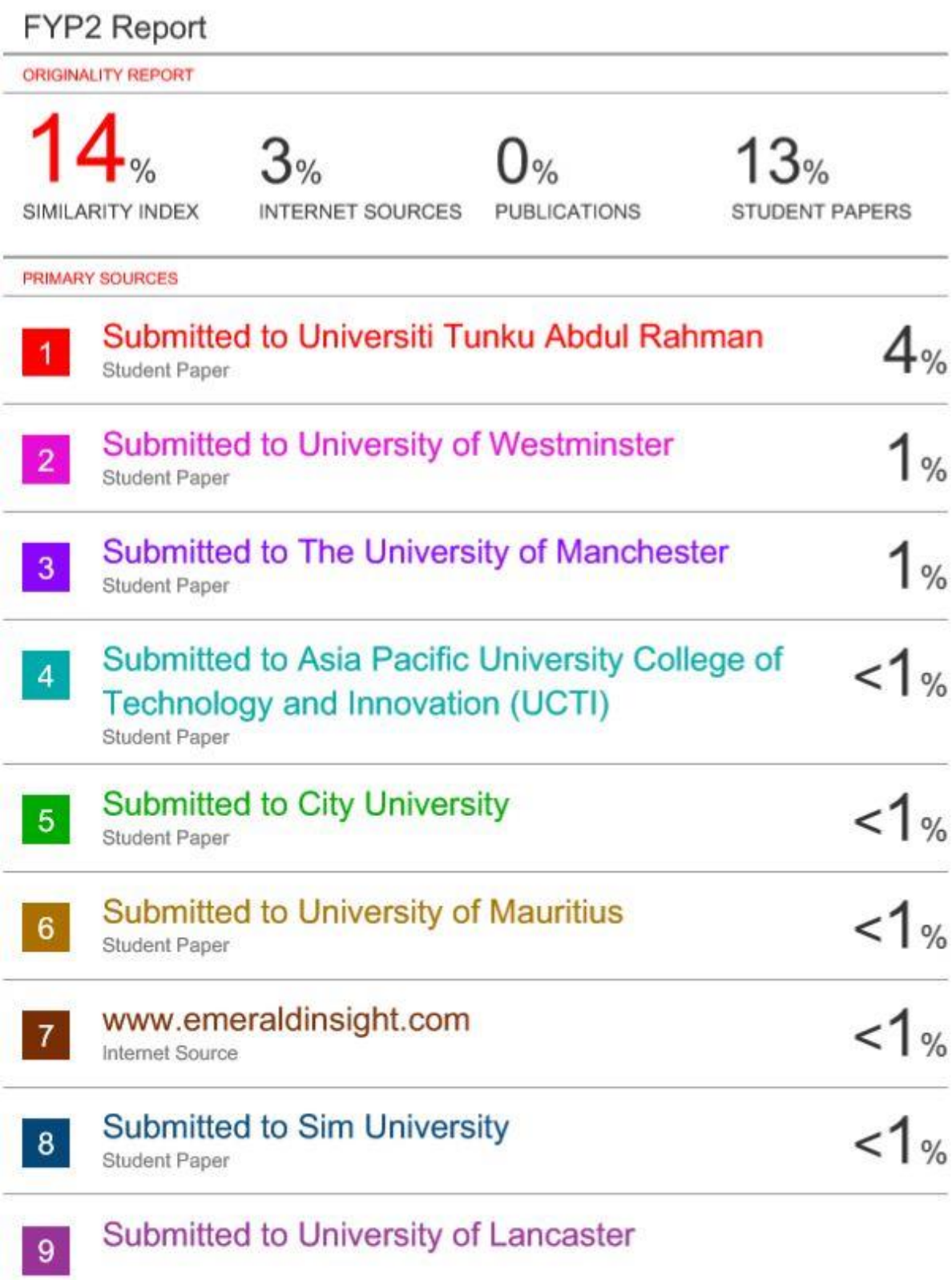

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