

**UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE
APPLICATION**

BY

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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

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ABSTRACT

As the trend of the GIG economy is on the rise, yet there are still some business sectors such as digital printing services not completely uberize through any software such as mobile application technology. As the pandemic of covid 19 hits hard on the global economy, most digital printing shop owners have moved their printing services online while digital printing services customers preferred online services, yet most online digital printing services mobile apps are not well designed resulting in certain problems for digital printing shop owners and customers. Digital printing service providers faced problems such as receiving adult content photos, blurry image and image resolution that was not suitable for certain sizes of printing materials. On the other hand, there are limited functions in existing online digital printing mobile apps for users to perform certain tasks such as editing images. For this project entitled "Uberization of Online Printing Services with Mobile Application" was to build mobile apps with advanced functionalities for any digital printing services provider or known as service provider to set up their online digital printing services while online digital printing services customers search for their ideal service provider for printing services. Authority role known as admin existed to manage activities occurring in mobile apps. Key feature of this mobile app is to allow online digital printing services customers to upload their documents, fill in printing preferences and send it to service providers. In the meantime, service providers will accept or reject orders and inform customers. Some additional features such as a review mechanism also existed in mobile apps to allow customers to rate, provide feedback and complaint on certain service providers. Advanced functionalities existed in proposed application are edit images, rejecting adult content photos to prevent service providers from receiving it. Other than this, rejection of blurry images, identification for suitability of image resolution to be printed on a certain size of printing materials existed in this mobile app.

TABLE OF CONTENTS

TITLE PAGE	i
REPORT STATUS DECLARATION FORM	ii
FYP THESIS SUBMISSION FORM	iii
DECLARATION OF ORIGINALITY	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
TABLE OF CONTENTS	vii
LIST OF FIGURES	x
LIST OF TABLES	xi
LIST OF SYMBOLS	xii
LIST OF ABBREVIATIONS	xiii
CHAPTER 1 INTRODUCTION	1
1.1 Motivation and Problem Statement	1
1.2 Project Scope	2
1.3 Objectives	3
1.4 Proposed Approach	4
1.5 Impact, Significance and Contribution	5
1.6 Background Information	6
1.7 Report Organization	7
CHAPTER 2 LITERATURE REVIEW	8
2.1 Literature Review on Existing Solutions	8
2.1.1 Literature Review on Print Studio – Print Your Heart Out	8
2.1.2 Literature Review on Campus Print	10
2.1.3 Literature Review on PRINTcess	12
2.1.4 Literature Review on PrinterOn	14
2.2 Critical Remarks of Previous Works	16

CHAPTER 3 SYSTEM DESIGN	17
3.1 Use Case Diagram	17
3.1.1 Use Case Description	19
3.2 Activity Diagrams	32
3.2.1 Activity Diagram for Use Case-Login	32
3.2.2 Activity Diagram for Use Case-Registration	33
3.2.3 Activity Diagram for Use Case-Rate Service Provider	34
3.2.4 Activity Diagram for Use Case-Provide Feedback on Service Provider	35
3.2.5 Activity Diagram for Use Case-File Complaint on Service Provider	36
3.2.6 Activity Diagram for Use Case-Filter and Select Service Provider	37
3.2.7 Activity Diagram for Use Case-Make Order for Printing Services	38
3.2.8 Activity Diagram for Use Case-View Customer Orders	40
3.2.9 Activity Diagram for Use Case- View Orders	41
3.2.10 Activity Diagram for Use Case-Edit User Profile	42
3.2.11 Activity Diagram for Use Case-View Statistics of User's Number Based on Their Roles	43
3.2.12 Activity Diagram for Use Case-Block or Approve Users from Access	44
3.2.13 Activity Diagram for Use Case-Edit Printing Setting	45
3.2.14 Activity Diagram for Use Case-Edit Business Setting	46
3.3 Flow Charts	47
3.3.1 Flow Chart for Process of Detecting Blurry Image	47
3.3.2 Flow Chart for Process of Identifying Suitability of Image to be Printed on Certain Size of Printing Material based on PPI.	48
3.3.3 Flow Chart for Detection of Image with Adult Content	49
3.4 Sequence Diagrams	50

3.4.1	Sequence Diagram of Marking Preparation Status for Order in Self-Pick Option	50
3.4.2	Sequence Diagram of Marking Preparation Status for Order in Delivery Option	51
CHAPTER 4 METHODOLOGIES AND TOOLS		52
4.1	Methodologies	52
4.2	Tools to Use	53
4.2.1	Hardware	54
4.2.2	Software	54
4.2.3	Libraries	55
CHAPTER 5 USER REQUIREMENTS AND SYSTEM ARCHITECTURE		56
5.1	User Requirements	56
5.2	System Requirements	57
5.3	System Architecture Design	58
5.4	Entity Relation Diagram (ERD) of Database	59
5.5	Data Dictionary of ERD	60
CHAPTER 6 SYSTEM IMPLEMENTATION		68
6.1	Installation and Integration Steps	68
6.1.1	Deploying CNN Model to Android Studio Project	68
6.2	Implementation for Detection of Image with Adult Content using CNN Model in Proposed Application	69
6.2.1	Overview	69
6.2.2	Introduction to Dataset	70
6.2.3	Introduction to Architecture of CNN model- MobileNetV2	70
6.2.4	Environment Setup for Training and Testing MobileNetV2 Model with Dataset	71

6.3	Implementation for Detection of Blurry Image using OpenCV in Proposed Application	73
6.4	Graphical User Interface of Application	75
6.4.1	Graphical User Interface of Application for User	75
6.4.2	Graphical User Interface of Application for User as Customer	85
6.4.3	Graphical User Interface of Application for User as Service Provider	111
6.4.4	Graphical User Interface of Application for User as Admin	124
CHAPTER 7 SYSTEM TESTING AND RESULT		127
7.1	Testing on Modules of Proposed Application	127
7.1.1	Test Case for Module of User Authentication	127
7.1.2	Test Case for Module of Create and View Feedback	134
7.1.3	Test Case for Module of Rating	136
7.1.4	Test Case for Module of File Complaint	138
7.1.5	Test Case of Module for Place and View Order	139
7.1.6	Test Case of Module for Filter and Selection of Service Provider	151
7.1.7	Test Case of Module for Edit Profile Setting	153
7.1.8	Test Case for Module of Advanced Functionalities	155
7.1.9	Test Case of Module for Edit Printing Setting	159
7.1.10	Test Case of Module for Edit Business Setting	162
7.1.11	Test Case of Module for Management of Mobile App Activities	163
7.2	CNN Model Performance on Detection of Images with Adult Content	167
7.3	Performance of Application on Detection of Blurry Image.	167
CHAPTER 8 CONCLUSION		169
8.1	Project Review and Discussion	169
8.2	Project Contribution	169
8.3	Future Work	170

REFERENCES	171
APPENDIX	173
WEEKLY LOGS	182
POSTER	195
PLAGIARISM CHECK RESULT	196
FORM IAD-FM-IAD-005	199
FYP2 CHECKLIST	200

LIST OF TABLES

Table Number	Title	Page
Table 2-2-1	Comparison of the Previous Solutions and the Proposed Method.	16
Table 3-1-1-1	Use Case Description for Use Case-Login.	19
Table 3-1-1-2	Use Case Description for Use Case-Logout.	19
Table 3-1-1-3	Use Case Description for Use Case-Registration.	20
Table 3-1-1-4	Use Case Description for Use Case-Make Order for Printing Services.	20
Table 3-1-1-5	Use Case Description for Use Case-View Customer Orders.	21
Table 3-1-1-6	Use Case Description for Use Case-View Orders.	21
Table 3-1-1-7	Use Case Description for Use Case-Check and Mark Preparation Status of Order.	21
Table 3-1-1-8	Use Case Description for Use Case-Accept or Reject Order.	22
Table 3-1-1-9	Use Case Description for Use Case-Filter and Select Service Provider.	22
Table 3-1-1-10	Use Case Description for Use Case-View Profile of Service Provider.	23
Table 3-1-1-11	Use Case Description for Use Case-View Feedback.	23
Table 3-1-1-12	Use Case Description for Use Case-Rate Service Provider.	24
Table 3-1-1-13	Use Case Description for Use Case-File Complaint on Service Provider.	24
Table 3-1-1-14	Use Case Description for Use Case-Edit Profile.	25
Table 3-1-1-15	Use Case Description for Use Case-Edit Printing Setting.	25
Table 3-1-1-16	Use Case Description for Use Case-Edit Cost Setting for Printing.	26
Table 3-1-1-17	Use Case Description for Use Case-Availability for Certain Type of Print.	26
Table 3-1-1-18	Use Case Description for Use Case-Edit Printing Preferences for Certain Type of Print	27
Table 3-1-1-19	Use Case Description for Use Case-Detect and Reject Blurry	27

	Image.	
Table 3-1-1-20	Use Case Description for Use Case-Detect and Reject Adult Content Image.	28
Table 3-1-1-21	Use Case Description for Use Case-Detect and Reject Image that not Suitable for Certain Size of Printing Based on PPI of Image.	28
Table 3-1-1-22	Use Case Description for Use Case-Edit Image.	28
Table 3-1-1-23	Use Case Description for Use Case- View Statistics of User's Number Based on Their Roles.	29
Table 3-1-1-24	Use Case Description for Use Case- Block or Approve Users from Access.	29
Table 3-1-1-25	Use Case Description for Use Case-View Complaint Record.	30
Table 3-1-1-26	Use Case Description for Use Case-Edit Business Setting.	30
Table 3-1-1-27	Use Case Description for Use Case-Edit Delivery Zone.	30
Table 3-1-1-28	Use Case Description for Use Case-Edit Shipping Option.	31
Table 3-1-1-29	Use Case Description for Use Case-Edit Payment Setting.	31
Table 4-2-1-1	Specifications of Laptop.	53
Table 4-2-1-2	Specifications of Physical Device-Smartphone.	53
Table 4-2-2-1	Specifications of Android Emulator.	54
Table 5-5-1	Data Dictionary of User Table.	60
Table 5-5-2	Data Dictionary of Customer Table.	60
Table 5-5-3	Data Dictionary of Printer Table.	60
Table 5-5-4	Data Dictionary of Comments Table.	61
Table 5-5-5	Data Dictionary of Rating Table.	61
Table 5-5-6	Data Dictionary of Complaint Table.	61
Table 5-5-7	Data Dictionary of Orders Table.	62
Table 5-5-8	Data Dictionary of Preparation_Status Table.	62
Table 5-5-9	Data Dictionary of Payment Table.	63
Table 5-5-10	Data Dictionary of Order_Address Table.	63
Table 5-5-11	Data Dictionary of Sub_Orders Table.	63
Table 5-5-12	Data Dictionary of Resources_Record Table.	64
Table 5-5-13	Data Dictionary of Product_Printing_Preferences Table.	64
Table 5-5-14	Data Dictionary of Document_Printing_Setting Table.	65

Table 5-5-15	Data Dictionary of Image_Printing_Setting Table.	65
Table 5-5-16	Data Dictionary of Delivery_Zone Table.	66
Table 5-5-17	Data Dictionary of Shipping_Option Table.	66
Table 5-5-18	Data Dictionary of Delivery_Time_Setting Table.	66
Table 5-5-19	Data Dictionary of Payment_Setting Table.	67
Table 5-5-20	Data Dictionary of Advanced_Feature_Setting Table.	67
Table 7-1-1-1	Test Case (TC_UA_Login_1) for Module of User Authentication-Login.	127
Table 7-1-1-2	Test Case (TC_UA_Login_2) for Module of User Authentication-Login.	128
Table 7-1-1-3	Test Case (TC_UA_Register_1) for Module of User Authentication-Registration.	129
Table 7-1-1-4	Test Case (TC_UA_Register_2) for Module of User Authentication-Registration.	130
Table 7-1-1-5	Test Case (TC_UA_Register_3) for Module of User Authentication-Registration.	131
Table 7-1-1-6	Test Case (TC_UA_Register_4) for Module of User Authentication-Registration.	133
Table 7-1-2-1	Test Case (TC_FB_1) for Module of Create and View Feedback-View Feedback.	134
Table 7-1-2-2	Test Case (TC_FB_2) for Module of Create and View Feedback-Create Feedback.	135
Table 7-1-3-1	Test Case (TC_RA_1) for Module of Rating – View Average Rating.	136
Table 7-1-3-2	Test Case (TC_RA_2) for Module of Rating-Provide Rating.	137
Table 7-1-4-1	Test Case (TC_COM_1) for Module of File Complaint.	138
Table 7-1-5-1	Test Case (TC_PV_1) for Module for Place and View Order-View Order.	139
Table 7-1-5-2	Test Case (TC_PV_2) for Module for Place and View Order-View Customer Printing Order.	141
Table 7-1-5-3	Test Case (TC_PV_3) for Module for Place and View Order-View Customer Printing Order.	143

Table 7-1-5-4	Test Case (TC_PV_4) for Module for Place and View Order-View Customer Printing Order.	145
Table 7-1-5-5	Test Case (TC_PV_5) for Module for Place and View Order-Place Order.	146
Table 7-1-6-1	Test Case (TC_FS_1) of Module for Filter and Selection of Service Provider.	151
Table 7-1-6-2	Test Case (TC_FS_2) of Module for Filter and Selection of Service Provider.	152
Table 7-1-7-1	Test Case (TC_EP_1) of Module Edit Profile Setting.	153
Table 7-1-7-2	Test Case (TC_EP_2) of Module Edit Profile Setting.	154
Table 7-1-8-1	Test Case (TC_AF_1) of Module Advanced Functionalities	155
Table 7-1-8-2	Test Case (TC_AF_2) of Module Advanced Functionalities.	157
Table 7-1-9-1	Test Case (TC_ES_1) of Module for Edit Setting for Printing Services.	159
Table 7-1-9-2	Test Case (TC_ES_2) of Module for Edit Setting for Printing Services.	161
Table 7-1-10-1	Test Case (TC_BS_1) of Module for Edit Business Setting.	162
Table 7-1-11-1	Test Case (TC_MA_1) of Module for Management of Mobile App Activities.	163
Table 7-1-11-2	Test Case (TC_MA_2) of Module for Management of Mobile App Activities.	164
Table 7-1-11-3	Test Case (TC_MA_3) of Module for Management of Mobile App Activities.	165
Table 7-11-4	Test Case (TC_MA_4) of Module for Management of Mobile App Activities.	166
Table 7-2-1	Table for Training Accuracy and Testing Accuracy of CNN Model.	167
Table 7-3-1	Table on Baseline, Testing on Blurry and Non-Blurry Images.	168

LIST OF FIGURES

Figure Number	Title	Page
Figure 2-1-1-1	Logo of Print Studio-Print Your Heart Out.	8
Figure 2-1-1-2	UI of Print Studio-Print Your Heart Out.	9
Figure 2-1-2-1	Logo of Campus Print.	10
Figure 2-1-2-2	UI of Campus Print.	11
Figure 2-1-3-1	Logo of PRINTcess.	12
Figure 2-1-3-2	UI of PRINTcess.	13
Figure 2-1-4-1	Logo of 1ClickPrint.	14
Figure 2-1-4-2	UI of 1ClickPrint.	15
Figure 3-1-1	Use Case Diagram (Part 1).	17
Figure 3-1-2	Use Case Diagram (Part 2).	18
Figure 3-2-1-1	Activity Diagram for Use Case-Login.	32
Figure 3-2-2-1	Activity Diagram for Use Case-Registration.	33
Figure 3-2-3-1	Activity Diagram for Use Case-Rate Service Provider.	34
Figure 3-2-4-1	Activity Diagram for Use Case-Provide Feedback on Service Provider.	35
Figure 3-2-5-1	Activity Diagram for Use Case-File Complaint on Service Provider.	36
Figure 3-2-6-1	Activity Diagram for Use Case-Filter and Select Service Provider.	37
Figure 3-2-7-1	Activity Diagram for Use Case-Make Order for Printing Services.	38
Figure 3-2-8-1	Activity Diagram for Use Case-View Customer Orders.	40
Figure 3-2-9-1	Activity Diagram for Use Case-View Orders.	41
Figure 3-2-10-1	Activity Diagram for Use Case-Edit User Profile.	42
Figure 3-2-11-1	Activity Diagram for Use Case-View Statistics of User's Number Based on Their Roles.	43
Figure 3-2-12-1	Activity Diagram for Use Case-Block or Approve Users from Access.	44
Figure 3-2-13-1	Activity Diagram for Use Case-Edit Printing Setting.	45

Figure 3-2-14-1	Activity Diagram for Use Case-Edit Business Setting.	46
Figure 3-3-1-1	Flow Chart for the Process of Detecting Blurry Image.	47
Figure 3-3-2-1	Flow chart for Process of Identifying Suitability of Image to be Printed on a Certain Size of Printing Material Based on PPI.	48
Figure 3-3-3-1	Flow Chart for the Detection of Adult Content in Image.	49
Figure 3-4-1-1	Sequence Diagram of Marking Preparation Status for Order in Self-Pick Option.	50
Figure 3-4-2-1	Sequence Diagram of Marking Preparation Status for Order in Delivery Option.	51
Figure 4-1-1	Diagram of Throwaway Prototyping.	52
Figure 5-3-1	System Architecture Diagram.	58
Figure 5-4-1	Entity Relation Diagram (ERD) of Database.	59
Figure 6-1-1-1	Code for Implementation of Pytorch Android in Android Studio Project.	68
Figure 6-2-1-1	Flow Chart for System Implementation of Advanced Function - Detection of Image with Adult Content Using CNN Model into Mobile App.	69
Figure 6-2-2-1	Image with label “1” (Adult Content).	70
Figure 6-2-2-2	Image with label “0” (Non-Adult Content).	70
Figure 6-2-3-1	System Architecture of MobileNetV2.	71
Figure 6-2-4-1	“AdultContentDataset” Folder with “train” and “valid” sub-Folder.	71
Figure 6-2-4-2	Adult Content Images in “NonAdultContent” Folder of “train” Folder.	71
Figure 6-2-4-3	Non-Adult Content Images in “NonAdultContent” Folder of “train” Folder.	72
Figure 6-3-1	Flow Chart for Implementation for Detection of Blurry Image Using OpenCV in Proposed Application.	73
Figure 6-3-2	Selected Images to Find the Baseline Value (Average Laplacian Value).	74

Figure 6-4-1-1	Interface of Splash Screen.	75
Figure 6-4-1-2	Interfaces of User Logins.	75
Figure 6-4-1-3	Interface of Login Unsuccessfully (Validation Message).	76
Figure 6-4-1-4	Interface of User Logins (Validation Message).	76
Figure 6-4-1-5	Validation Message for Connection Error.	77
Figure 6-4-1-6	Interfaces for User Registration (Service Provider).	77
Figure 6-4-1-7	Interfaces for User Registration (Customer).	78
Figure 6-4-1-8	Validation Message for User Registration (Customer).	79
Figure 6-4-1-9	Validation Message for Duplicated Email during User Registration.	79
Figure 6-4-1-10	Validation Message for User Registration (Service Provider).	80
Figure 6-4-1-11	Interface of Logout.	81
Figure 6-4-1-12	Interfaces for Edit Profile Setting of User (Customer).	82
Figure 6-4-1-13	Validation Message for Edit Profile Setting of User (Customer).	82
Figure 6-4-1-14	Interfaces for Edit Profile Setting of User (Service Provider).	83
Figure 6-4-1-15	Validation Message for Edit Profile Setting of User (Service Provider).	84
Figure 6-4-2-1	Navigation Drawer of Mobile App for User with Customer Role.	85
Figure 6-4-2-2	Interfaces for List of Available Service Providers.	85
Figure 6-4-2-3	Interfaces that Display List of Available Service Providers After Presses “ALL” Button.	86
Figure 6-4-2-4	Interfaces for Filtering List of Available Service Providers Based on Printing Type.	87
Figure 6-4-2-5	Interfaces for Filtering List of Available Service Providers Based on Shipping Options.	87
Figure 6-4-2-6	Interfaces for Filtering List of Available Service Providers Based on Shipping Options (Validation Message).	88
Figure 6-4-2-7	Interface for Users to Provide Feedback.	89

Figure 6-4-2-8	Interface for User to Rate Service Provider.	90
Figure 6-4-2-9	Interface for User to File Complaint on Service Provider.	91
Figure 6-4-2-10	Interface for List of Orders View by Customer.	92
Figure 6-4-2-11	Interfaces that Show More Specific Details of an Order.	92
Figure 6-4-2-12	Interface that Displays Details of a Document in an Order.	93
Figure 6-4-2-13	Interface for Showing Profile of Service Provider.	94
Figure 6-4-2-14	Interface of Order Tracking.	95
Figure 6-4-2-15	Main Interface for Placing Order by User.	96
Figure 6-4-2-16	Clear Orders in Main Interface for Placing Orders.	96
Figure 6-4-2-17	Interface for Printing Selection.	97
Figure 6-4-2-18	Interfaces for Photo Printing.	97
Figure 6-4-2-19	Interfaces for File Picker and Photo Printing Preferences Fill Up.	98
Figure 6-4-2-20	Validation Message for Images that Appears Blurry.	98
Figure 6-4-2-21	Validation Message for Images with Adult Content.	99
Figure 6-4-2-22	Validation Message for Copies Not in Range (Photo Printing).	100
Figure 6-4-2-23	Interfaces for Document Printing.	100
Figure 6-4-2-24	Interfaces for File Picker and Document Printing Preferences Fill Up.	101
Figure 6-4-2-25	Validation Message for Copies Not in Range (Document Printing).	101
Figure 6-4-2-26	Validation Message for Invalid Page Range.	102
Figure 6-4-2-27	Interfaces of Displaying Printing Details for Photo.	102
Figure 6-4-2-28	Interfaces of Displaying Printing Details for Document.	103
Figure 6-4-2-29	Interface of Previewing Image.	104
Figure 6-4-2-30	Interface of Previewing Document.	104
Figure 6-4-2-31	Interfaces for Selection of Date Time, Shipping Option and Payment.	104
Figure 6-4-2-32	Interfaces for Selection of Date and Time.	105
Figure 6-4-2-33	Interfaces for Filling Up Date Time, Shipping Option and	105

	Payment.	
Figure 6-4-2-34	Validation Message of Interface for Selection of Date Time, Payment, Shipping Option.	106
Figure 6-4-2-35	Validation Message of “Invalid Address Provided”.	107
Figure 6-4-2-36	Validation Error Message for Selected Delivery Time not within the time range.	107
Figure 6-4-2-37	Interface for “Tools” section.	108
Figure 6-4-2-38	Interface for Editing Images-Grayscale.	109
Figure 6-4-2-39	Interface for Editing Images-Blurry.	110
Figure 6-4-3-1	Navigation Drawer of Application for Service Provider	111
Figure 6-4-3-2	Interfaces for Editing Document Printing Setting.	112
Figure 6-4-3-3	Validation Message of Edit Document Printing Setting.	113
Figure 6-4-3-4	Validation Message of “Min Copies cannot be more than max copies” (Document Printing Setting).	113
Figure 6-4-3-5	Interfaces for Editing Photo Printing Setting.	114
Figure 6-4-3-6	Validation Message of Edit Photo Printing Setting.	115
Figure 6-4-3-7	Validation Message of “Min Copies cannot be more than max copies” (Photo Printing Setting).	115
Figure 6-4-3-8	Interfaces for Edit Business Setting.	116
Figure 6-4-3-9	Validation Message of Edit Business Setting.	117
Figure 6-4-3-10	Validation Message of Start Time, End Time, and Distance (Edit Business Setting).	117
Figure 6-4-3-11	Validation Message of “End Time must be bigger than Start Time” (Edit Business Setting).	118
Figure 6-4-3-12	Interface Of Displaying List of New Customer Printing Orders.	119
Figure 6-4-3-13	Interface of Displaying Details on Selected New Customer Printing Order.	119
Figure 6-4-3-14	Interface Of Displaying Document Detail for New Order.	120
Figure 6-4-3-15	Interface of Displaying List of Customer Printing Orders.	121
Figure 6-4-3-16	Interfaces for Displaying Details of a Specific Order.	122
Figure 6-4-3-17	Interface of Order Tracking.	122

Figure 6-4-3-18	Interface of Displaying Details of a Document.	123
Figure 6-4-4-1	Navigation Drawer of Application for Admin.	124
Figure 6-4-4-2	Interface for Statistics of User's Number Based on Their Roles.	124
Figure 6-4-4-3	Interface for Blocking or Approving Users from Access.	125
Figure 6-4-4-4	Interfaces for Displaying Complaints Records.	126
Figure 7-1-1-1	Test Result of Test Case "TC_UA_Login_1".	127
Figure 7-1-1-2	Test Result of Test Case "TC_UA_Login_2".	128
Figure 7-1-1-3	Test Result of Test Case "TC_UA_Register_1".	129
Figure 7-1-1-4	Test Result of Test Case "TC_UA_Register_2".	130
Figure 7-1-1-5	Test Result of Test Case "TC_UA_Register_3".	132
Figure 7-1-1-6	Test Result of Test Case "TC_UA_Register_4".	133
Figure 7-1-2-1	Test Result of Test Case "TC_FB_1".	134
Figure 7-1-2-2	Test Result of Test Case "TC_FB_2".	135
Figure 7-1-3-1	Test Result of Test Case "TC_RA_1".	136
Figure 7-1-3-2	Test Result of Test Case "TC_RA_2".	137
Figure 7-1-4-1	Test Result of Test Case "TC_COM_1".	138
Figure 7-1-5-1	Test Result of Test Case "TC_PV_1" (Before Case 1).	139
Figure 7-1-5-2	Test Result of Test Case "TC_PV_1" (Case 1).	140
Figure 7-1-5-3	Test Result of Test Case "TC_PV_1" (Case 2).	141
Figure 7-1-5-4	Test Result of Test Case "TC_PV_2" (Before Case 1).	142
Figure 7-1-5-5	Test Result of Test Case "TC_PV_2" (Case 2).	142
Figure 7-1-5-6	Test Result of Test Case "TC_PV_2" (Case 3).	143
Figure 7-1-5-7	Test Result of Test Case "TC_PV_3" (Before Case 1).	143
Figure 7-1-5-8	Test Result of Test Case "TC_PV_3" (Case 1).	144
Figure 7-1-5-9	Test Result of Test Case "TC_PV_4".	145
Figure 7-1-5-10	Test Result of Test Case "TC_PV_5". (Case 1).	147
Figure 7-1-5-11	Test Result of Test Case "TC_PV_5". (Case 2).	148
Figure 7-1-5-12	Test Result of Test Case "TC_PV_5". (Case 3-7).	148
Figure 7-1-5-13	Test Result of Test Case "TC_PV_5". (Case 8-9).	149
Figure 7-1-5-14	Test Result of Test Case "TC_PV_5". (Case 10).	149
Figure 7-1-5-15	Test Result of Test Case "TC_PV_5". (Case 11-18).	151

Figure 7-1-6-1	Test Result of Test Case “TC_FS_1”.	151
Figure 7-1-6-2	Test Result of Test Case “TC_FS_2”.	152
Figure 7-1-7-1	Test Result of Test Case “TC_EP_1”.	153
Figure 7-1-7-2	Test Result of Test Case “TC_EP_2”.	154
Figure 7-1-8-1	Test Result of Test Case “TC_AF_1”.	155
Figure 7-1-8-2	Test Result of Test Case “TC_AF_2”.	157
Figure 7-1-9-1	Test Result of Test Case “TC_ES_1”.	160
Figure 7-1-9-2	Test Result of Test Case “TC_ES_2”.	161
Figure 7-1-10-1	Test Result of Test Case “TC_BS_1”.	162
Figure 7-1-11-1	Test Result of Test Case “TC_MA_1”.	163
Figure 7-1-11-2	Test Result of Test Case “TC_MA_2”.	164
Figure 7-1-11-3	Test Result of Test Case “TC_MA_3”.	165
Figure 7-1-11-4	Test Result of Test Case “TC_MA_4”.	166
Figure 7-3-1	Non-Blurry Image for Testing.	167
Figure 7-3-2	Blurry Image for Testing.	167

LIST OF SYMBOLS

,	Comma
.	Full stop
:	Colon
“ “	Ellipsis
-	Hyphen
()	Parentheses
[]	Brackets
!	Exclamation mark
?	Question mark
/	Slash

LIST OF ABBREVIATIONS

<i>App/app</i>	Application
<i>API</i>	Application Programming Interface
<i>AVD</i>	Android Virtual Devices
<i>CRUD</i>	Create, Read, Update, Delete
<i>Covid-19</i>	Coronavirus
<i>DOC</i>	document
<i>ERD</i>	Entity Relationship Diagram
<i>FYP</i>	Final Year Project
<i>GPS</i>	Global Positioning System
<i>GSON</i>	Google Gson
<i>IDE</i>	Integrated Development Environment
<i>JSON</i>	JavaScript Object Notation
<i>JPEG</i>	Joint Photographic Experts Group
<i>PPI</i>	Pixels Per Inches
<i>PNG</i>	Portable Network Graphics
<i>PDF</i>	Portable Document Format
<i>SQL</i>	Structured Query Language
<i>UI</i>	User Interface
<i>CNN</i>	Convolutional Neural Network
<i>PBE</i>	Public Bank's online banking website.
<i>COD</i>	Cash On Delivery
<i>N/A</i>	Not Applicable
<i>GUI</i>	Graphic User Interface
<i>PHP</i>	Hypertext Preprocessor
<i>SDK</i>	Software Development Kit

Chapter 1

Introduction

1.1 Motivation and Problem Statement

Since the rising trend of smartphones usage in the early 10s in the 21st century, different business sectors and industries have digitalized and uberized, thus creating a new form of economic trend known as the gig economy. This aspect of the gig economy is enabling smaller businesses to compete with the huge, often multi-national, competitors by making use of the same technology that helped these companies grow in the first place (Towers-Clark, C., 2021.). However, some of the business sectors such as digital printing service is not completely uberized through any software such as mobile app technology.

As the pandemic of covid-19 turned into a global crisis which threatened all human lives, printing service providers had moved their services online while most citizens didn't want to physically go to the printer shop to print documents. Also, new players who wish to enter the online digital printing service market find themselves in difficulty to set up effective online printing services due to lack of knowledge in this field. Most online digital printing mobile apps that exist in the market are poorly designed, yet not fully equipped with advanced functions such as image editor. As a result, most online printing service users find themselves could only perform limited functionality with it. Also, users had to go through different mobile apps to search for ideal service that met all their specific requirements, resulting in giving up using online printing service. On the other hand, online printing service providers faced certain problems such as receiving images with adult content, blurry images or low resolution's image that did not fit on a certain size of printing which disrupted the online business process.

An online digital printing service mobile app consists of advanced functionalities for online printing service customers and multiple online printing service providers come to help and solve the above problems. It allows any users who own printing machines to start their online digital printing service under one mobile platform. Besides this, it allows users to easily search for an ideal online printing service provider.

CHAPTER 1: INTRODUCTION

- i) Difficulties faced by any printing service provider to carry out open door business during this covid-19 pandemic period and users facing difficulty in printing documents as they need to be physically at the shop to print the document.
- ii) Absence of some advanced features in existing online digital printing mobile app resulted in limited functions for online printing service customers to perform certain tasks such as editing images while online printing service providers facing problems such as receiving adult content images, blurry image and low resolution of image that are not suitable for certain size of printing material.

1.2 Project Scope

This project is to develop an interactive mobile application that facilitates online business processes between any online printing service provider and online printing service customers through assisting any users to set up their own online service for digital printing and help any users to easily search for credible online printing service providers based on their own requirements.

Advanced functionalities exist in this mobile app to help all parties, some of the functionalities for online printing service providers are rejecting images with adult content, blurry images, low resolution images that are not suitable for a certain size of printing. Besides this, image editor and review mechanism are implemented in proposed application for online printing service customers to edit images or view reviews of service provider.

Android Studio platform with Java programming language is used in the project to develop proposed application. MYSQL and Firebase storage store and sync data and files for client-and-server-side development. Libraries such as Open CV integrated in Android Studio project for development of functions such as image transformation and detection of image blurriness. Besides this, frameworks such as PyTorch Mobile embed PyTorch ML model on-device to develop certain computer vision function.

CHAPTER 1: INTRODUCTION

1.3 Objectives

Some objectives for this project are:

- i. To develop an interactive mobile application with important features for any users to set up their own online digital printing service and for online printing service customers to apply those service in an effective manner.
 - To develop an online digital printing mobile application which allows online digital printing customers to make orders for printing purposes through uploading documents or images, fill in printing preferences and send order details to specific online printing service providers.
 - To develop an online digital printing mobile application which allows users to view printing orders history and status of current orders.
 - To develop an interactive online digital printing mobile application that allows users to fill in certain requirements such as type of printing, delivery option to filter and select online printing service provider that meet all requirements.
 - To develop an online digital printing mobile application with extra functions such as rating, feedback, and file complaint.
- ii. To develop an interactive online digital printing mobile application with advanced features which facilitated business processes for online printing service providers and online printing service customers.
 - To develop an interactive online digital printing mobile application with editor tools for users to edit images.
 - To develop an online digital printing mobile application with advanced functions for online printing service providers such as rejection of adult content photos, blurry images and low resolution's image that are not suitable on certain sizes of printing materials.

1.4 Proposed Approach

Proposed mobile application is to setup an online printing services business platform for any users. User can register own account with the role of customer, and service provider. As a customer, user was able to place order for printing, view orders, mark status of orders, edit profile and edit images. Other functions for customer are rate, provide feedback and file complaint on service providers. As for service provider, user can view orders, accept new orders, mark the status of order, edit business setting, printing services setting. As for admin, admin able to manage activities in the business platform.

Development of mobile application is done using Android mobile application development platform-Android Studio with JAVA programming language. For the backend of this project, online web server- 000Webhost is selected as it provides MYSQL database to store data and managed through phpMyAdmin. Efficient communication between database of system and mobile app is setup using PHP script. Beside this, Firebase Storage acts as file server, allows any uploaded files to be store in it.

Advanced functionalities of proposed application such as edit images and detection of blurry image setup through integration of Open CV SDK into Android Studio project. By using Open CV, application can calculate value for variance of Laplacian of image to determine the blurriness of an image.

CNN model such as MobileNetV2 is implemented in mobile app through PyTorch Mobile framework to build up advanced function for detection of image with adult content.

1.5 Impact, Significance and Contribution

By solving these problems, an online digital printing service mobile application which connects directly between online printing service customers and online printing service providers was born. It marks a huge contribution to the development of online digital printing industry and sharing economy as it widens the sectors involved in sharing economy, opening more businesses and jobs opportunities to public especially during this covid-19 pandemic period. It brings huge benefits to society, which allows any users to set up an online digital printing service via mobile platform during this difficult period. In the meantime, it provides user an efficient way to search for online printing services or make any comparison on services. Also, users could make orders for online printing services in an efficient way.

Advanced features such as images editor in this mobile app could assist any users to perform modification on image. Features such as detect and rejection of adult content images, blurry images or images with resolution that are not suitable for a certain size of printing, come along to solve online printing service provider problems.

CHAPTER 1: INTRODUCTION

1.6 Background Information

Uberization

Uberization is described as the process of new participants using modern computing platforms such as mobile applications to commoditize an existing service-based industry to aggregate transactions between clients and providers of a service.

The rise of uberization began with the emerging smartphone industry in the early 10s in the 21st century, enabling more services to be put online effectively. Some of the business industries which had been uberized included ride hailing, food delivery and house rental. Through uberization of industry, business organizations such as UBER, GRAB, allow their potential customers to be put into direct contact with potential providers of a service.

GIG Economy

In a GIG Economy or known as sharing economy, large numbers of people can have more flexible jobs such as part-time jobs or freelancers. A gig economy is different from a traditional economy where in traditional economy, workers focus fully on their career development only.

The main factor for the rise of the GIG Economy is the massive development of the smartphone industry and wide coverage of the internet around the globe, resulting in more effective and cheaper services such as Uber or Airbnb, for those willing to use them.

Digital printing

Digital printing is the printing technique of transferring digital-based images such as PDFs or desktop publishing files directly onto a different type of media substrates through a printing press. Some of the media substrates were paper, photo paper, cardstock, and other substrates.

Online printing service

Online printing service refers to a service where user contacts printing service providers such as printer shops and make printing orders via online quickly and effectively.

CHAPTER 1: INTRODUCTION

1.7 Report Organization

This report is organized into 8 chapters: Chapter 1 Introduction, Chapter 2 Literature Review, Chapter 3 System Design, Chapter 4 Methodologies and Tools, Chapter 5 System Requirements and System Architecture, Chapter 6 System Implementation, Chapter 7 System Testing and Result, Chapter 8 Conclusion.

Chapter 1 is the introduction of this project which includes motivation and problem statement, project scope, objectives, proposed approach, contribution of project and report organization.

Chapter 2 is the literature review on different existing solution. Each weakness and strength of existing solutions is identified and compare it with proposed solutions.

Chapter 3 explains the system design of proposed application through use case diagram, activity diagram, flow chart and sequence diagram.

Chapter 4 is the methodology and tools used in this project. For the tools part, it includes hardware, software, libraries involved during development of the proposed application.

Chapter 5 describes the user requirements and system architecture of this project. For requirements, it includes user requirements and system requirements while on the system architecture part, it shows the system architecture diagram of the entire proposed application.

Chapter 6 includes description on steps for installation, integration of Pytorch model to physical phone. Besides this, this chapter explains implementation for detection of image with adult content using CNN model in proposed application and implementation for detection of blurry image using OpenCV in proposed application. Graphical User Interfaces of mobile application show in this chapter.

Chapter 7 shows the result of testing which performed on different application modules, functionalities of the proposed application.

Chapter 8 is the conclusion of project which describe overview of project, project contribution and future work.

Chapter 2

Literature Review

2.1 Literature Review of Existing Solution

2.1.1 Literature Review on Print Studio – Print Your Heart Out



Figure 2-1-1-1: Logo of Print Studio-Print Your Heart Out.

Print Studio – Print Your Heart Out is a mobile application providing online digital printing service which allows users to upload images for the digital printing service provider to print images with certain media substrates such as magnets, photo, poster, or metal prints. Print Studio – Print Your Heart Out is available at Google Play Store with currently 100,000 downloads and average rating star of 4.3.

Main Features:

- Display and view available printing service.
- Online payment methods and selection of shipping service for products is available.
- Upload images, preview images and fill in printing preferences for printing purpose.
- Login and registration with third-party.
- Intuitive photo cropping and editing tools.

Strength of Print Studio – Print Your Heart Out:

- Clean and intuitive design of interface.
- Extra features available such as an intuitive photo cropping tool for users to crop images.
- Upload images in various format such as JPEG, JPG and PNG.
- Exist function that determine if resolution of image is suitable for a certain printing size and reminds users to select suitable size of image.

Weakness of Print Studio – Print Your Heart Out:

- Lack of some necessary features such as feedback system, rating system.
- Users cannot keep track of orders history record or status of current order.
- Lack of some necessary features that facilitated the business process for digital printing service providers of this mobile application such as detection and rejection of blurry images, images with adult content.

Suggested way to improve:

- Add in a function that views records of order history to allow users to keep track of previous orders and status of current orders.
- Add in function for feedback, rating, file complaint on service.
- Add in advanced functionalities such as rejection of blurry images or images with adult content.

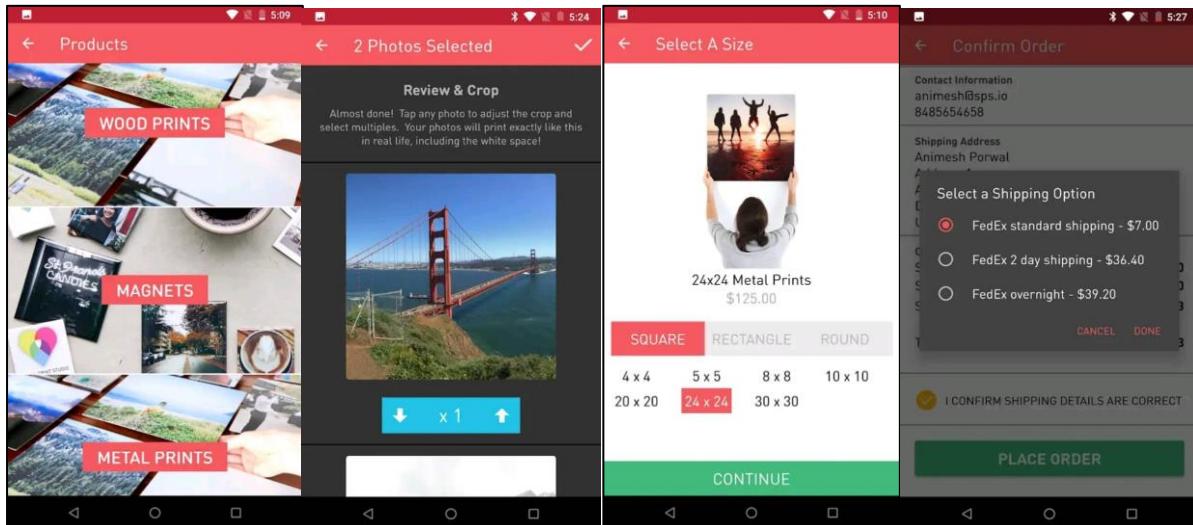


Figure 2-2-1: UI of Print Studio-Print Your Heart Out.

2.1.2 Literature Review on Campus Print

Figure 2-1-2-1: Logo of Campus Print.

Campus Print is a mobile application developed by Canon Nederland N.V. This mobile application allows any user to upload documents and search for nearby available printers to print documents out. The mobile application can be downloaded from Google Play Store, with currently around 1000 downloads and average star rating of 2.6.

Main Features:

- Display and view available online printing services.
- Allow upload documents or photos for printing purposes.
- Filter and select the printer machine based on the location.
- Built-in E-wallet with top up function for payment.
- Scan generated QR code for order with the scanner available in the printer machine to verify the order and started the printing process.

Strength of Campus Print:

- Design of the interface is simple and clean.
- Allow upload documents in different formats such as PDF and DOC.
- Allow upload photos in different formats available such as JPEG, JPG and PNG.
- Allow users to keep track of their past order history record.

Weakness of Campus Print:

- Function to determine if resolution of image is suitable for certain printing size not available.
- Lack of some necessary features that help digital printing service users in preparing documents for printing purposes such as image editor.

CHAPTER 2: LITERATURE REVIEW

- Lack of some advanced features in this mobile application that facilitate business processes for digital printing service providers such as detection and rejection of blurry image or adult content image.
- Function that determines if resolution of image is suitable for certain printing size is not available.

Suggested way to improve:

- Add in feedback, rating, file complaint function in the mobile application.
- Add in the image's editor.
- Add in advanced functionalities such as rejection of blurry images or adult content images.
- Add in advanced function to determine certain images were suitable to be printed in a certain size of printing material.
- Add in a function that allow user views order history records.

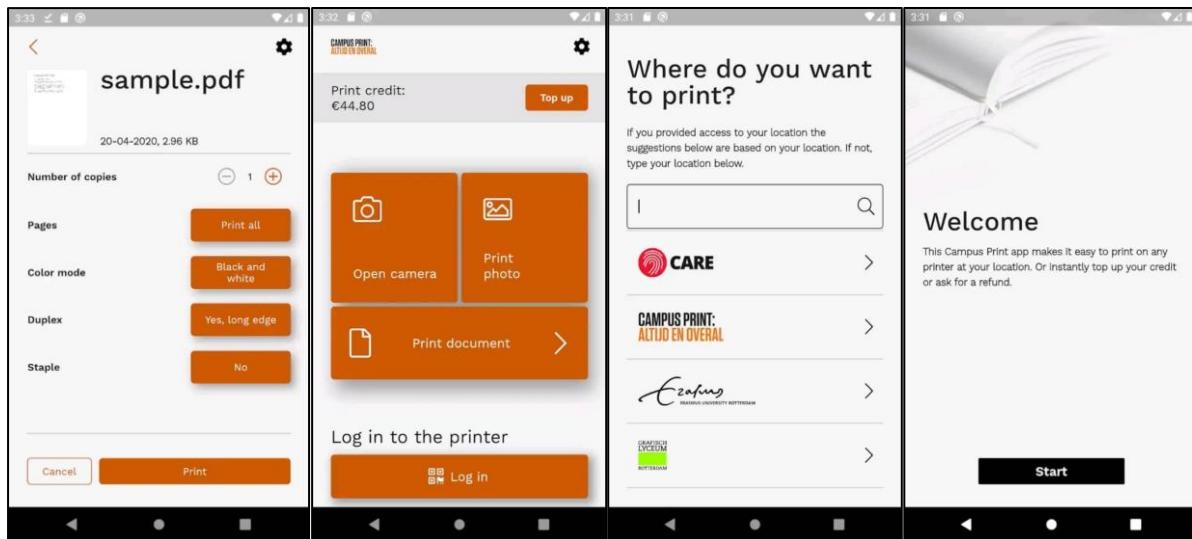


Figure 2-1-2-2: UI of Campus Print.

2.1.3 Literature Review on PRINTcess

Figure 2-1-3-1: Logo of PRINTcess.

PRINTcess is a mobile application that provides online printing preference setting in advanced and documents collection at any available printer. Users only need to upload documents in PDF or DOC format via mobile application, get the generated QR code and go for any available printer. As soon as user scans the QR code with the scanner at the printer, the printer will print out those papers. This mobile application is available in Google Play Store, with 10,000 downloads and average star rating of 2.4.

Main Features:

- Built-in credit system and top up function.
- View location of nearby available printers in a map.
- Upload document file/ image, fill in printing preferences for printing purpose.
- QR code generated for user and allow user to execute the order at printer after scanning the QR code with scanner at the printer
- Built-in E-wallet with top up function.
- Keep track of user orders history records.
- Login and registration with third-party.

Strength of PRINTcess:

- Allows upload of document files in different formats such as PDF and DOC.
- Allows upload of different images in different formats such as JPEG, PNG, and JPG.
- Some necessary features such as feedback system, rating system, allows digital printing service users and digital printing service providers justify service provided.
- Allows users to easily check the record of past orders.

CHAPTER 2: LITERATURE REVIEW

Weakness of PRINTcess:

- Design of the user interface was not clean and intuitive.
- Lack of some advanced features that facilitated the business process for digital printing service providers of this mobile application such as rejection of blurry image or adult content image.
- Non-existed of function that determines if resolution of image was suitable for certain printing size.
- Images editor not available to assist user in preparing images.

Suggested way to improve:

- Add in advanced functionalities such as rejection of blurry images or adult content
- Add in advanced function to determine if certain images were suitable to be printed in a certain size of printing material.
- Add in images editor feature.

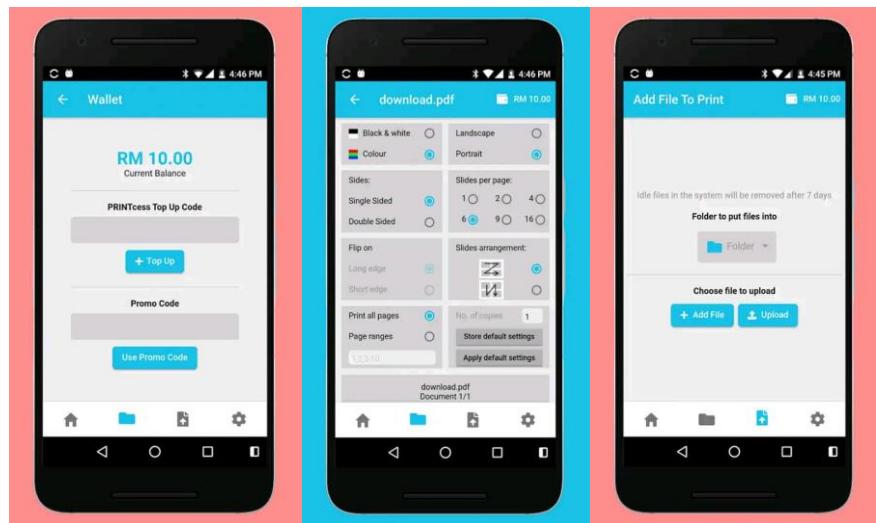


Figure 2-1-3-2: UI of PRINTcess.

2.1.4 Literature Review on 1ClickPrint



Figure 2-1-4-1: Logo of 1ClickPrint.

1ClickPrint is a mobile application that provides online digital printing by allowing users to upload images and print it with certain media substrates such as photo, acrylic blocks, and metal prints. 1 Click is a mobile platform available at Google Play Store with currently 10 thousand downloads and average rating star of 4.6.

Main Features:

- View all available printing services.
- Editor tools for photo cropping and photo filtering.
- Selection of shipping service for order.
- Online payment methods available.
- Uploading images in different formats such as JPEG, JPG and PNG format.

Strength of 1ClickPrint:

- Clean and intuitive design of interface.
- Allows users to perform photo cropping and photo filtering.
- When the uploaded image was not suitable to be printed in a certain size, the system of the mobile application will alert the user about it and warn the user the result of printing will be blurry.
- Allows user to easily keep track for order history.

CHAPTER 2: LITERATURE REVIEW

Weakness of 1ClickPrint:

- Lack of some necessary features that facilitated business process for digital printing service provider of this mobile application such as detection and rejection of blurry image or adult content image.
- Lack of some necessary features such as feedback system, rating system.

Suggested way to improve:

- Add in advanced functionalities such as rejection of blurry images or adult content images.
- Add in feedback, rating, file complaint function in the mobile application.

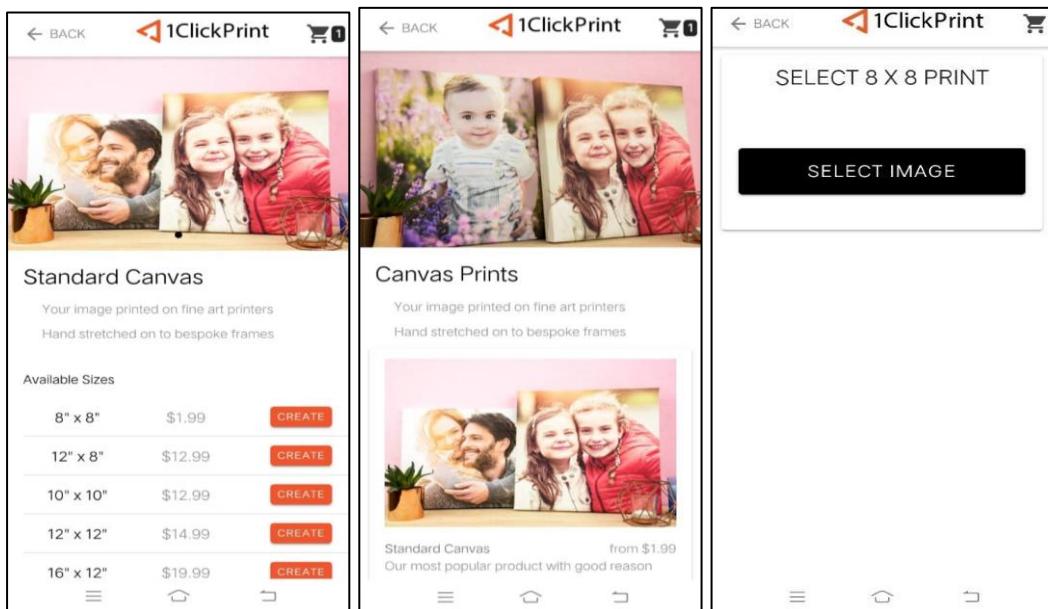


Figure 2-1-4-2: UI of 1ClickPrint.

CHAPTER 2: LITERATURE REVIEW

2.2 Critical Remarks of Previous Works

	1CLICK-PRINT	Print Studio – Print Your Heart Out	Campus Print	PRINTcess	Proposed Method
Number of printing service providers and customers involved	Multiple Customers, One Provider	Multiple Customers, One Provider	Multiple Customers, One Provider	Multiple Customers, one Provider	Multiple Customer and Multiple Provider
Clean and Intuitive user interface	✓	✓	✓		✓
Images/Document file uploaded for printing	Images	Images	Document file, Images	Document file, Images	Document file, Images
Format of Documents File/Images available	PNG, JPEG, JPG	PNG, JPEG, JPG	PDF, DOC, JPG, PNG, JPEG	PDF, DOC, PNG, JPEG, JPG	PDF, PNG, JPEG, JPG
Online Payment method /built-in E-wallet	Built-in E-Wallet	Online Payment Method	Built-in Credit System	Built-in E-Wallet	Bank Transfer
Rating /Feedback/ Complain function on printing service.				Feedback, Rating	Feedback, Rating, Complaint
Filter, view and select available digital printing service providers.					✓
Keep track of current order status.					✓
Keep track of order history records.	✓		✓	✓	✓
Editor tools available to modify images.	✓	✓			✓
Advanced functionalities in application					
Detects and rejects images with adult content.					✓
Identify if uploaded images suitable to be printed on a certain size of printing material.	✓	✓			✓
Detects and rejects if image is blurry.					✓

Table 2-2-1: Comparison of the Previous Solutions with the Proposed Method.

Chapter 3

System Design

3.1 Use Case Diagram

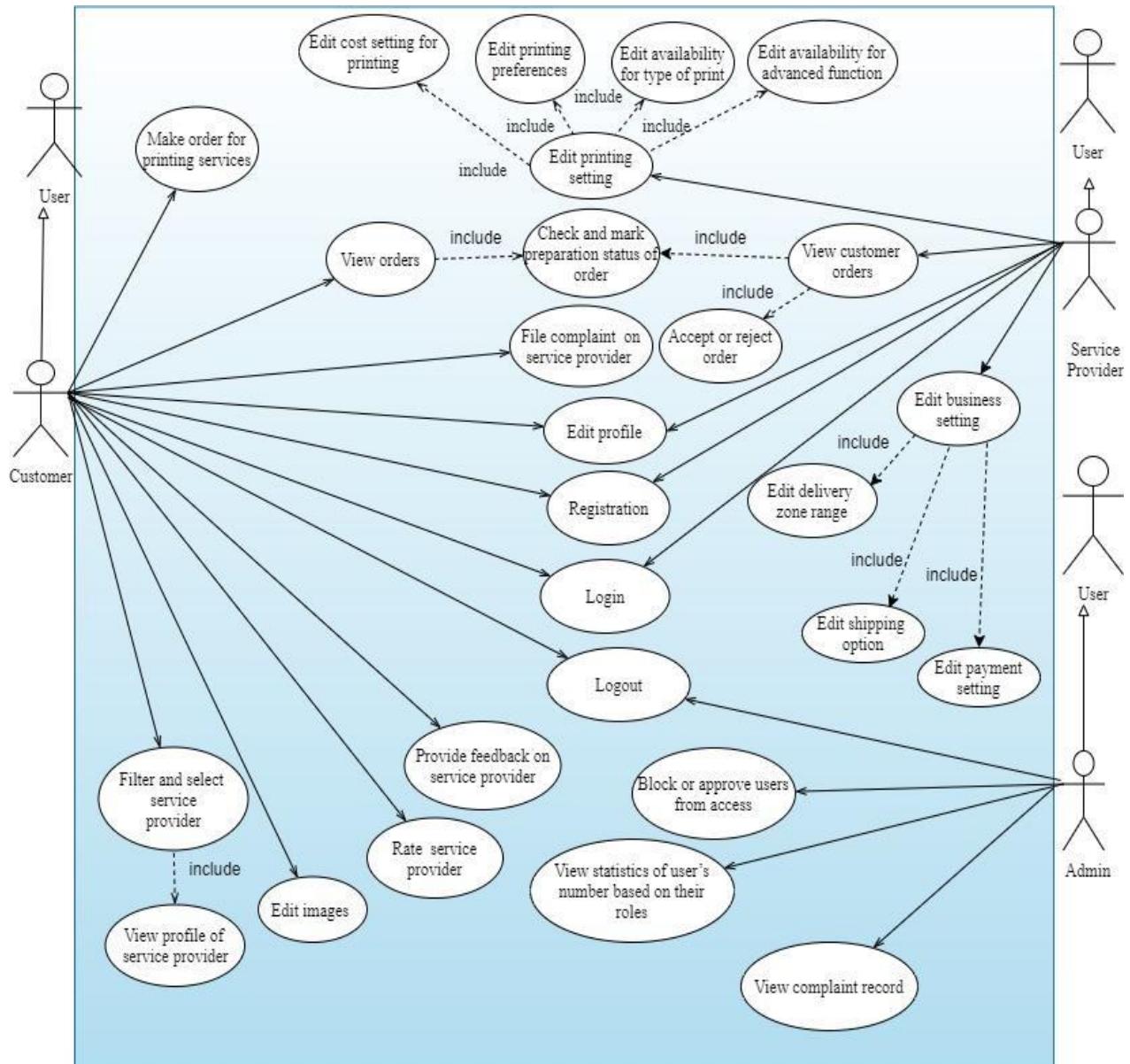


Figure 3-1-1: Use Case Diagram (Part 1).

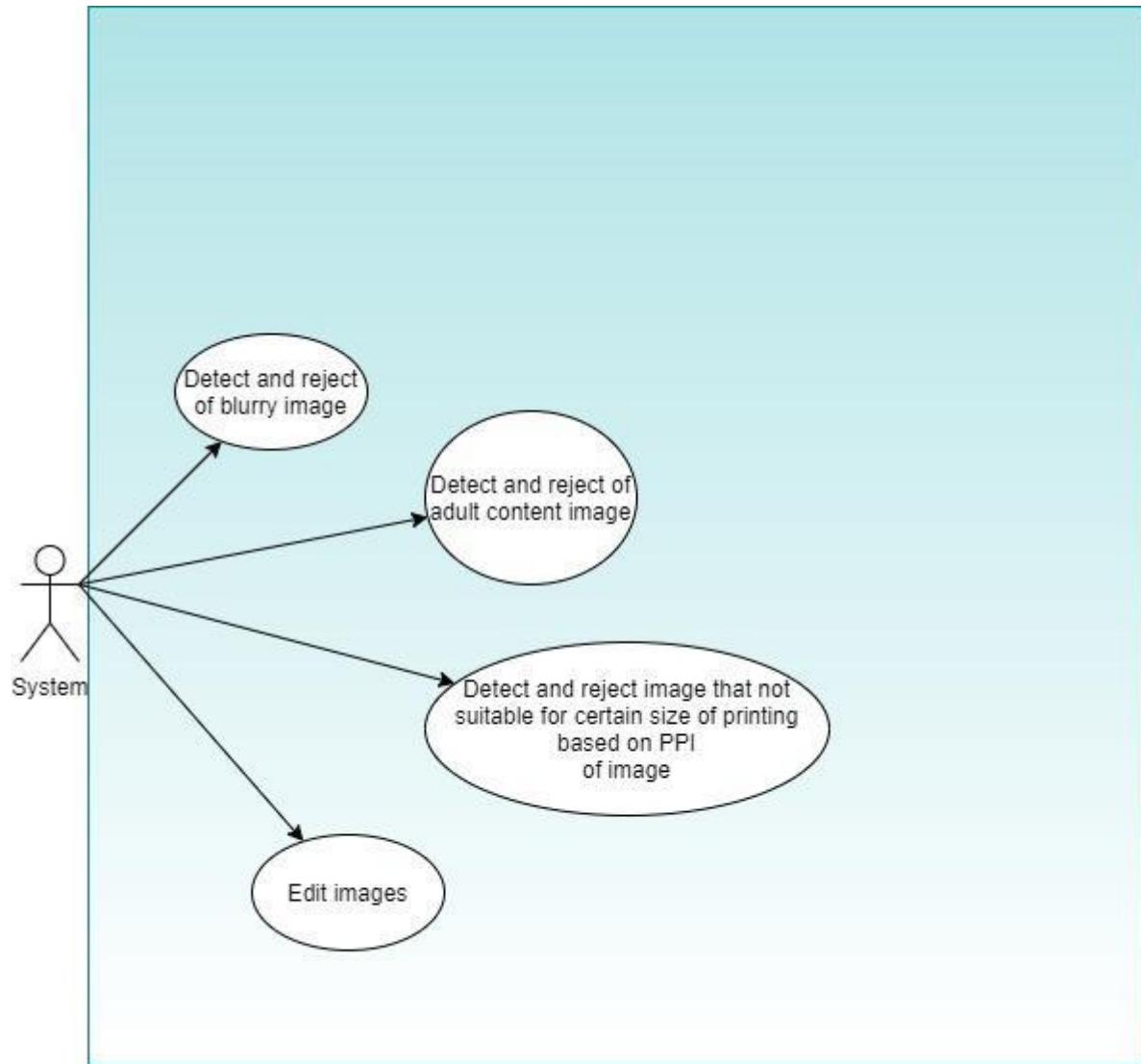


Figure 3-1-2: Use Case Diagram (Part 2).

CHAPTER 3: SYSTEM DESIGN

3.1.1 Use Case Description

Use Cases categorized into 11 main modules.

1) Module for User Authentication

Table 3-1-1-1: Use Case Description for Use Case-Login.

Use Case Name: Login	ID: UC_UA_1
Parent: -	Relation with parent: -
Primary Actor: Customer/Admin/Service provider	
Brief Description: User accesses to their own account by login with correct combination of user-email and password.	

Table 3-1-1-2: Use Case Description for Use Case-Logout.

Use Case Name: Logout	ID: UC_UA_2
Parent: -	Relation with parent: -
Primary Actor: Customer/Admin/Service provider	
Brief Description: Logout from current account.	

Table 3-1-1-3: Use Case Description for Use Case-Registration.

Use Case Name: Registration	ID: UC_UA_3
Parent: -	Relation with parent: -
Primary Actor: Customer/Service provider	
Brief Description: Users can register a new account with the role of customer or service provider.	

2) **Module for Place and View Order.**

Table 3-1-1-4: Use Case Description for Use Case-Make order for Printing Services.

Use Case Name: Make order for printing services	ID: UC_PVO_1
Parent: -	Relation with parent: -
Primary Actor: Customer	
Brief Description: Customer makes orders from selected service provider by selecting the type of printing, upload related files, filling in printing preferences, selecting date and time, payment methods (online payment method via PBE bank transaction, COD), and shipping option (delivery/self-pick up).	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-5: Use Case Description for Use Case-View Customer Orders.

Use Case Name: View customer orders	ID: UC_PVO_2
Parent: -	Relation with parent: -
Primary Actor: Service provider	
Brief Description:	
Service provider views new available customer orders, then reject or accept those orders. If accepted, the service provider was able to view details of orders and download files of orders to be printed.	

Table 3-1-1-6: Use Case Description for Use Case-View Orders.

Use Case Name: View orders	ID: UC_PVO_3
Parent: -	Relation with parent: -
Primary Actor: Customer	
Brief Description:	
Customer views and checks the changes for the preparation status of orders. Customer also must mark the preparation status of order when required.	

Table 3-1-1-7: Use Case Description for Use Case-Check and Mark Preparation Status of Order.

Use Case Name: Check and mark preparation status of order	ID: UC_PVO_4
Parent: View orders, View customer orders	Relation with parent: included
Primary Actor: Customer, Service provider	
Brief Description:	
Customer or service provider marks the preparation status of order when required.	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-8: Use Case Description for Use Case-Accept or Reject Order.

Use Case Name: Accept or reject order	ID: UC_PVO_5
Parent: View orders, View customer orders	Relation with parent: included
Primary Actor: Service provider	
Brief Description: Service provider accepts or rejects new orders.	

3) Module for Filter and Selection of Service Provider

Table 3-1-1-9: Use Case Description for Use Case-Filter and Select Service Provider.

Use Case Name: Filter and select service provider	ID: UC_FS_1
Parent: View customer orders	Relation with parent: included
Primary Actor: Customer	
Brief Description: Customer views list of available service providers that had been filtered based on customer's requirements such as shipping option or printing type.	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-10: Use Case Description for Use Case-View Profile of Service Provider.

Use Case Name: View profile of service provider	ID: UC_FS_2
Parent: Filter and select service provider	Relation with parent: included
Primary Actor: Customer	
Brief Description: Customer selects service provider from list and view the profile of service provider such as name, contract number, email address, name, type of printing services provided.	

4) Module of Create and View Feedback

Table 3-1-1-11: Use Case Description for Use Case-View Feedback.

Use Case Name: Provide feedback on service provider	ID: UC_FB_1
Parent: -	Relation with parent: -
Primary Actor: Customer	
Brief Description: Customers provides feedback for certain service provider and view feedbacks written by other users.	

CHAPTER 3: SYSTEM DESIGN

5) Module of Rating

Table 3-1-1-12: Use Case Description for Use Case-Rate Service Provider.

Use Case Name: Rate service provider	ID: UC_RATE_1
Parent: -	Relation with parent: -
Primary Actor: Customer	
Brief Description: Customer star rated service provider and view average star rating of service provider.	

6) Module of File Complaint

Table 3-1-1-13: Use Case Description for Use Case-File Complaint on Service Provider.

Use Case Name: File complaint on service provider	ID: UC_FC_1
Parent: -	Relation with parent: -
Primary Actor: Customer	
Brief Description: Customer files complaints on service provider	

CHAPTER 3: SYSTEM DESIGN

7) Module for Edit Profile Setting

Table 3-1-1-14: Use Case Description for Use Case-Edit Profile.

Use Case Name: Edit profile	ID: UC_EP_1
Parent: -	Relation with parent: -
Primary Actor: Customer, Service provider	
Brief Description: Customer edits details of their own profile (name, age, address, state, city, phone number, email). Service provider edits details of their own profile (name, age, address, state, city, phone number, email, PBE beneficiary account number).	

8) Module for Edit Printing Setting

Table 3-1-1-15: Use Case Description for Use Case-Edit Printing Setting.

Use Case Name: Edit printing setting	ID: UC_EPS_1
Parent: -	Relation with parent: -
Primary Actor: Service provider	
Brief Description: Adjust the setting of printing services such as set printing preferences setting for certain types of printing, cost setting, availability of advanced features and availability for certain type of printing.	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-16: Use Case Description for Use Case-Edit Cost Setting for Printing.

Use Case Name: Edit cost setting for printing	ID: UC_EPS_2
Parent: Edit printing setting	Relation with parent: Included
Primary Actor: Service provider	
Brief Description: Adjust the cost setting for printing services such as cost per page/cost per photo for document or image.	

Table 3-1-1-17: Use Case Description for Use Case-Edit Availability for Type of Print.

Use Case Name: Edit availability for type of print	ID: UC_EPS_3
Parent: Edit printing setting	Relation with parent: Included
Primary Actor: Service provider	
Brief Description: Set availability for document printing or photo printing.	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-18: Use Case Description for Use Case-Edit Printing Preferences for Certain Type of Print.

Use Case Name: Edit printing preferences for certain type of print	ID: UC_EPS_4
Parent: Edit printing setting	Relation with parent: Included
Primary Actor: Service provider	
Brief Description: Set the setting for printing preferences of certain types of printing.	

9) Module of Advanced Functionalities

Table 3-1-1-19: Use Case Description for Use Case-Detect and Reject Blurry Image.

Use Case Name: Detect and reject blurry image	ID: UC_AF_1
Parent: -	Relation with parent: -
Primary Actor: System	
Brief Description: Detects the blurriness of the image by comparing the value for variance Laplacian of image with a certain baseline. If the image is considered blurry, it will be rejected.	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-20: Use Case Description for Use Case-Detect and Reject Adult Content Image.

Use Case Name: Detect and reject adult content image	ID: UC_AF_2
Parent: -	Relation with parent: -
Primary Actor: System	
Brief Description: Detects and rejects image with adult content.	

Table 3-1-1-21: Use Case Description for Use Case-Detect and Reject Image that not Suitable for Certain Size of Printing Based on PPI of Image.

Use Case Name: Detect and reject image that not suitable for certain size of printing based on PPI of image	ID: UC_AF_3
Parent: -	Relation with parent: -
Primary Actor: System	
Brief Description: Find the resolution of the image and calculate the PPI of the image based on the diagonal of certain size of printing material, image with lower PPI will be rejected.	

Table 3-1-1-22: Use Case Description for Use Case-Edit Image.

Use Case Name: Edit Image	ID: UC_AF_4
Parent: -	Relation with parent: -
Primary Actor: System, Customer	
Brief Description: Customer edits images while the system performs image transformation by converting the image to grayscale or blurry.	

CHAPTER 3: SYSTEM DESIGN

10) Module for Management of Application Activities

Table 3-1-1-23: Use Case Description for Use Case- View Statistics of User's Number Based on Their Roles.

Use Case Name: View statistics of user's number based on their roles.	ID: UC_MAA_1
Parent: -	Relation with parent: -
Primary Actor: Admin	
Brief Description:	
Views the numbers for customers and service provider in a pie chart and table.	

Table 3-1-1-24: Use Case Description for Use Case- Block or Approve Users from Access.

Use Case Name: Block or approve users from access	ID: UC_MAA_2
Parent: -	Relation with parent: -
Primary Actor: Admin	
Brief Description:	
Blocks or grants access for users to access their mobile app accounts.	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-25: Use Case Description for Use Case-View Complaint Record.

Use Case Name: View complaint record	ID: UC_MAA_3
Parent: -	Relation with parent: -
Primary Actor: Admin	
Brief Description: Views complaint records filed by customers.	

11) Module for Edit Business Setting

Table 3-1-1-26: Use Case Description for Use Case-Edit Business Setting.

Use Case Name: Edit business setting	ID: UC_BS_1
Parent: -	Relation with parent: -
Primary Actor: Service provider	
Brief Description: Adjusts the business setting of printing services such as edit delivery zone range, shipping option and payment setting.	

Table 3-1-1-27: Use Case Description for Use Case-Edit Delivery Zone.

Use Case Name: Edit delivery zone range	ID: UC_BS_2
Parent: Edit business setting	Relation with parent: included
Primary Actor: Service provider	
Brief Description: Set the distance in kilometres, with location of the service provider as centre and distance act as radius, delivery zone area in circle shaped is estimated.	

CHAPTER 3: SYSTEM DESIGN

Table 3-1-1-28: Use Case Description for Use Case-Edit Shipping Option.

Use Case Name: Edit shipping option	ID: UC_BS_3
Parent: Edit business setting	Relation with parent: included
Primary Actor: Service provider	
Brief Description: Set the availability of shipping options which are self-pickup and delivery.	

Table 3-1-1-29: Use Case Description for Use Case-Edit Payment Setting.

Use Case Name: Edit payment setting	ID: UC_BS_4
Parent: Edit business setting	Relation with parent: included
Primary Actor: Service provider	
Brief Description: Set the availability of payment options which are online payment via PBE online banking or cash on delivery (COD).	

3.2 Activity Diagrams

3.2.1 Activity Diagram for Use Case-Login

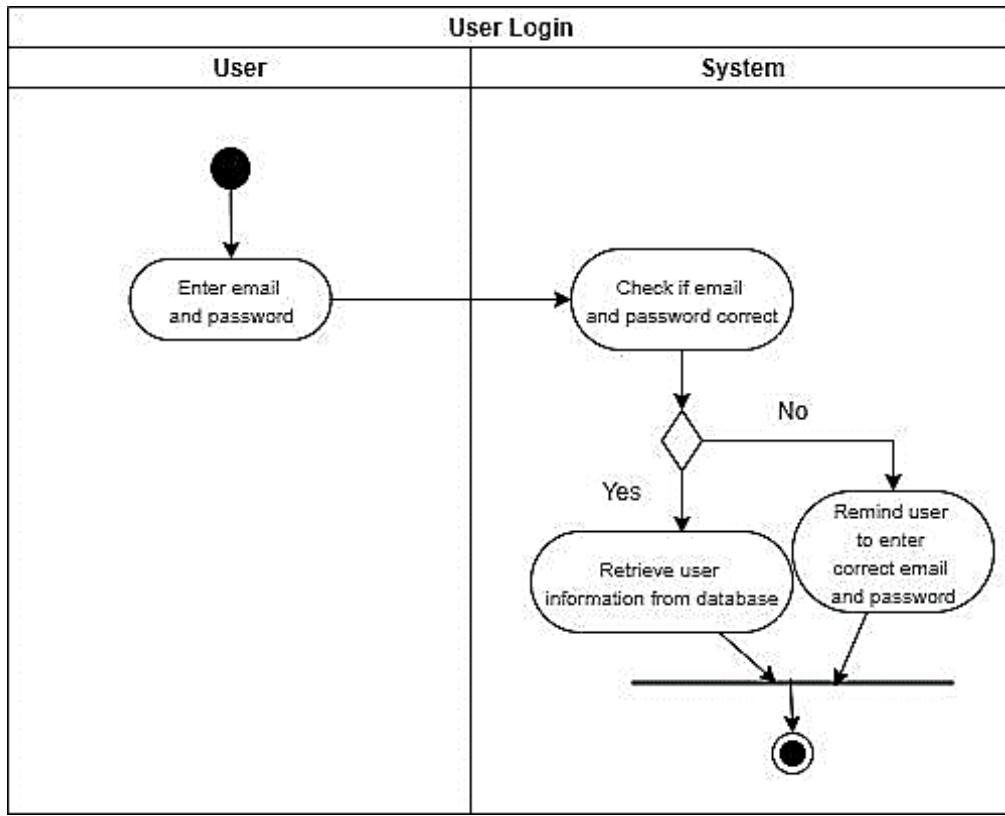


Figure 3-2-1-1: – Activity Diagram for Use Case-Login.

Figure 3-2-1-1 shows activity diagram for use case- login, user logs in to their account by entering their correct email and password. If incorrect email or password was entered, system will remind user to re-enter.

3.2.2 Activity Diagram for Use Case-Registration

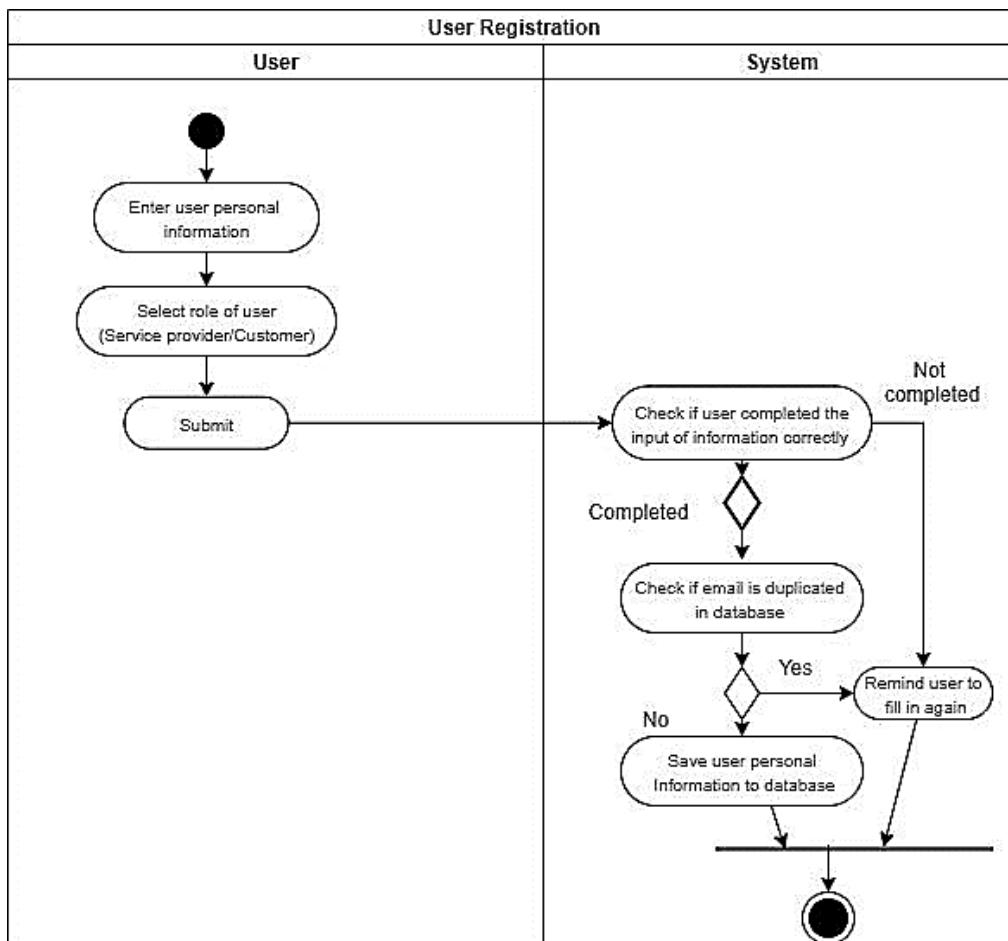


Figure 3-2-2-1: Activity Diagram for Use Case- Registration.

Figure 3-2-2-1 shows the activity diagram for use case-Registration, user could register as customer or service provider by providing their personal information and select role. System will deny any registration using already existed email, empty fill in, invalid address, invalid email, wrong pattern of phone number, wrong pattern of PBE beneficiary number or combinations of passwords or username that do not meet requirements.

3.2.3 Activity Diagram for Use Case-Rate Service Provider

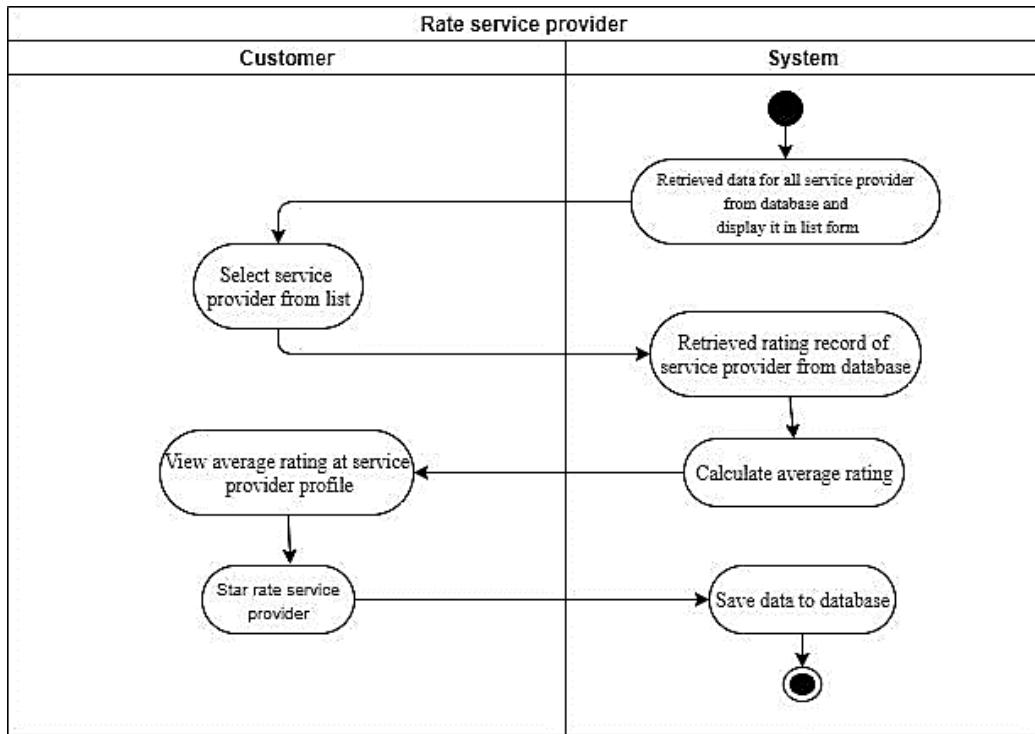


Figure 3-2-3-1: Activity Diagram for Use Case- Rate Service Provider.

Figure 3-2-3-1 shows the activity diagram for use case- rate service provider. Data for all service providers were retrieved from the database and displayed in a list form for customer to select. Customer selects service provider from list, then able to view average star rating earned by selected service provider. Customer can rate service providers by providing values ranging from 1 to 5. New rating records will be saved and updated in the database.

3.2.4 Activity Diagram for Use Case-Provide Feedback on Service Provider

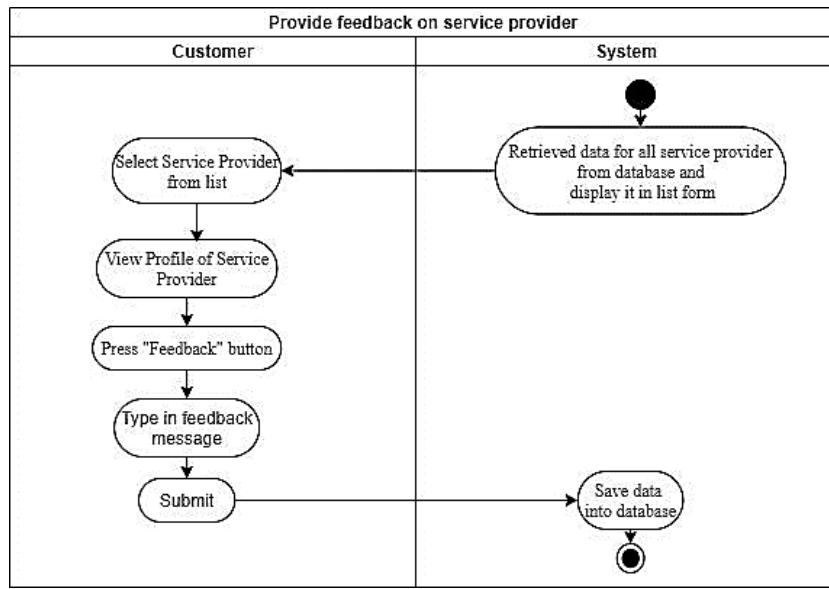


Figure 3-2-4-1: Activity Diagram for Use Case- provide Feedback on Service Provider.

Figure 3-2-4-1 shows the activity diagram for use case – provide feedback on service providers. Data for all service providers are retrieved from the database and displayed in a list form for customers to select. Customer selects service provider from list of service providers, views profile of selected services provider, press “Feedback” button, type in feedback message and submit it to be saved in the database.

3.2.5 Activity Diagram for Use Case-File Complaint on Service Provider

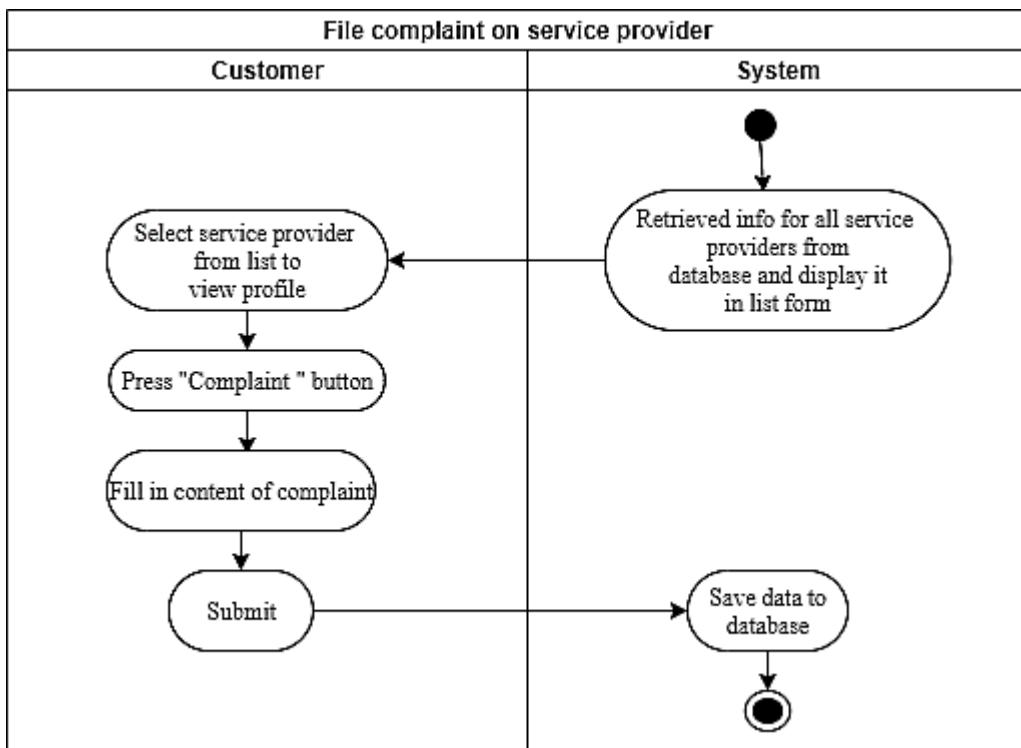


Figure 3-2-5-1: Activity Diagram for Use Case - File Complaint on Service Provider.

Figure 3-2-5-1 shows the activity diagram for use case- file complaint on service provider. Data for all service providers are retrieved from the database and displayed in a list form for customers to select. Customer selects service provider from list and view profile of service provider, then press “COMPLAINT” button on profile page to write complaint message. Eventually, customers press the “SEND” button to forward the complaint message to be saved and created in the database.

3.2.6 Activity Diagram for Use Case-Filter and Select Service Provider

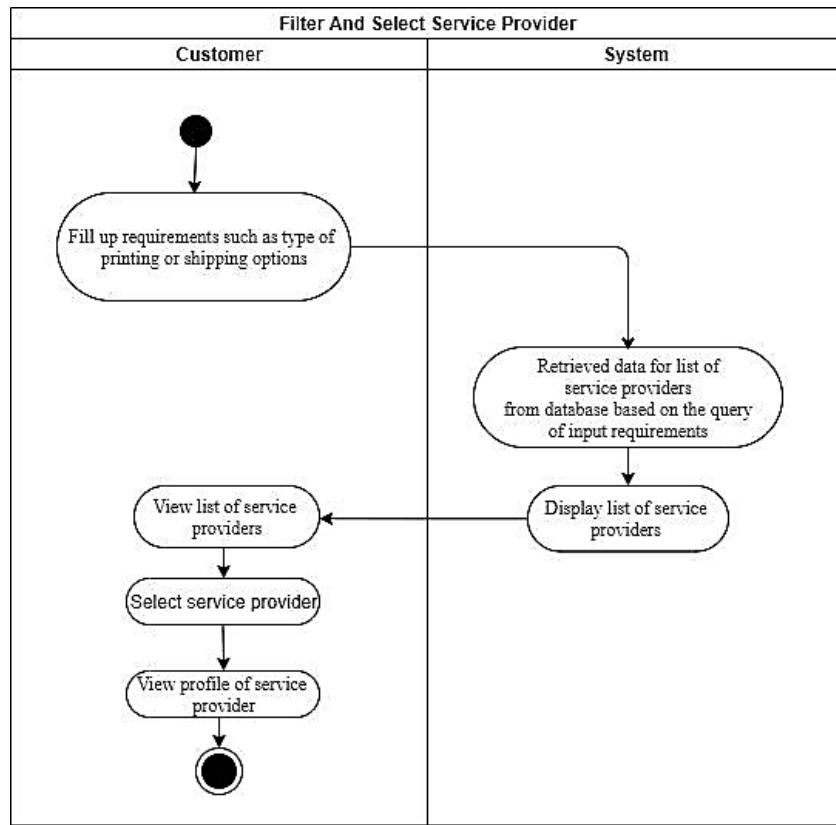


Figure 3-2-6-1: Activity Diagram for Use Case - Filter and Select Service Provider.

Figure 3-2-6-1 shows the activity diagram for use case -filter and select service provider. Customer can filter the list of service providers based on the requirements they have entered such as shipping option and type of printing. System will display a list of service providers which match customer entered requirements. Customer was able to select service providers from the list and views their profile.

3.2.7 Activity Diagram for Use Case-Make order for Printing Services

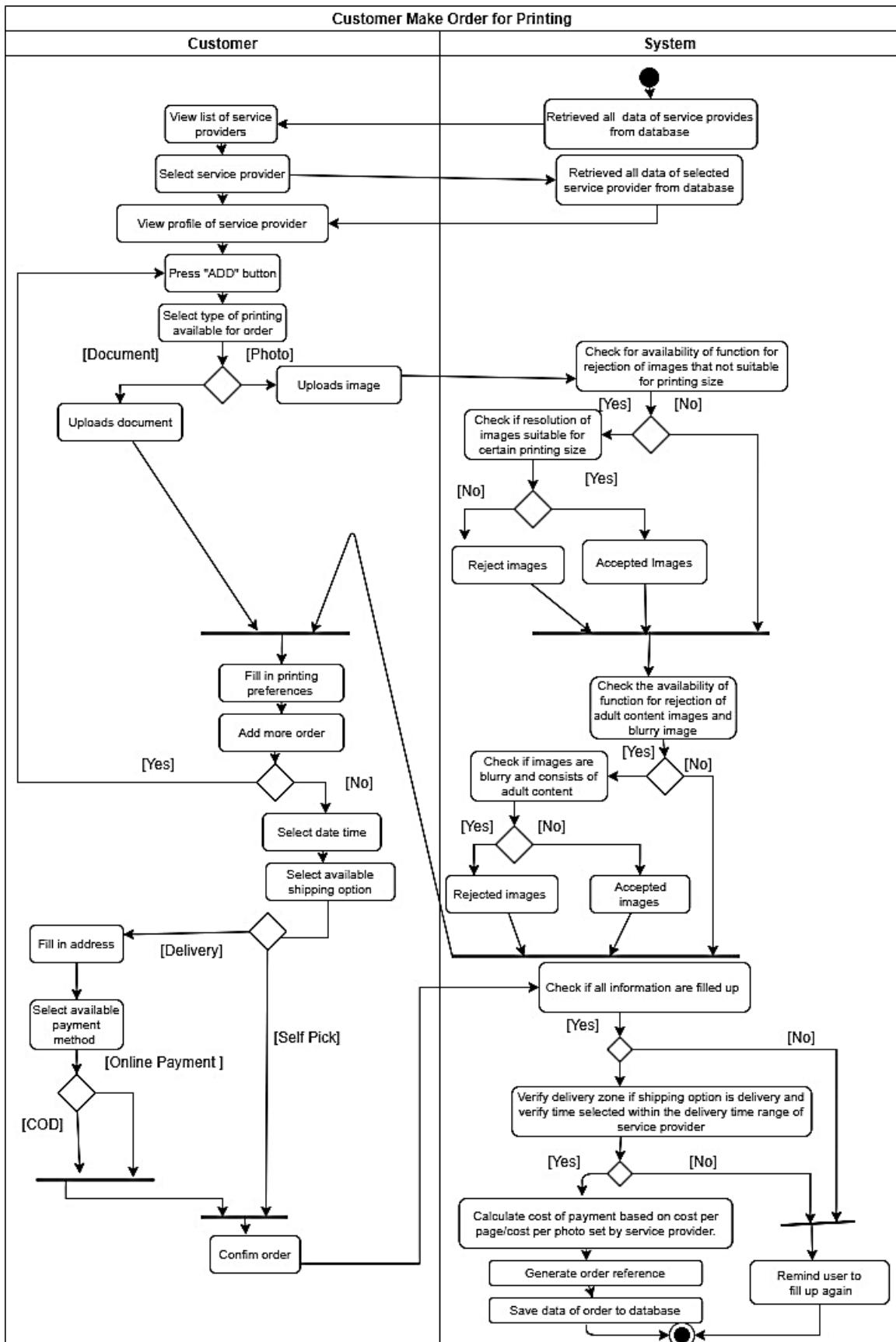


Figure 3-2-7-1: Activity Diagram for Use Case - Make Order for Printing Services.

CHAPTER 3: SYSTEM DESIGN

From figure 3-2-7-1, the system retrieved data from the database for all available service providers who had completed fill up document printing setting or photo printing setting, and business setting. Application displays list of available service providers; user selects a service provider from the list. After that, the system retrieved data for selected service provider from the database, these data included, printing settings, payment settings, shipping options, delivery zone ranges, and profile data of selected service provider. At this point, user can view the profile of selected service provider. To make an order, user presses the “ADD” button, select the type of available printing, upload documents or images. If the selected type of print is photo printing, the system will verify the image through three advanced functionalities where the availability of functions is set by the service provider. These advanced functionalities are rejection of blurry image, rejection of image with adult content and rejection of image with size that is not suitable to be printed on a certain printing size. After that, user required to fill in the printing preference for a certain printing document or photo, this sub-order will be added to cart. After user confirmed with all sub-orders, user presses “CONFIRM” button. Finally, user needs to select date and time, shipping option and payment method. If the shipping option selected is delivery, user is required to fill in the address. After confirms the order by pressing the “ORDER” button, the system will check if all information is filled up. If yes, the system will verify if delivery address is within delivery zone by comparing the calculated distance between delivery address and service provider address with the distance of delivery zone set by service provider. Beside this, system will verify if selected delivery time is within the delivery time range of the service provider. Once verification successful, the system will calculate total cost and unique order reference is generated. Eventually, all data will be stored into the database.

3.2.8 Activity Diagram for Use Case-View Customer Orders

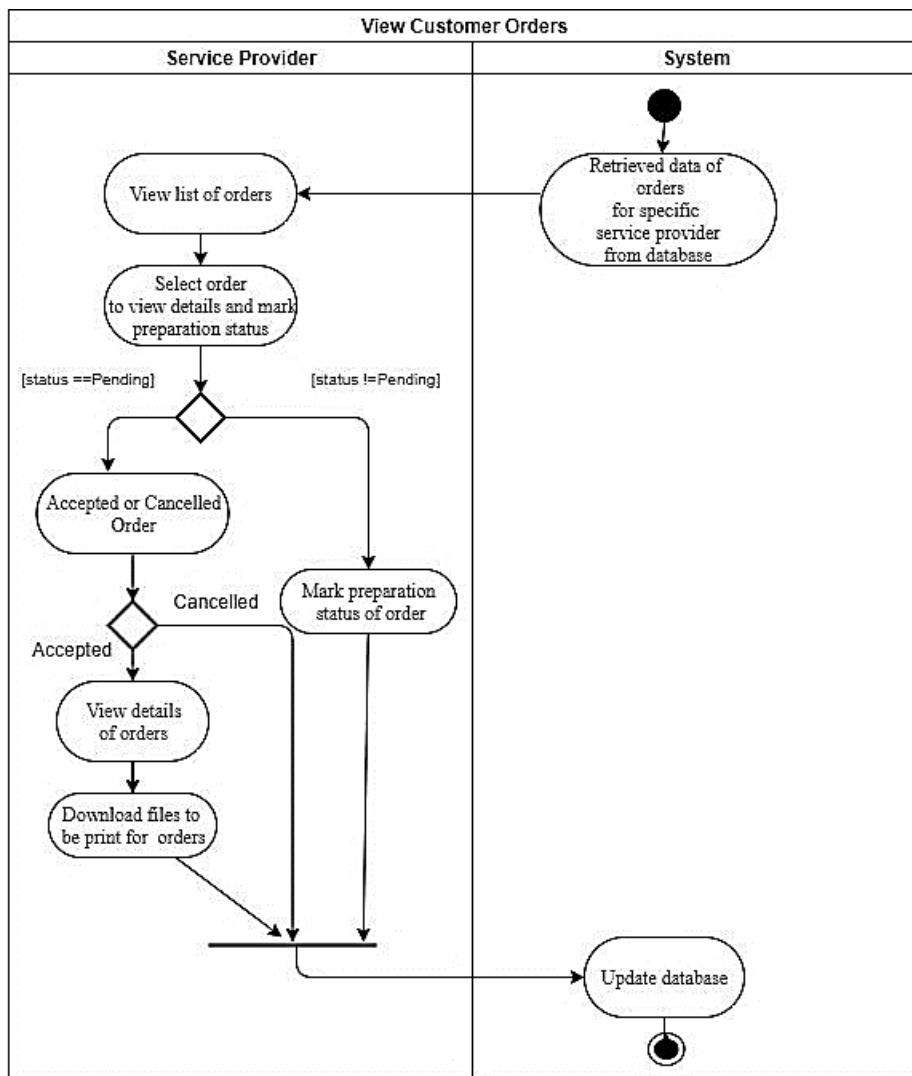


Figure 3-2-8-1: Activity Diagram for Use Case - View Customer Orders.

Figure 3-2-8-1 shows the activity diagram for use case-view customer orders. Service provider views new available customer orders and mark new orders status as “Accepted” or “Cancelled”. If a new order marked as “Accepted”, service provider could download files to be print and new preparation status will be updated in the database. During the preparation of orders, service provider can change the preparation status of order (Accepted/Cancelled, Printed Out, On the Way, Arrived).

3.2.9 Activity Diagram for Use Case-View Orders

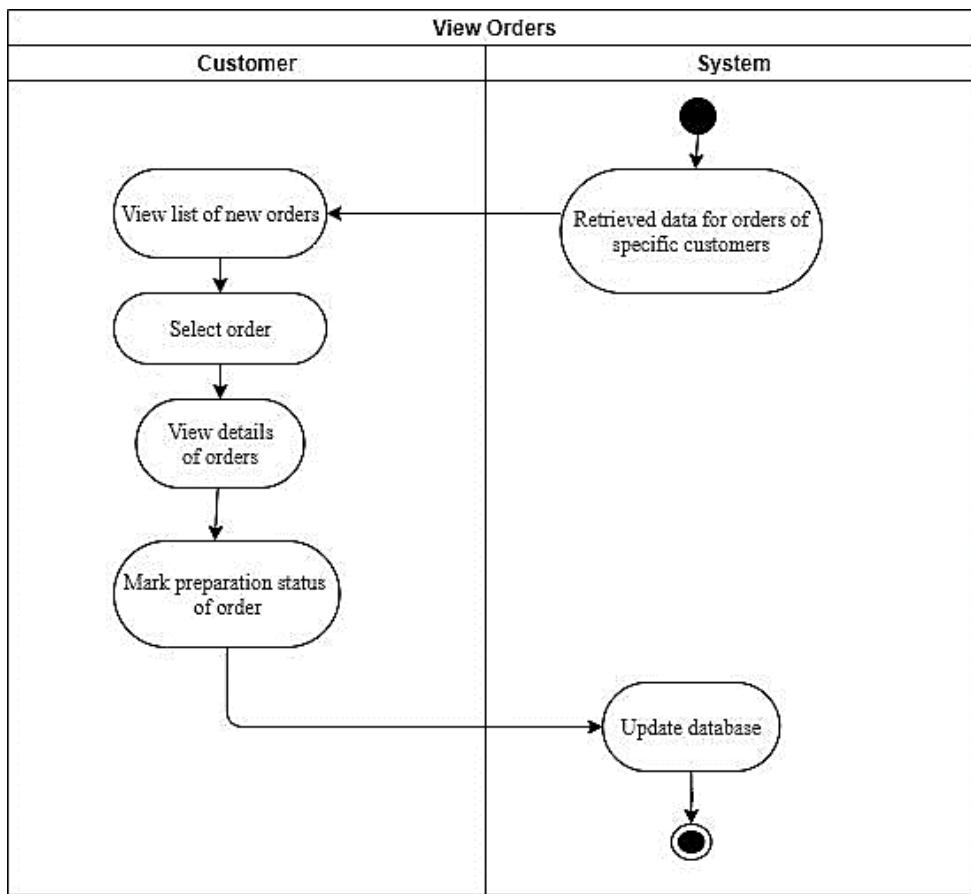


Figure 3-2-9-1: Activity Diagram for Use Case – View Orders.

Figure 3-2-9-1 shows the activity diagram for use case-view orders. Data for orders of specific customer is retrieved from the database and allows customers to view and check the changes for the preparation status of orders. Customers also had to mark the preparation status of order when required. Updated preparation status of order will be stored in database.

3.2.10 Activity Diagram for Use Case-Edit User Profile

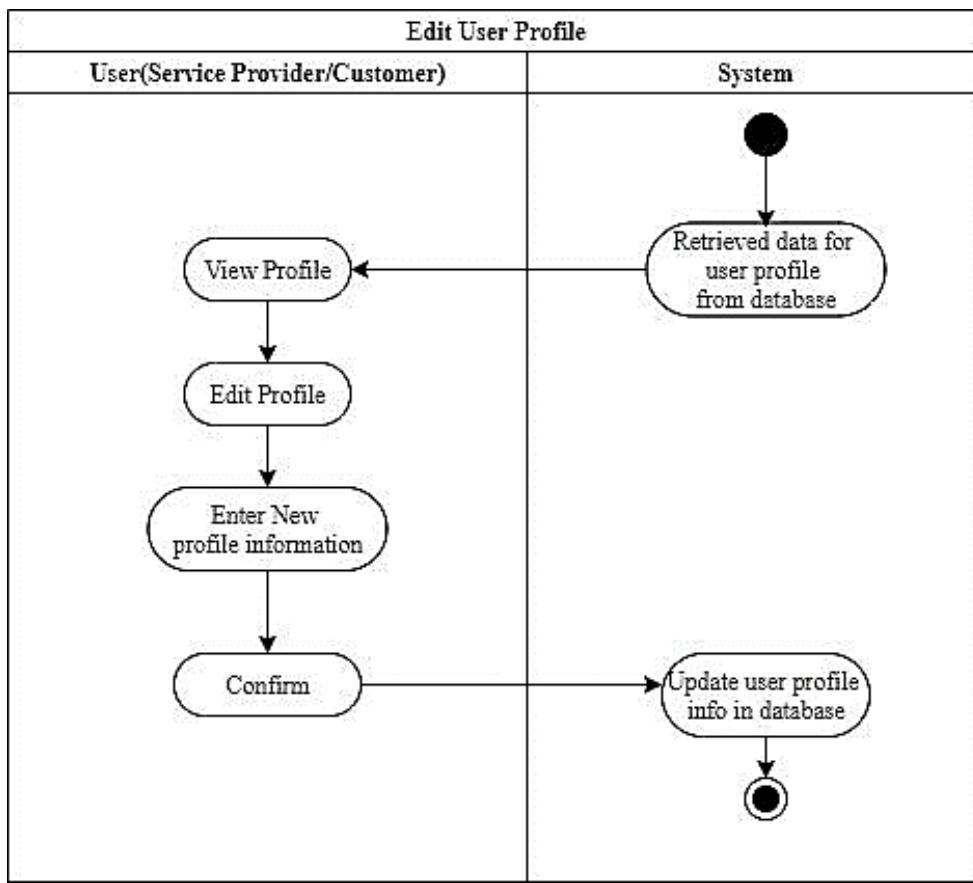


Figure 3-2-10-1: Activity Diagram for Use Case - Edit User Profile.

Figure 3-2-10-1 shows the activity diagram for use case-Edit User Profile. For user with customer role, user updates their profile information (username, password, phone number, email, address location) of the account by entering new information. As for user with service provider role, user updates their profile information (username, password, phone number, PBE beneficiary account number, email, address location) of the account by entering new information.

3.2.11 Activity Diagram for Use Case-View Statistics of User's Number Based on Their Roles.

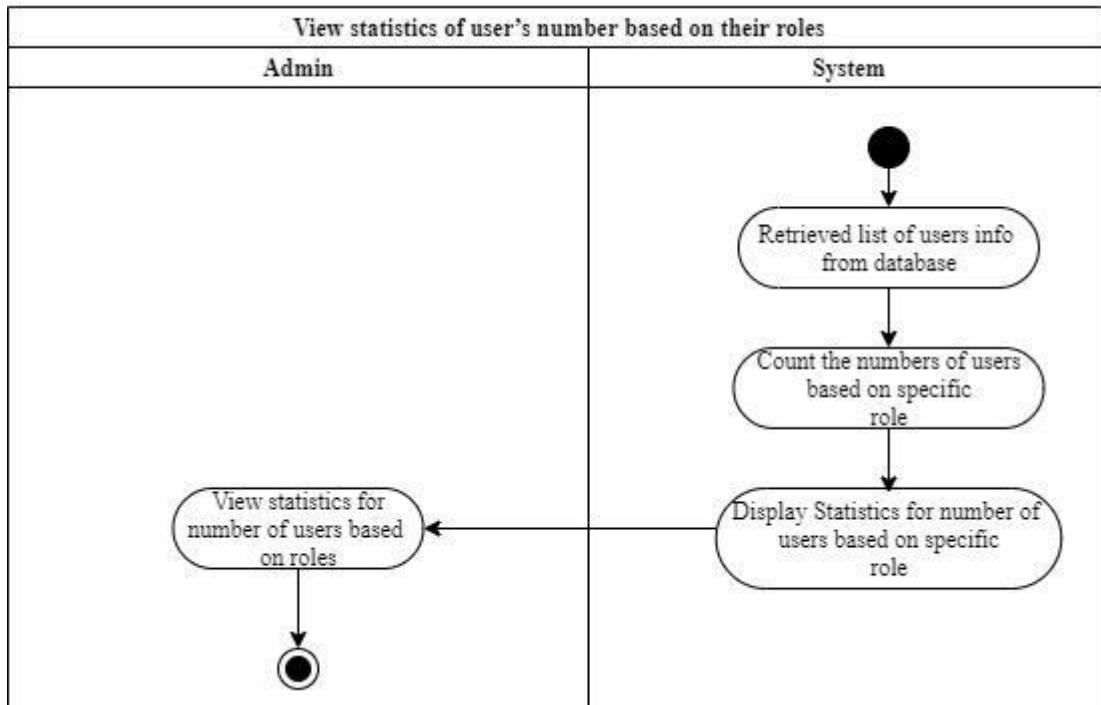


Figure 3-2-11-1: Activity Diagram for Use Case - View Statistics of User's Number Based on Their Roles.

Figure 3-2-11-1 shows the activity diagram for use case- view statistics of user's number based on their roles. System retrieved all information of users from the database, and categorized it based on the user's role. Eventually the system will display statistics for the user's number based on their roles for admin to view.

3.2.12 Activity Diagram for Use Case-Block or Approve Users from Access

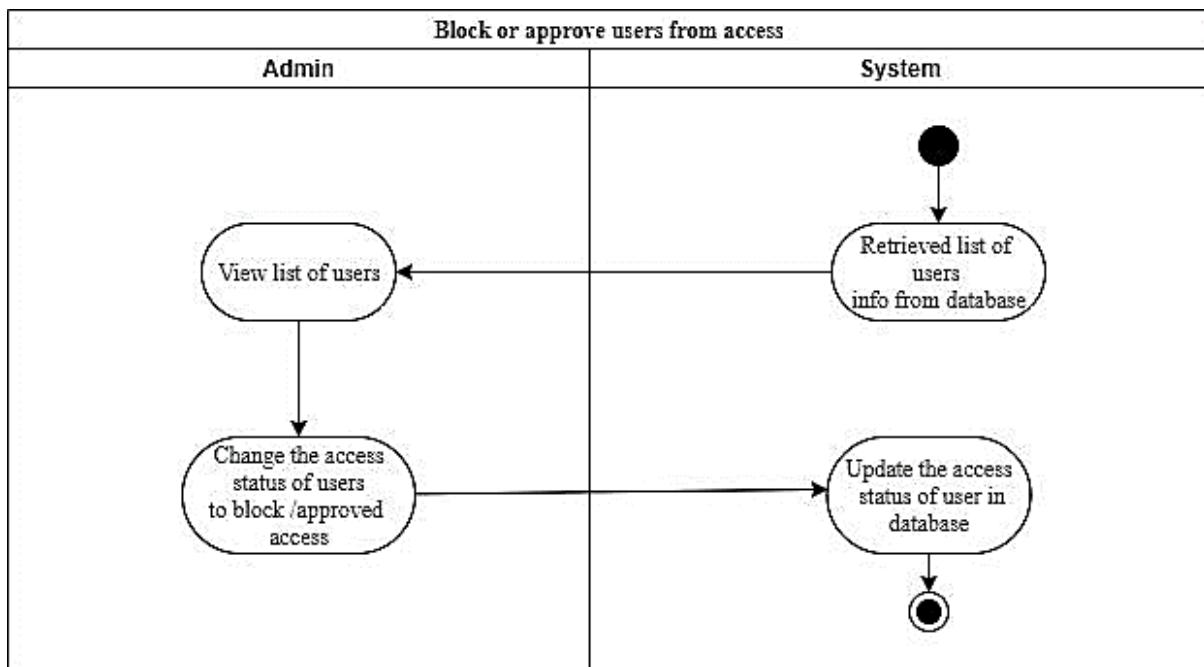


Figure 3-2-12-1: Activity Diagram for Use Case - Block or Approve Users from Access.

Figure 3-2-12-1 shows the activity diagram for use case-block or approve users from access. All data for users were retrieved from the database for admin to view and change the access status of users.

3.2.13 Activity Diagram for Use Case-Edit Printing Setting

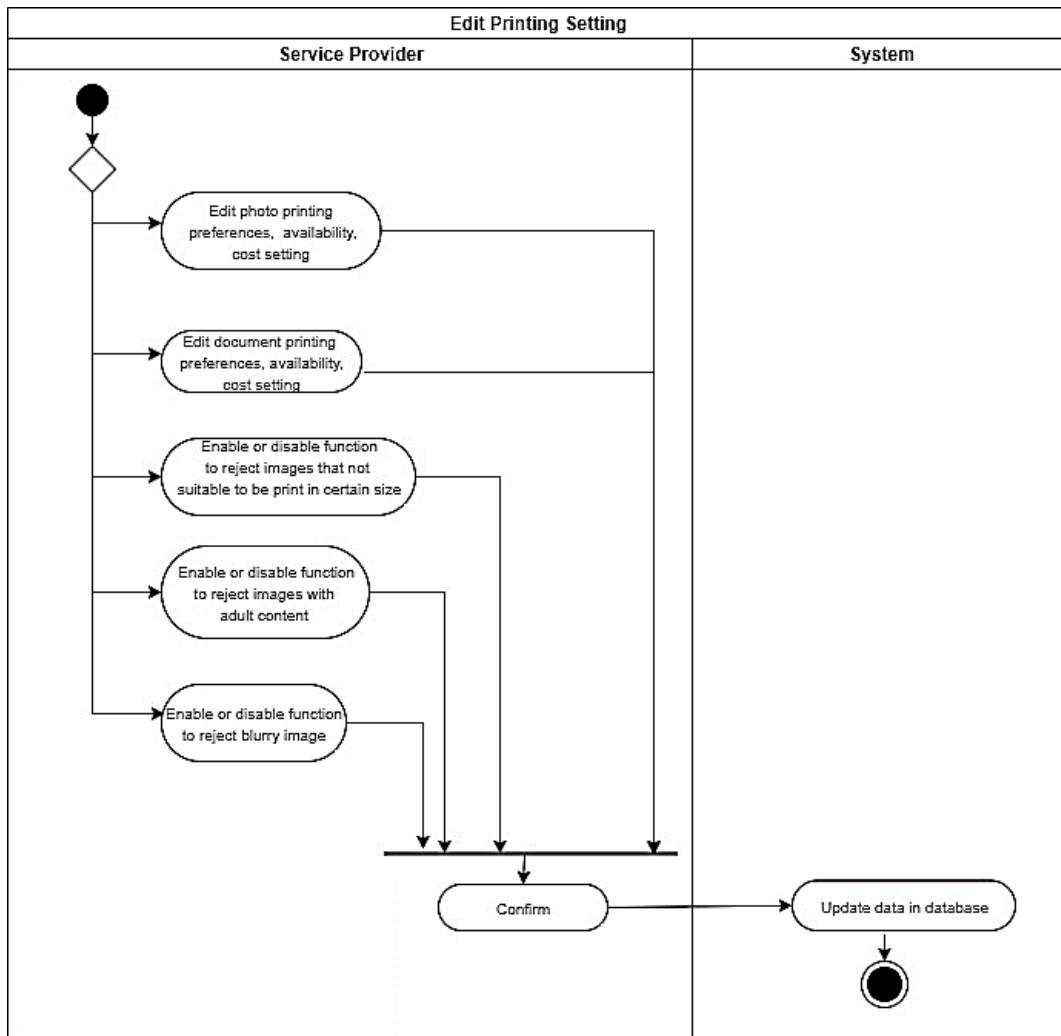


Figure 3-2-13-1: Activity Diagram for Use Case - Edit Printing Setting.

Figure 3-2-13-1 shows the activity diagram for use case- edit printing setting. In this use case, it included edit cost setting, edit availability of advanced features, edit availability for certain type of print, edit printing preferences setting of certain type of printing. For edit cost setting, service provider inputs cost per page/ cost per photo for certain types of printing. Also, service provider can enable or disable availability of document printing or photo printing. Service provider can set the printing preferences of document printing and photo printing. Besides this, service provider enables and disable advanced functionalities which reject blurry images, reject images that are not suitable for a certain printing size and reject images with adult content.

3.2.14 Activity Diagram for Use Case-Edit Business Setting

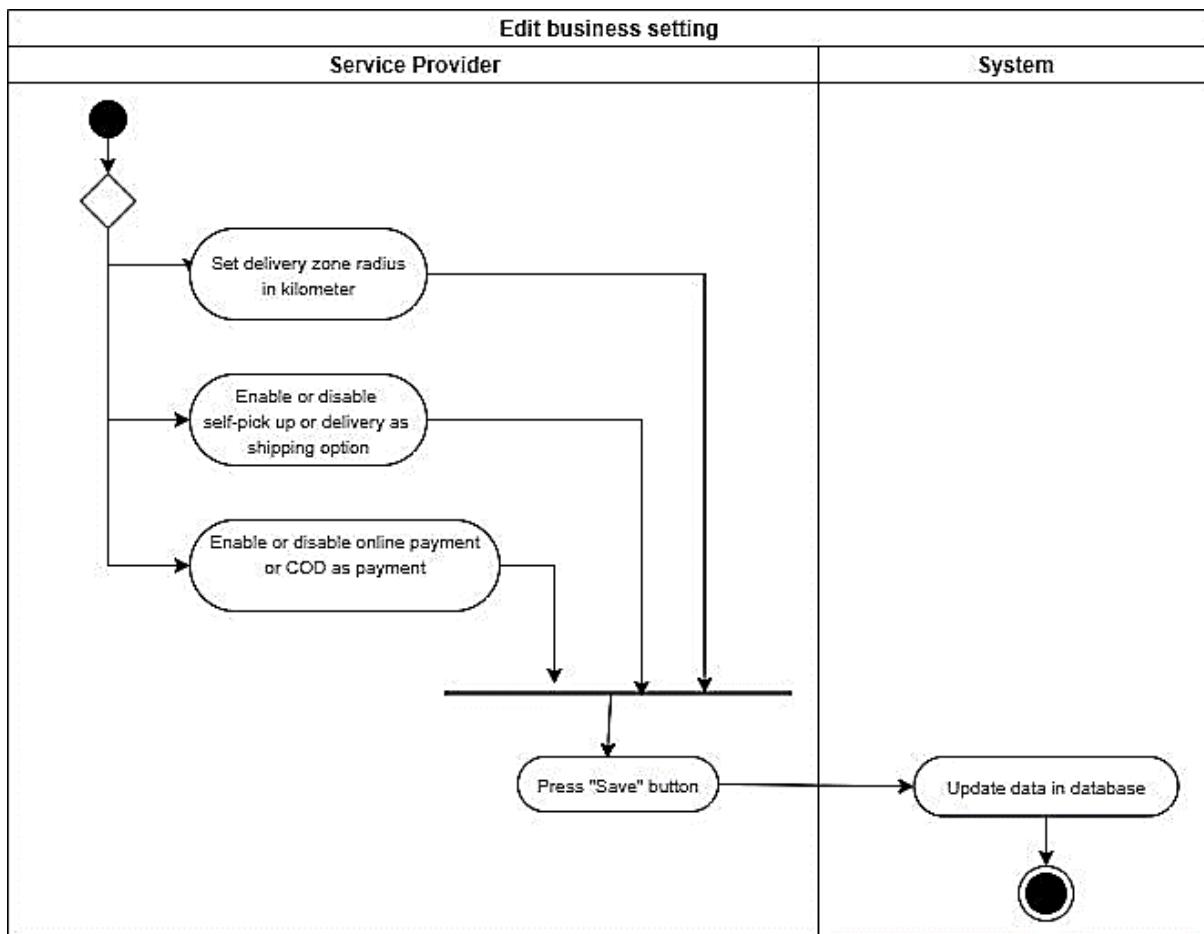


Figure 3-2-14-1: Activity Diagram for Use Case - Edit Business Setting.

Figure 3-2-14-1 shows the activity diagram for use case- edit business setting. In this use case, it included edit delivery zone range, edit shipping options, and edit payment setting. First, for edit delivery zone range, user had to input number which act as radius in km, with service provider location as centre, the delivery area is set in circle shaped. Next, for the edit shipping option, user could mark the checkbox of self-pick up or delivery to enable it as shipping option. As for the edit payment setting, user can mark the checkboxes of online payment via PBE or COD to enable it as payment setting for online printing services.

3.3 Flow Chart Diagram

3.3.1 Flow Chart for Process of Detecting Blurry Image

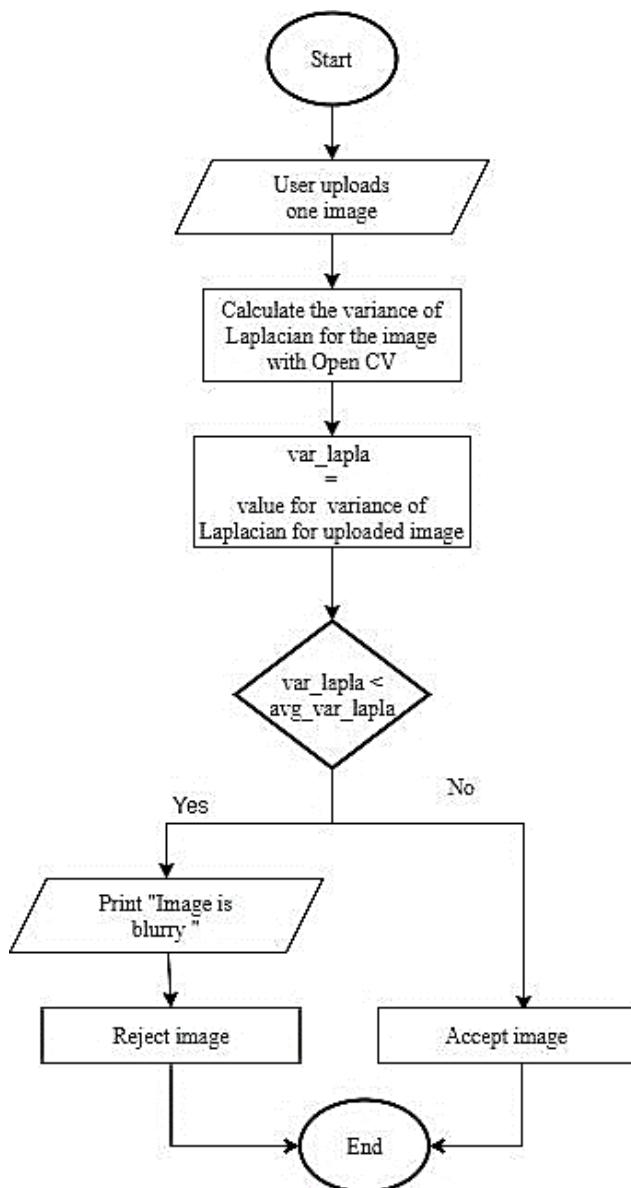


Figure 3-3-1-1: Flow Chart for the Process of Detecting Blurry Images.

Figure 3-3-1-1 shows the flow chart of the process to detect blurry images. To detect if a certain image is blurry, it is by comparing the value for variance Laplacian of uploaded image with the baseline. Baseline here refers to average value for variance of Laplacian for five selected blurry images. If the value for variance of Laplacian of uploaded image was lower than average variance, it is considered blurry. Otherwise, it is considered not blurry. During this process, the variance of the Laplacian of the image is estimated using OpenCV.

3.3.2 Flow Chart for Process of Identifying Suitability of Image to be Printed on a Certain Size of Printing Material Based on PPI

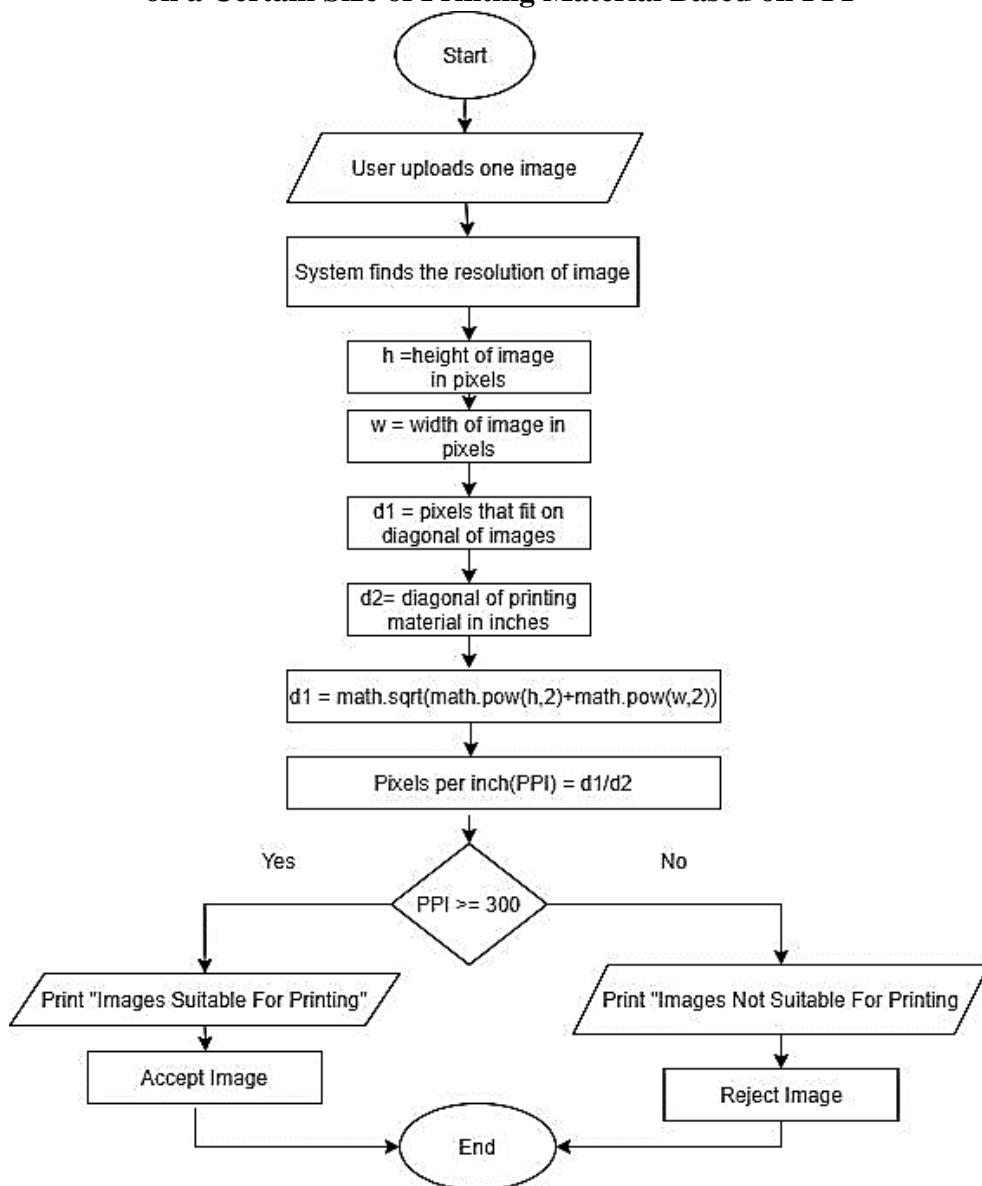


Figure 3-3-2-1: Flow chart for Process of Identifying Suitability of Image to be Printed on a Certain Size of Printing Material Based on PPI.

Figure 3-3-2-1 shows the flow chart of process for identifying suitability of image to be printed on a certain size of printing material based on PPI. First of all, resolution of uploaded images ($\text{width}(w) \times \text{height}(h)$) and diagonal for certain printing size material($d2$) were obtained, then pixels that fit on diagonal of images($d1$) was calculated using formula of " $\text{math.sqrt}(\text{math.pow}(h,2)+\text{math.pow}(w,2))$ " , then PPI was calculated by dividing $d1$ with $d2$. If the value of PPI was lower than 300, the image was considered not suitable to be printed in this printing size.

3.3.3 Flow Chart for Detection of Image with Adult Content

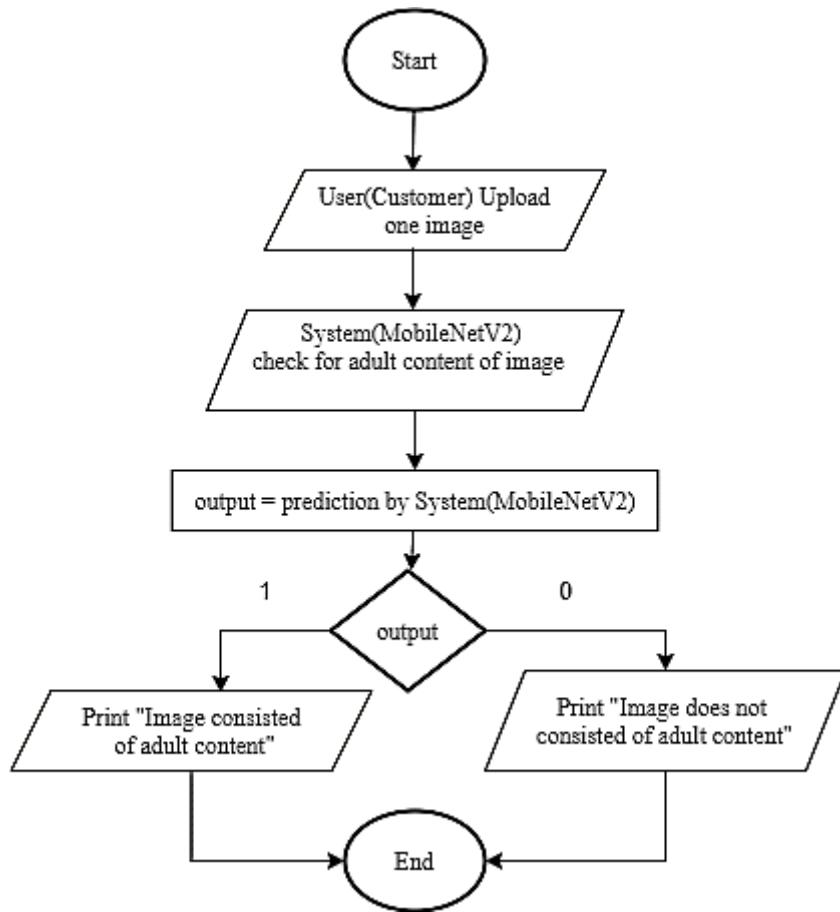


Figure 3-3-3-1: Flow Chart for the Detection of Adult Content in Image.

Figure 3-3-3-1 shows the flow chart for the detection of adult content in image. First, user required to input one image. Next, CNN model- MobileNetV2 which implemented in the system of this mobile app predicts if image consisted of adult content. If the predicted output is “1”, the image is considered an adult content image, on the other hand, if the predicted output is “0”, the image is considered a non-adult content image.

3.4 Sequence Diagrams

3.4.1 Sequence Diagram of Marking Preparation Status for Order in Self-Pick Option

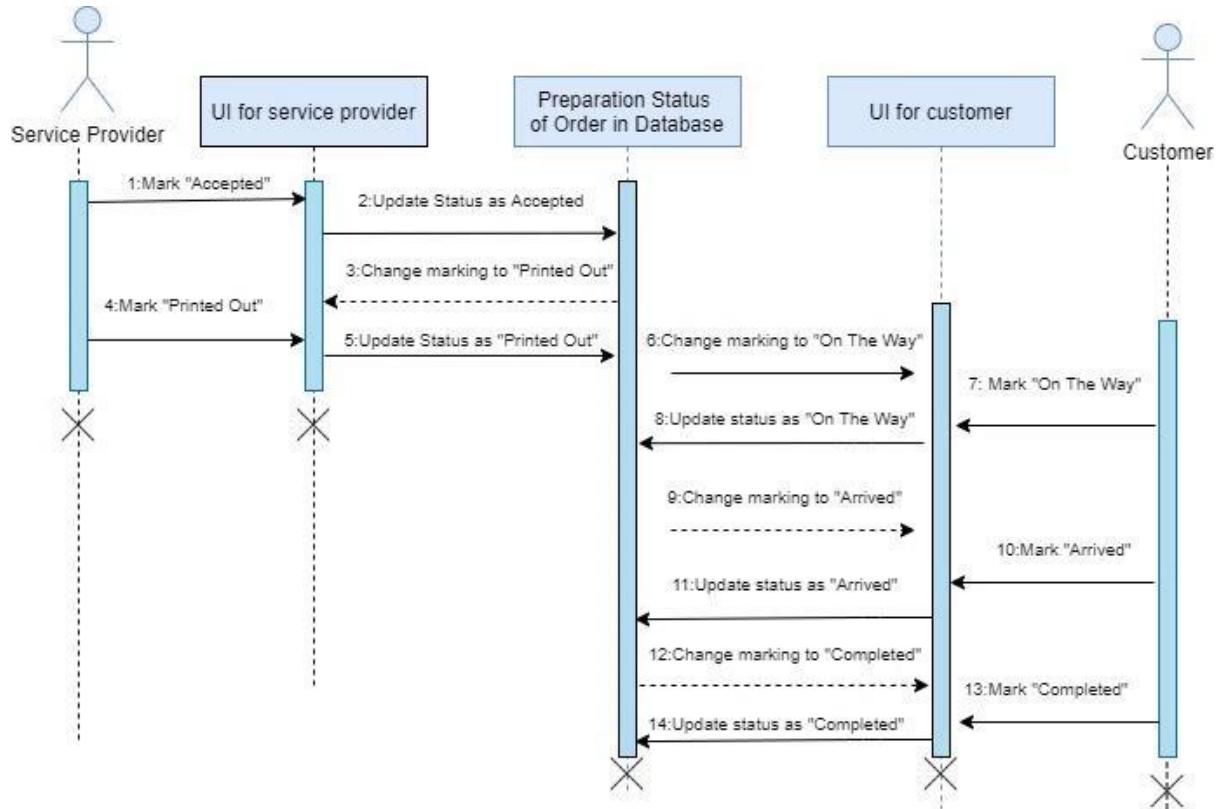


Figure 3-4-1-1: Sequence Diagram of Marking Preparation Status for Order in Self-Pick Option.

Based on figure 3-4-1-1, sequence of preparation status is as follow: “Pending”, “Accepted/Cancelled”, “Printed Out”, “On the way”, “Arrived” and “Completed”.

“Pending” is the initial preparation status for new order. Marking preparation status of order is the responsibility of both customer and service provider. For order in delivery option, a service provider will be required to mark order with the preparation status of “Accepted/Cancelled”, “Printed Out” while customer to mark “On the Way”, “Arrived”, “Completed” for preparation status of order.

3.4.2 Sequence Diagram of Marking Preparation Status for Order in Delivery Option

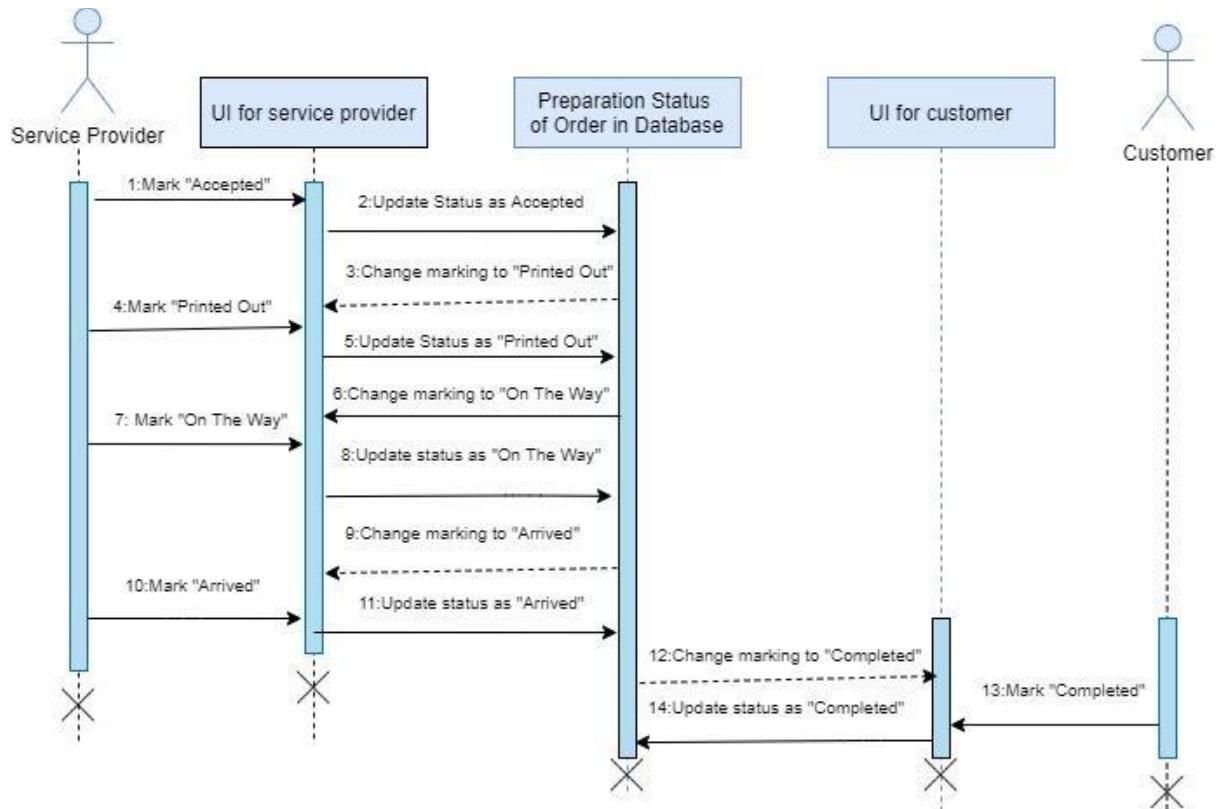


Figure 3-4-2-1: Sequence Diagram of Marking Preparation Status for Order in Delivery Option.

Based on figure 3-4-2-1, sequence of preparation status is as follow: “Pending”, “Accepted/Cancelled”, “Printed Out”, “On the way”, “Arrived” and “Completed”.

“Pending” is the initial status for new order. Marking preparation status of order is the responsible for both customer and service provider. For order in delivery option, a service provider will be required to mark order with the preparation status of “Accepted/Cancelled”, “Printed Out”, “On the Way”, “Arrived” while customer only to mark “Completed” for preparation status of order.

Chapter 4

Methodologies and Tools

4.1 Methodologies

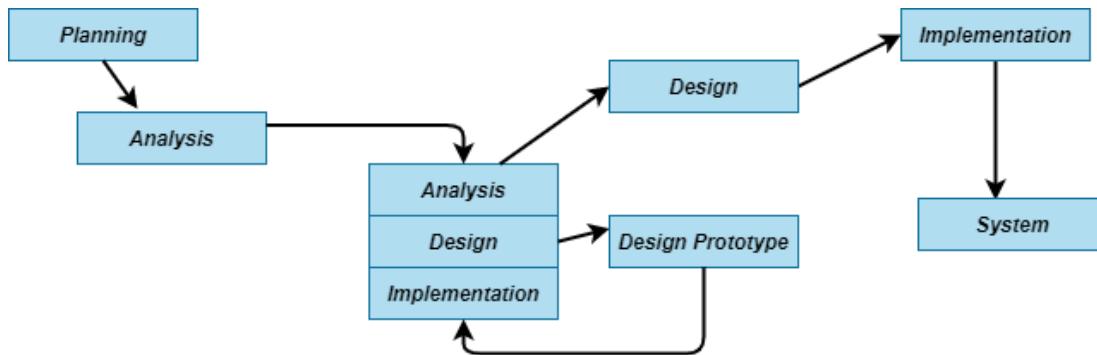


Figure 4-1-1: Diagram of Throwaway Prototyping.

Methodology of system development for this project will be a throwaway prototyping methodology. One of the advantages of this methodology is that any issue arises which not well understood examined by analysing, designing, and building a design prototype during development process, achieving high feasibility. Several design prototypes were developed containing enough details to enable users to understand the issues under consideration. Once all issues are resolved, the project moves into design and implementation.

Throwaway prototyping methodology is considered most suitable for this project development as it saves time, fast, flexible, more quickly provides a system to users and quickly refine real requirements.

Planning Phase: Make an appointment with the supervisor to discuss the title and search for some related information. Identify problem statements and motivation, project scope, project objectives and make sure it is achievable within time. Besides this, software and hardware involved are identified and listed out.

Analysis Phase: Perform research on similar online digital printing mobile applications which downloaded from Google Play Store, related API, and related articles. Verbally perform surveys on university friends to understand user requirements for online printing services. Search for local online digital printing service and perform research to identify business flow of it.

CHAPTER 4: METHODOLOGIES AND TOOLS

Design Phase: List out user requirements for online printing service of all parties, define and draw out certain diagrams such as user case diagram, ERD of database, activity diagrams, flow charts and sequence diagrams.

Implementation Phase: Build up the system through setting up database and proposed application, regularly perform debugging and user testing.

Analysis, Design, and Implementation phases concurrently repeated to create a new design prototype based on new requirements.

Eventually, when all issues are solved, and mobile app is created. Then, it will proceed to the last two phases, final design, and implementation in mobile phones.

4.2 Tools to Use

4.2.1 Hardware

Table 4-2-1-1: Specifications of Laptop.

Description	Specifications
Model	ACER ASPIRE 3 A315-53-36L1
Processor	Intel Core i3-8130U
Operating System	Windows 10
Graphic	Intel HD Graphics
Memory	4GB DDR4 + 16GB Optane Memory
Storage	1TB HDD

Table 4-2-1-2: Specifications of Physical Device-Smartphone.

Description	Specifications
Model	Samsung Galaxy J7
Dimension	152.2 x 78.7 x 7.5 mm (5.99 x 3.10 x 0.30 in)
Operating System	Android 6.0.2
RAM	2GB
Storage	16GB

CHAPTER 4: METHODOLOGIES AND TOOLS

4.2.2 Software

Android Studio

Android studio is an integrated development environment for Google's Android operating system mobile application. Version of Android Studio used in this project is 4.1.0 and JAVA programming language is selected.

Google Colaboratory

Google Colaboratory is a free Jupyter notebook environment running wholly in the cloud. It was well suited to deep learning, machine learning and data analytics. Deep learning models such as CNN can be built using Google Colaboratory. Python is the main programming language used in Google Colaboratory for this project.

Android Emulator:

Android Emulator is one of the tools in Android Studio that creates virtual Android devices to run mobile applications.

Table 4-2-2-1: Specifications of Android Emulator.

Description	Specifications
Target	google_apis [Google APIs] (API level 21)
SD Card	512 M
CPU/MBI	Google APIs Intel Atom (x86_64)
Skin	pixel_2

Firebase Storage:

Firebase Storage is an object storage service which can be accessed via Google Cloud Platform. It can be used to store documents or images uploaded from mobile apps. Besides this, documents or images can be retrieved from firebase storage.

XAMPP

XAMPP is a cross-platform web server, which helps developers to create and test their programs on a local webserver. Some of the services provided by XAMPP are phpMyAdmin and MYSQL. Version of XAMPP used in this project is 3.2.4.

CHAPTER 4: METHODOLOGIES AND TOOLS

MYSQL

MYSQL is an open-source relational database management system which is used to set up databases. Version of MYSQL used in this project is MariaDB 10.4.14.

phpMyAdmin

phpMyAdmin is an open-source administration tool for MySQL and MariaDB. Version of phpMyAdmin used in this project is 5.0.2.

000webhost

000webhost is an online platform which provides web host services with cPanel, phpMyAdmin and MYSQL.

PyTorch Mobile

PyTorch Mobile is a framework which assists mobile developers embed PyTorch Machine Learning Models to Torch Script format and eventually allow it to run directly inside any IOS or Android applications.

4.2.3 Libraries

Open CV

Open CV is an open-source library which is widely used in developing real-time computer vision. Version of OpenCV SDK used in this project is OpenCV 4.1.0 (android). It is integrated into Android Studio for development of proposed application functions such as transforms image to grayscale or blurry and calculate value for variance of Laplacian for images.

JSON

JSON is a Java library implemented in android studio. It can be used to serialize Java objects to JSON and deserialize JSON back to Java objects.

CHAPTER 5

User Requirements and System Architecture

5.1 User Requirements

I. Roles of Users:

1. Customer – User who uses online digital printing service.
2. Service Provider - User who provides online digital printing service.
3. Admin – User who is authorized to manage activities occur in mobile app platforms.

II. Customer Requirements:

1. Customer should be able to filter and select service providers from a list based on their requirements.
2. Customer should be able to select the type of printing for an online printing service.
3. Customer should be able to upload documents or images for online printing purposes and fill in desired printing preferences.
4. Customer should be able to view their orders and preparation status of order.
5. Customer should be able to provide feedback and rate service providers.

III. Service Provider Requirements

1. Service provider should be able to reject or accept orders from customers.
2. Service provider should be able to mark preparation status for the orders of customers.
3. Service provider should be able to view details of orders from customers.
4. As a service provider, I want my mobile app to automatically detect and reject blurry images, images with adult content or images that are not suitable to be printed on a certain size of printing.

IV. Admin Requirements

1. Admin should be able to view the number of users based on their specific role.
2. Admin should be able to block or approve certain users from login to mobile apps.
3. Admin should be able to view a list of complaint record files by customer on specific service provider.

5.2 System Requirements

I. Functional Requirements:

1. The system shall allow users to register and insert registration data into the database.
2. The system shall allow users to make orders for printing services and insert order data into the database.
3. The system shall allow users to view their orders with the preparation status of the order.
4. The system shall allow users to update order preparation in database.
5. The system shall allow user to insert reviews and rating data into the database.
6. The system shall allow users to view reviews and ratings.
7. The system shall detect if the uploaded image is blurry, consists of adult content or does not match the PPI of the image.
8. The system shall provide passing arguments and run PHP script as web request, finally return JavaScript Object Notation (JSON) as the result of the web request.

II. Non-Functional Requirements

1. The system shall be able to exit gracefully without any error.
2. The system shall be able to respond effectively with given user action.
3. The system shall detect if the uploaded image is blurry, consists of adult content or does not match the PPI of the image within 30 seconds.

5.3 System Architecture Design

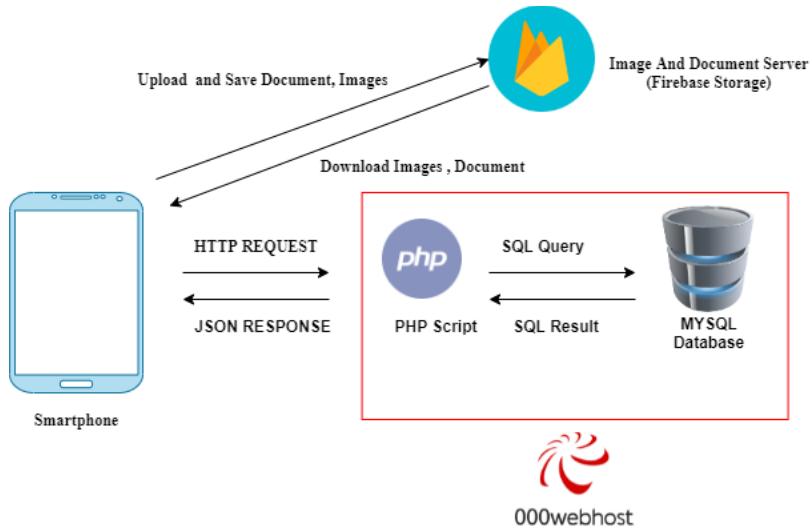


Figure 5-3-1: System Architecture Diagram.

For this project, firebase storage acts as storage for documents and images. Documents or images can directly upload or download from firebase storage from a smartphone.

000webhost acts as a web host server which provides several services, some of the services used in the project are cPanel, MySQL, phpMyAdmin. Database is built in MySQL and managed under phpMyAdmin. PHP scripts used to set connection between mobile app and MySQL database, mobile app sent HTTP request for PHP scripts to perform SQL query on database, eventually, JSON response is sent back to mobile app.

All PHP scripts are in a file manager of 000webhost, under a folder named “public-html”. Each PHP script named in the format of “CRUD_<user role>_<actions>”. In each PHP script, there are two `$_POST` global variables with the name of “action” and “data ” to collect an array of variables passed to the current script via the HTTP POST method from a mobile application. “action” refers to an action that needs to be performed on a database – create, read, update and delete while “data” refers data in JSON format created by application. For the storage of file in firebase storage, each uploaded image or document are stored in a folder named uniquely with the format of “<order_id>@<sub_order_id>@<resources_id>”, refer to the row of tables from MYSQL database and placed inside folder named “Document of printer ” under main folder - “FYP”.

During the early phase for development of mobile app, XAMPP acts as a local web server where all PHP scripts and MySQL databases are located. After finished development of the mobile app, all PHP scripts and SQL script are transferred to 000webhost.

5.4 Entity Relation Diagram (ERD) of Database

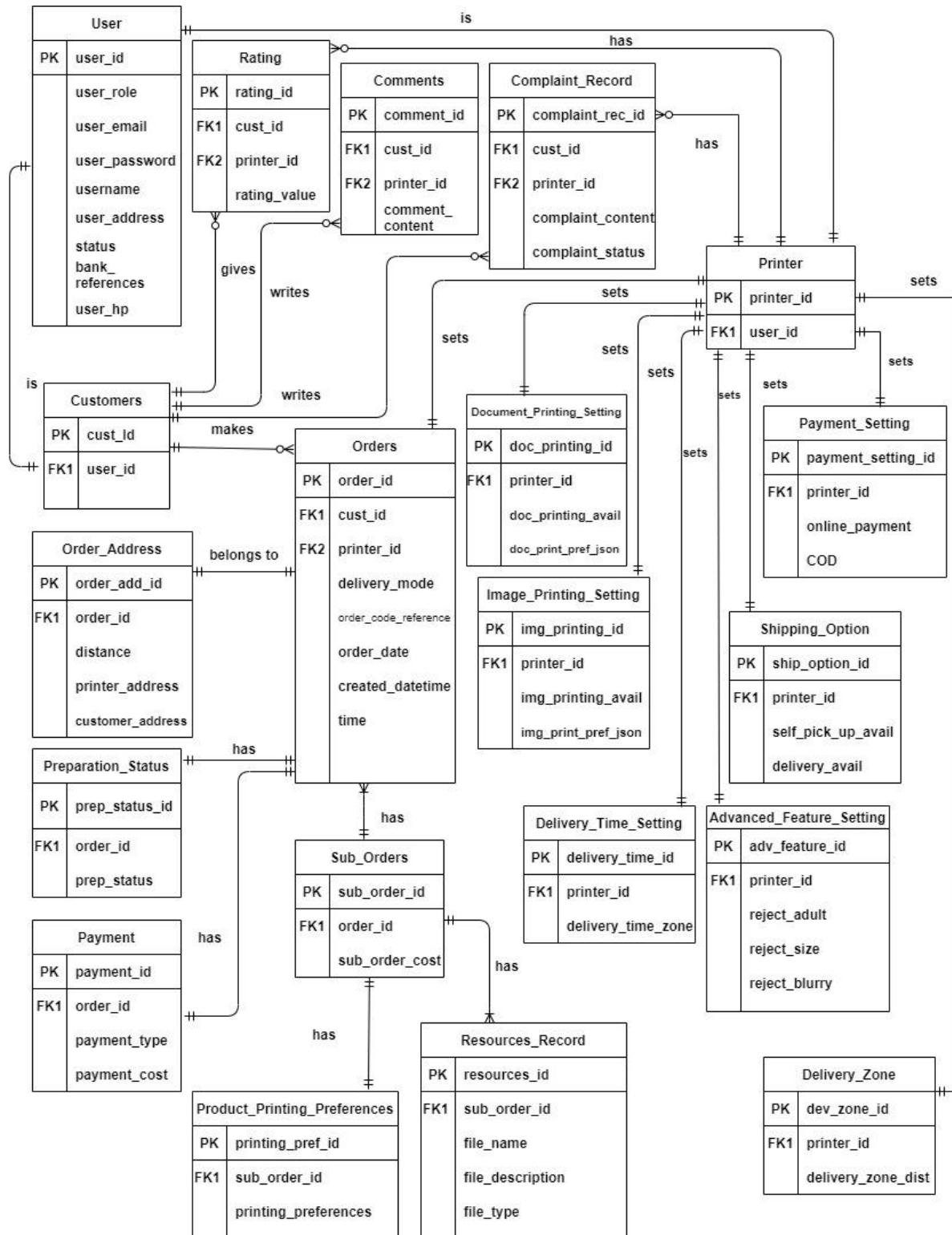


Figure 5-4-1: Entity Relation Diagram (ERD) of Database.

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

5.5 Data Dictionary of ERD

Table 5-5-1: Data Dictionary of User Table.

Column Name	Description	Data Type	Size	Null	PK/ FK	Reference to	Sample data
user_id	User ID	Int	8	No	PK	-	1
user_role	Role of User	Varchar	8	Yes	-	-	customer/ printer/admin
user_email	Email of user	Varchar	255	Yes	-	-	wankarhou@gmail.com
username	Name of User	Varchar	255	Yes	-	-	Wan Kar Hou
user_address	Address of User	Varchar	500	Yes	-	-	53,Bandar Baru,31900,Kampar,Perak
user_hp	Phone number of user	Varchar	255	Yes	-	-	012-5635843
bank_references	Beneficiary account number of PBE	Varchar	255	Yes	-	-	6900573451
status	Access status of user	Varchar	255	Yes	-	-	Blocked/Approved

Table 5-5-2: Data Dictionary of Customer Table.

Column Name	Description	Data Type	Size	Null	PK/ FK	Reference to	Sample data
cust_id	Customer ID	Int	11	No	PK	-	1
user_id	User ID	Int	11	No	FK	User	1

Table 5-5-3: Data Dictionary of Printer table

Column Name	Description	Data Type	Size	Null	PK/ FK	Reference to	Sample data
printer_id	Printer ID	Int	11	No	PK	-	1
user_id	User ID	Int	11	No	FK	User	1

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

Table 5-5-4: Data Dictionary of Comments Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
comment_id	Comment ID	Int	11	No	PK	-	1
cust_id	Customer ID	Int	11	No	FK	Customer	1
printer_id	Printer ID	Int	11	No	FK	Printer	1
comment_content	Content for customer comment on certain printer	Varchar	255	No	-	-	Nice services

Table 5-5-5: Data Dictionary of Rating Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
rating_id	Rating ID	Int	11	No	PK	-	1
cust_id	Customer ID	Int	11	No	FK	Customer	1
printer_id	Printer ID	Int	11	No	FK	Printer	1
rating_value	Value of rating	Int	5	No	-	-	0/1/2/3/4/5

Table 5-5-6: Data Dictionary of Complaint Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
complaint_rec_id	Rating ID	Int	11	No	PK	-	1
cust_id	Customer ID	Int	11	No	FK	Customer	1
printer_id	Printer ID	Int	11	No	FK	Printer	1
complaint_content	Content of complaint	Varchar	255	No	-	-	This service provider just scammed me.
Complaint_status	Status of complaint read by admin	Varchar	255	No	-	-	read/default

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

Table 5-5-7: Data Dictionary of Orders Table.

Column Name	Description	Data Type	Size	Null	PK/ FK	Reference to	Sample data
order_id	order ID	Int	11	No	PK	-	1
cust_id	customer ID	Int	11	No	FK	Customer	1
printer_id	printer ID	Int	11	No	FK	Printer	1
delivery_mode	Selected shipping option for order.	Varchar	255	No	-	-	Self Pick / Delivery
order_date	Date for order to be completed.	Varchar	255	No	-	-	15-8-2021
time	Time for order to be completed	Varchar	255	No	-	-	1400
created_datetime	Date Time for this order was created in database	Varchar	255	No	-	-	2021:1:12 16:30:00
order_code_reference	Unique Code reference for order	Varchar	255	No	-	-	41DOC3072021210

Table 5-5-8: Data Dictionary of Preparation_Status Table.

Column Name	Description	Data Type	Size	Null	PK/ FK	Reference to	Sample data
prep_status_id	ID for certain preparation status of order	Int	11	No	PK	-	1
order_id	Order ID	Int	11	No	FK	Orders	1
prep_status	Preparation Status of an order.	Varchar	255	No	-	-	Pending/Accepted/Cancelled/Printed Out/On the Way/Completed

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

Table 5-5-9: Data Dictionary of Payment Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
payment_id	ID for payment record	Int	11	No	PK	-	1
order_id	Order ID	Int	11	No	FK	Orders	1
payment_cost	Total cost of Payment (RM) for order	Varchar	255	No	-	-	12.00
payment_type	Type of payment	Varchar	255	No	-	-	OnlinePayment / COD

Table 5-5-10: Data Dictionary of Order_Address Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
order_add_id	ID for order address record	Int	11	No	PK	-	1
order_id	Order ID	Int	11	No	FK	Orders	1
customer_address	Customer address for order.	Varchar	1000	Yes	-	-	153,Bandar Baru,31900,Kampar, Perak
printer_address	Printer address for order	Varchar	1000	Yes	-	-	53,Bandar Baru,31900,Kampar, Perak
distance	Distance from customer address to printer address(km)	Varchar	255	No	-	-	0.5 / 0

Table 5-5-11: Data Dictionary of Sub_Orders Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
sub_order_id	ID for sub order	Int	11	No	PK	-	1
order_id	ID for order	Int	11	No	FK	Orders	1
sub_order_cost	Cost of sub-order (RM)	Varchar	255	No	-	-	12.32

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

Table 5-5-12: Data Dictionary of Resources_Record Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
resources_id	ID for resources record	Int	11	No	PK	-	1
sub_order_id	ID for sub order	Int	11	No	FK	Sub_orders	1
file_name	Name of file	Varchar	255	No	-	-	AndroidStudio.pdf/ AndroidStudio.jpg
file_type	Type of file	Varchar	255	No	-	-	Image/Document
file_description	Description of file	Varchar	255	No	-	-	This file had 25 pages

Table 5-5-13: Data Dictionary of Product_Printing_Preferences Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
printing_pref_id	ID for Product Printing Preferences	Int	11	No	PK	-	1
printing_preferences	Printing Preferences of printing order in JSON format	Varchar	1000	No	-	-	{"PaperSize":["3.5x5(3R)"],"PaperType":["CardStack"],"available":"Yes","border":["10cm x 10cm"],"maxQuantity":20,"minQuantity":1,"pricePerPage":1.30}

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

Table 5-5-14: Data Dictionary of Document_Printing_Setting Table.

Column Name	Description	Data Type	Size	Null	PK/ FK	Reference to	Sample data
doc_printing_id	ID for document printing setting	Int	11	No	PK	-	1
doc_print_pref_json	Document printing preferences in JSON format	Varchar	1000	No	-	-	{"ColorSelected": ["Color", "BlackWhite"], "Edge": ["ShortEdge", "LongEdge"], "PL": ["Portrait", "Landscap e"], "Slided": ["One-Sided"], "SlidesArrangement": ["Horizontal"], "SlidesPerPage": ["1", "4"], "available": "Yes", "maxCopies": "10", "minCopies": "1", "pricePerBlackWhitePage": "0.10", "ricePerCopy": "0.20"}

Table 5-5-15: Data Dictionary of Image_Printing_Setting Table.

Column Name	Description	Data Type	Size	Null	PK/ FK	Reference to	Sample data
img_printing_id	ID for image printing setting	Int	11	No	PK	-	1
img_print_pref_json	Img_printing preference setting in JSON format	Varchar	255	No	-	-	{"Color": "BlackWhite", "Color": "Copies": "10", "PaperSize": "A4", "PaperType": "Glossy Photo Paper, Plain Paper", "PictureSize": "13x18cm(1), 9x13cm(4)", "Quality": "Auto, Standard"}

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

Table 5-5-16: Data Dictionary of Delivery_Zone table

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
dev_zone_id	ID for delivery zone for specific printer	Int	11	No	FK	-	1
printer_id	ID for Printer	Int	11	No	FK	Printer	1
delivery_zone_dist	Distance(km) for zone area that covered from specific location of printer within this distance	Varchar	255	No	-	-	0.34

Table 5-5-17: Data Dictionary of Shipping_Option Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
ship_option_id	ID for shipping option	Int	11	No	PK	-	1
printer_id	ID for printer	Int	11	No	FK	Printer	1
delivery_avail	Availability of delivery service provided by printer	Varchar	50	No	-	-	No/Yes
self_pick_up_avail	Availability of Self-Pick Up	Varchar	50	No	-	-	No/Yes

Table 5-5-18: Data Dictionary of Delivery_Time_Setting Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
delivery_time_id	ID for delivery time setting	Int	11	No	PK	-	1
printer_id	ID for Printer	Int	11	No	FK	Printer	1
delivery_time_start	Starting time for delivery service	Varchar	255	No	-	-	090
delivery_time_end	Ending time for delivery service	Varchar	255	No	-	-	1200

CHAPTER 5: USER REQUIREMENTS AND SYSTEM ARCHITECTURE

Table 5-5-19: Data Dictionary of Payment_Setting table

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
payment_setting_id	ID for payment setting	Int	11	No	PK	-	1
printer_id	ID for Printer	Int	11	No	FK	Printer	1
online_payment	Availability for online payment	Varchar	255	No	-	-	No/Yes
COD	Availability for Cash On Delivery	Varchar	255	No	-	-	No/Yes

Table 5-5-20: Data Dictionary for Advanced_Feature_Setting Table.

Column Name	Description	Data Type	Size	Null	PK/FK	Reference to	Sample data
adv_feature_id	ID for advanced Feature setting	Int	11	No	PK	-	1
printer_id	Printer ID	Int	11	No	FK	Printer	1
reject_blurry	Availability of function for detect and reject blurry image	Varchar	50	No	-	-	No / Yes
reject_adult	Availability of function for detect and reject adult content image	Varchar	50	No	-	-	No/Yes
reject_size	Availability of function for detect and reject resolution of image that are not suitable for certain size of printing material	Varchar	50	No	-	-	No/Yes

Chapter 6

System Implementation

6.1 Installation and Integration Steps

6.1.1 Deploying CNN Model to Android Studio Project

Steps for deploying CNN model in Torch Script format to Android Studio:

1. Open Android Studio project.
2. At “main”, create an Assets Folder and name it “assets”.
3. Copy and paste “mobilenetV2.pt” to “assets”.
4. At “Gradle Scripts ->build. Gradle” for the module, write the following code at “dependencies”, then sync it.

```
//Pytorch
implementation 'org.pytorch:pytorch_android:1.8.0'
implementation 'org.pytorch:pytorch_android_torchvision:1.8.0'
```

Figure 6-1-1-1: Code for Implementation of Pytorch Android in Android Studio Project.

6.2 Implementation for Detection of Image with Adult Content using CNN Model in Proposed Application

6.2.1 Overview

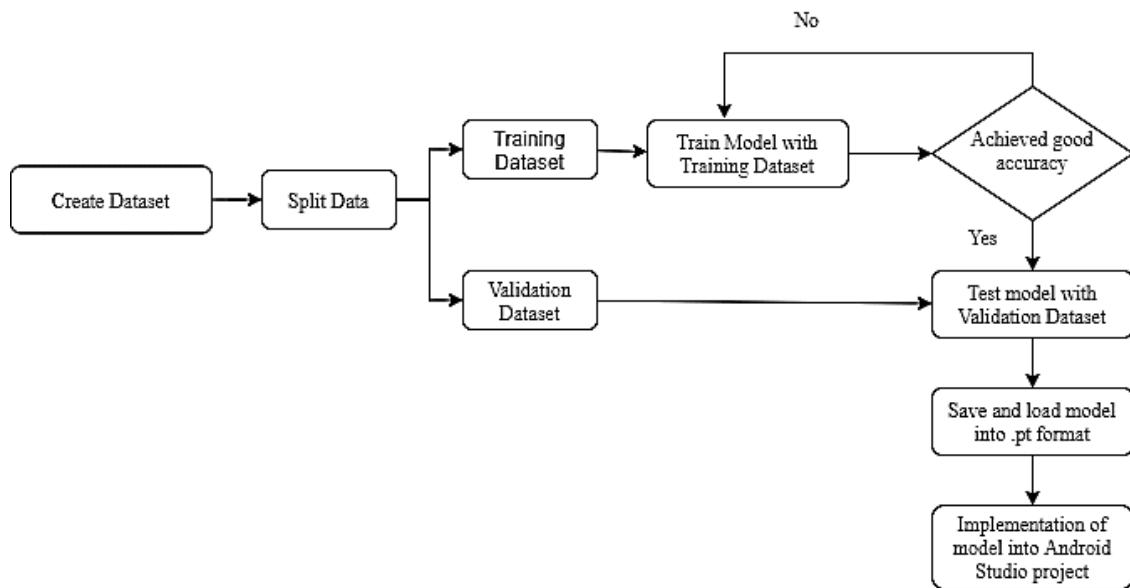


Figure 6-2-1-1: Flow Chart for System Implementation of Advanced Function - Detection of Image with Adult Content Using CNN Model into Mobile App.

Image with adult content is detected through a CNN model-MobileNetV2 which implemented into proposed mobile application. Firstly, 100 images are selected as a dataset to train and test the model. The dataset is categorized into “Adult Content” and “Non-Adult Content. Dataset is separated into training dataset and validation dataset, each with 80 images and 20 images respectively. The MobileNetV2 model is initialized from Torchvision packages. Model is trained with training dataset to achieve good accuracy and eventually tested with a validation dataset.

Well-trained and tested MobileNetV2 model is saved and loaded in Torch Script format – “.pt”, then implemented into the Android Studio project to set up function for detection of image with adult content.

6.2.2 Introduction to Dataset

Dataset is categorized and labelled as “1” and “0”. “1” represented Adult Content while “0” represented non-adult content. In total, dataset consisted of 100 images which spilted into training dataset and validation dataset, 80 images for training dataset and 20 images for validation dataset.



Figure 6-2-2-1: Image with Label “1”
(Adult Content).



Figure 6-2-2-2: Image with Label “0”
(Non-Adult Content).

6.2.3 Introduction to Architecture of CNN Model- MobileNetV2

MobileNetV2 is one of the convolutional neural network architectures that perform well on mobile devices due to small size, yet effective and powerful feature extractor for object detection. It is the improved version for MobileNetV1. As shown in figure 6-2-3-1, in the initial part of architecture structure of MobileNetV2, it contains 32 filters of fully convolution layers and followed by 19 residual bottleneck layers. In general, MobileNetV2 is based on inverted residual structure, residual connections are set up between bottlenecks while lightweight depth wise convolutions to filter features in the intermediate expansion layer.

Input	Operator	<i>t</i>	<i>c</i>	<i>n</i>	<i>s</i>
$224^2 \times 3$	conv2d	-	32	1	2
$112^2 \times 32$	bottleneck	1	16	1	1
$112^2 \times 16$	bottleneck	6	24	2	2
$56^2 \times 24$	bottleneck	6	32	3	2
$28^2 \times 32$	bottleneck	6	64	4	2
$14^2 \times 64$	bottleneck	6	96	3	1
$14^2 \times 96$	bottleneck	6	160	3	2
$7^2 \times 160$	bottleneck	6	320	1	1
$7^2 \times 320$	conv2d 1x1	-	1280	1	1
$7^2 \times 1280$	avgpool 7x7	-	-	1	-
$1 \times 1 \times 1280$	conv2d 1x1	-	k	-	-

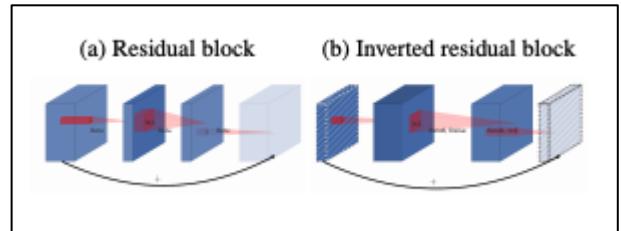


Figure 6-2-3-1: System Architecture of MobileNetV2.

6.2.4 Environment Setup for Training and Testing MobileNetV2 Model with Dataset

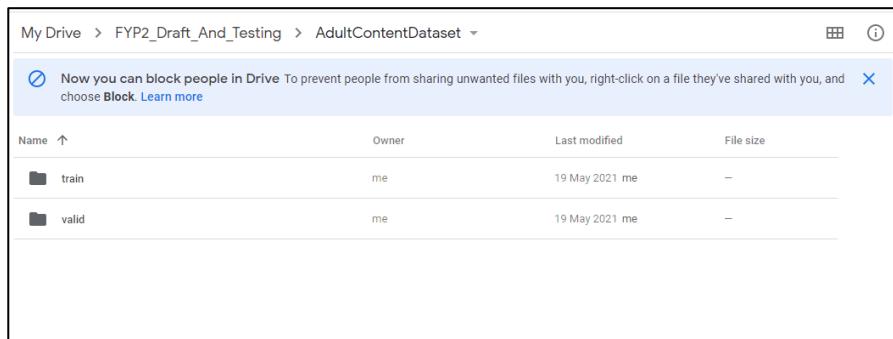


Figure 6-2-4-1: “AdultContentDataset” Folder with “train” and “valid” sub Folder

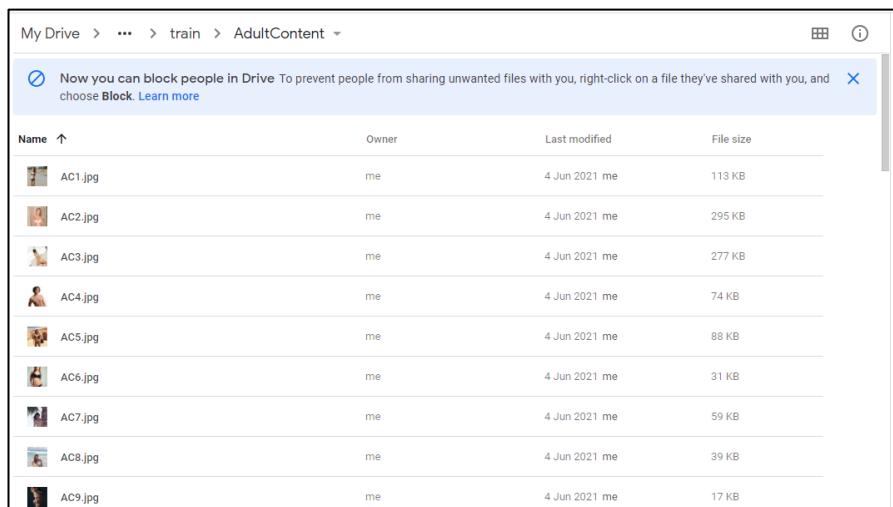


Figure 6-2-4-2: Adult Content Images in “AdultContent” Folder of “train” Folder.

CHAPTER 6: SYSTEM IMPLEMENTATION

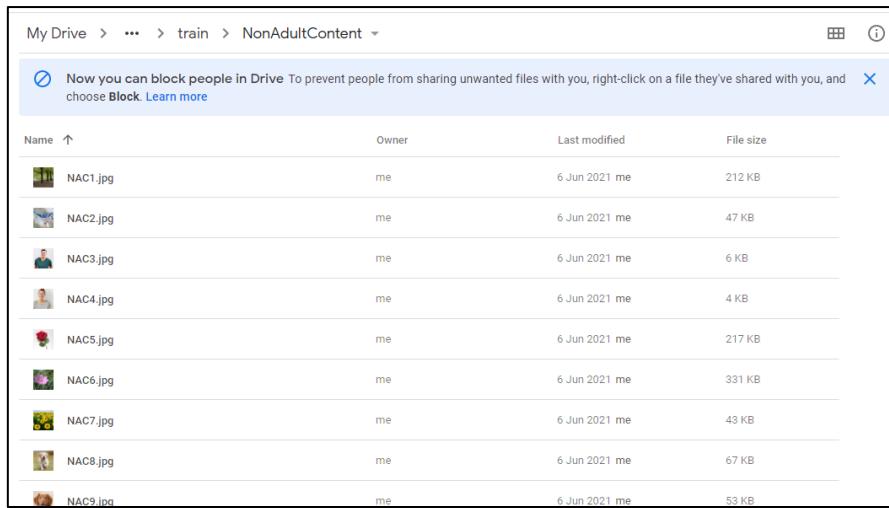


Figure 6-2-4-3: Non-Adult Content Images in “NonAdultContent” Folder of “train” Folder.

Environment setup for training and testing CNN model with dataset involved both Google Drive and Google Colaboratory. First, for the creation of the dataset, a folder is created in Google Drive and name it “AdultContentDataset”. Inside this folder, create two more folders with names of “train” and “valid” respectively as show in figure 6-2-4-1. In both folders, create two more folders with the name of “AdultContent” and “NonAdultContent”. For the “train” folder, both “AdultContent” and “NonAdult Content” should contain 40 images respectively, on the other hand, the “valid” folder should contain 10 images respectively on each sub folders. Dataset for this project can be obtained from the link below.

https://drive.google.com/drive/folders/1sajtFfdvsNWSYnt_H2zxurUebDSeIxXg?usp=sharing.

Training and testing of model done in Google Colaboratory. Code used in Google Colaboratory is mainly Python and can be obtained from the link below.

<https://colab.research.google.com/drive/1GjnfLou0ikPyxrixxHMOj-7hZ1y3uyTt?usp=sharing>

6.3 Implementation for Detection of Blurry Image using OpenCV in Proposed Application

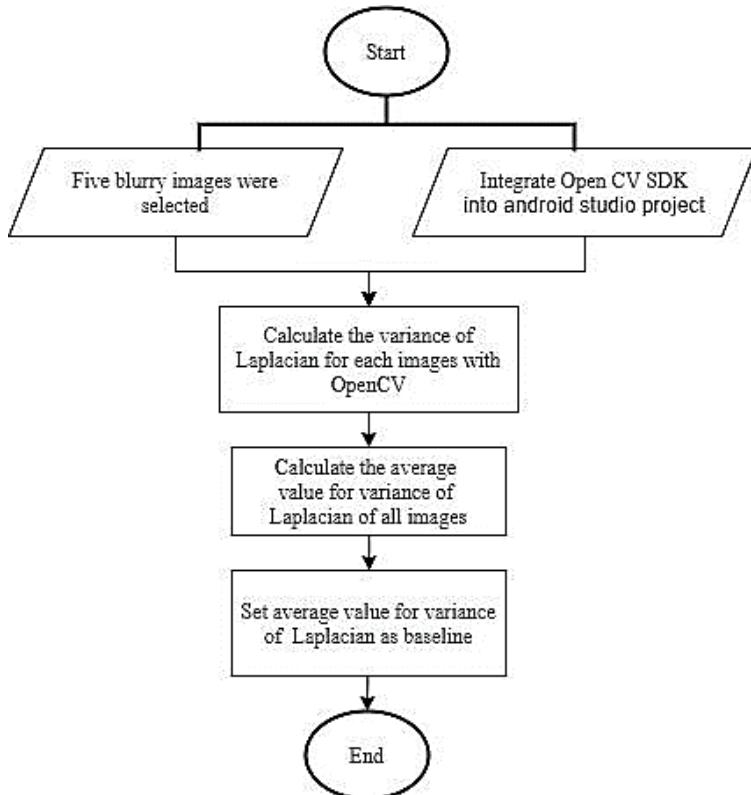


Figure 6-3-1: Flow Chart for Implementation for Detection of Blurry Image Using OpenCV in Proposed Application.

As shown in figure 6-3-1, after integrating OpenCV SDK into Android Studio project and selecting five images which appear blurry, then computed the average value for variance of Laplacian of selected images. Next stage would be set the average value for variance Laplacian of selected images as baseline. If value for variance of Laplacian of uploaded image is smaller than the value of baseline, it is considered as blurry. Baseline value of this project would be around 12.5.

CHAPTER 6: SYSTEM IMPLEMENTATION

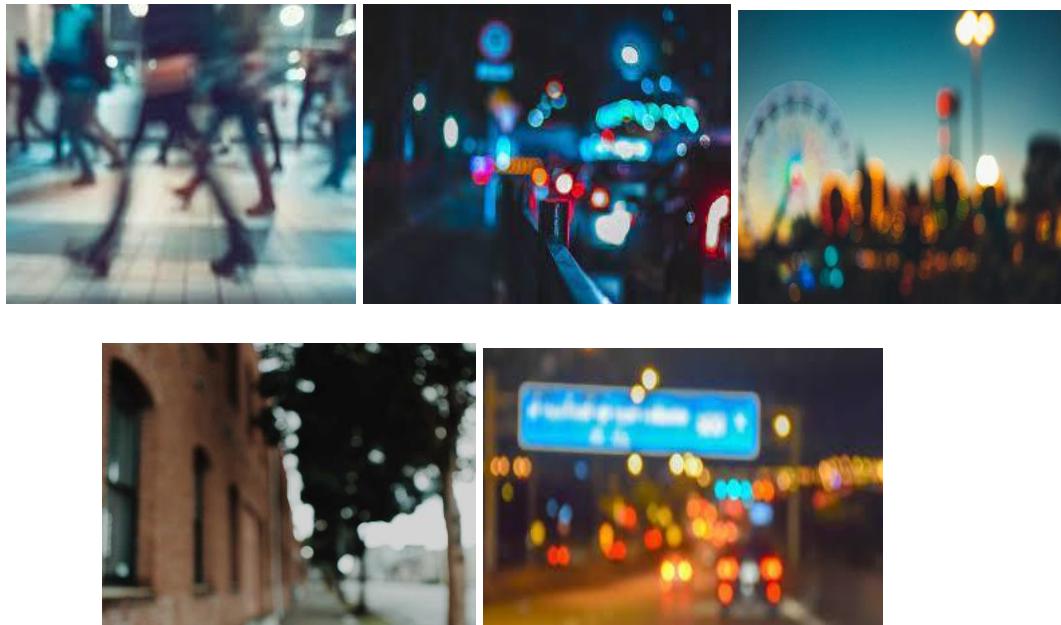


Figure 6-3-2: Selected Images to Find the Baseline Value (Average Laplacian Value).

6.4 Graphical User Interface of Application

6.4.1 Graphical User Interface of Application for User

1. Interface of Splash Screen



Figure 6-4-1-1: Interface of Splash Screen.

When accessing the mobile application, the first appearance of the user interface will be a splash screen, which last for around 3 seconds.

2. Interfaces of Module for User Authentication

I. Login

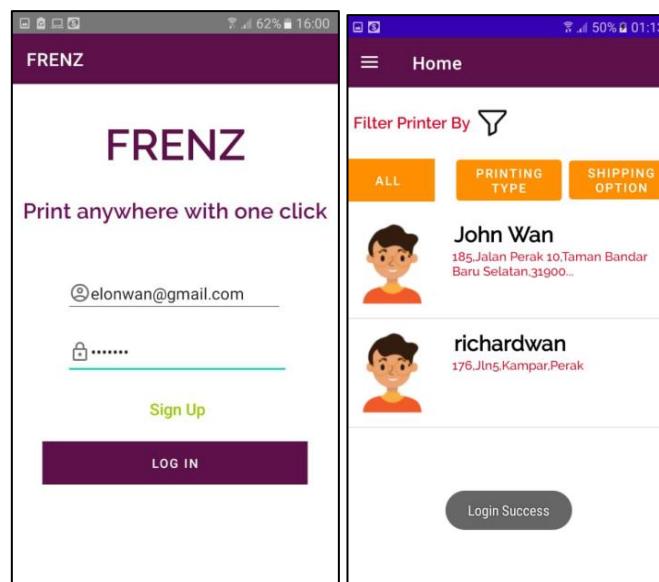


Figure 6-4-1-2: Interfaces of User Logins.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-1-2 shows the interfaces for login part of proposed application. Existing user is required to enter the correct combination of email and password, then press the “LOGIN” button. If the combination exists in the database, user is successfully login to his or her main page.

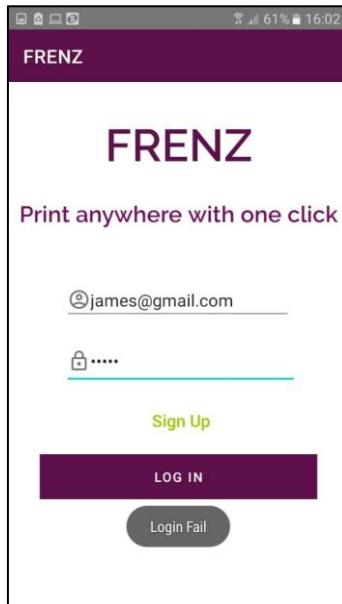


Figure 6-4-1-3: Interface of Login Unsuccessfully (Validation Message).

In Figure 6-4-1-3, if user enters the wrong combination of email and password, system of mobile app will display an error message of ‘Login Fail’.

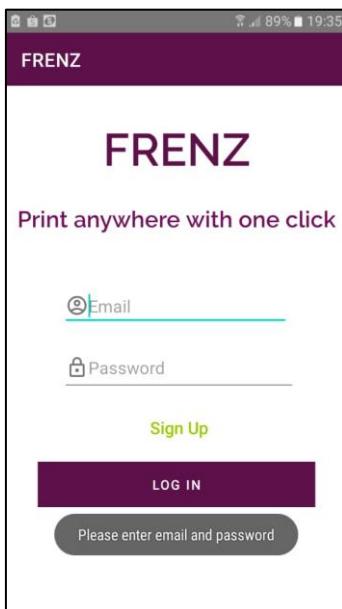


Figure 6-4-1-4: Interface of User Logins (Validation Message).

CHAPTER 6: SYSTEM IMPLEMENTATION

In figure 6-4-1-4, if the user did not fill in anything, the system of the mobile app will notify the user with a message of “Please enter valid email and password”.

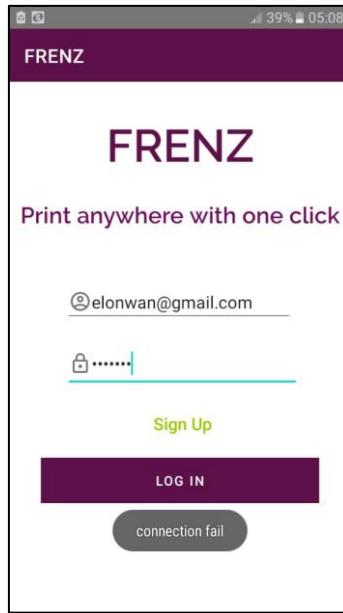


Figure 6-4-1-5: Validation Message for Connection Error.

Figure 6-4-1-5 shows validation message for connection error. If user did not connect his or her smartphone to internet. An error message of “connection error” will display out.

II. Registration

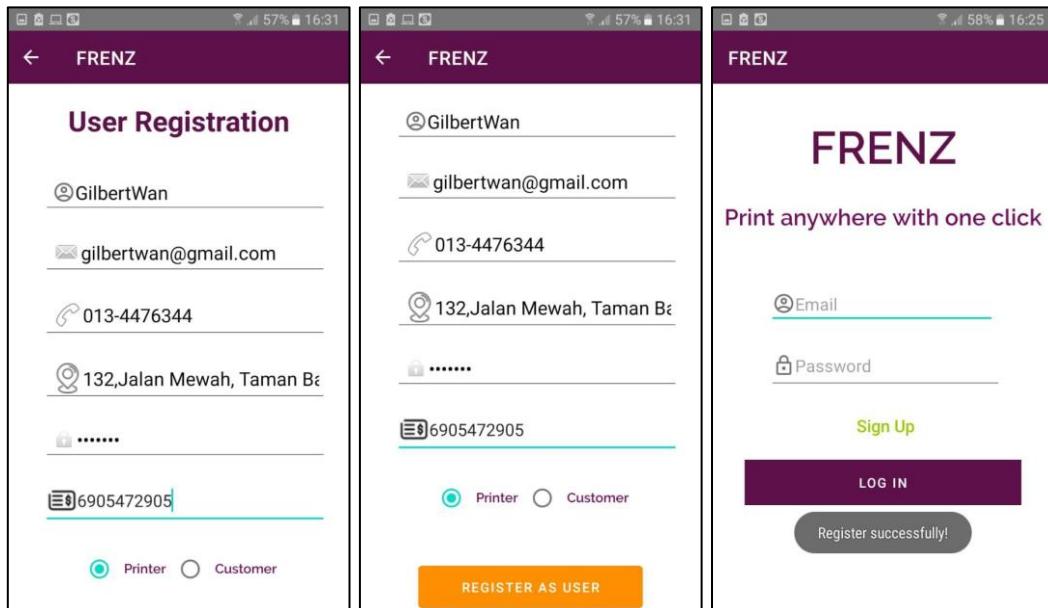


Figure 6-4-1-6: Interfaces for User Registration (Service Provider).

Figure 6-4-1-6 shows the sign-up part of the mobile application. For new user to create a new account with the role of service provider, firstly, user presses “Sign Up” at the login page as

CHAPTER 6: SYSTEM IMPLEMENTATION

shown in figure 6-4-1-2. User will be navigated to the Sign-Up page. Here, user fills up the username, email, password, home address and phone number. Next, user presses on “printer” button, the edit text box for PBE beneficiary account number will show up, and the user is required to fill it up. After the user presses “REGISTER AS USER”, the system will validate everything. Once validation successful, the application will save data into the database, displaying a message “Register successfully!” and redirected the user back to the login page.

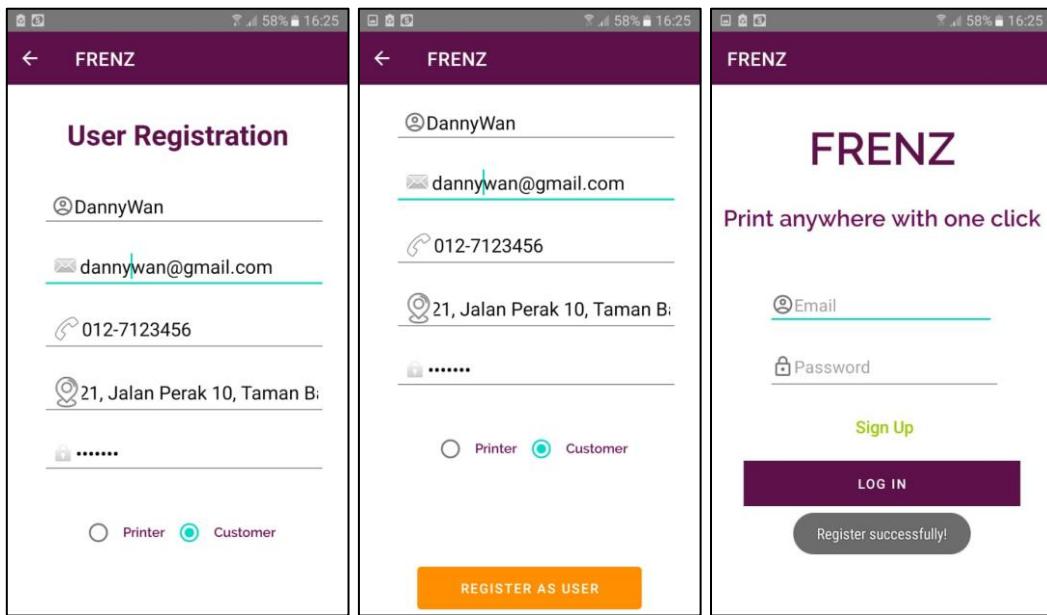


Figure 6-4-1-7: Interfaces for User Registration (Customer).

Figure 6-4-1-7 shows the sign-up part of the mobile application. For new user to create a new account with the role of customer, firstly, user presses “Sign Up” at the Login Page as shown in figure 6-4-1-2. User will be navigated to the Sign-Up page. Here, the new user fills up the username, email, password, home address and phone number. Next, user select customer role by clicking on the “Customer” button. After the user presses “REGISTER AS USER”, the system will validate everything. Once validation successful, the application will save data in the database, displaying a message “Register successfully!” and redirected user back to the login page.

CHAPTER 6: SYSTEM IMPLEMENTATION

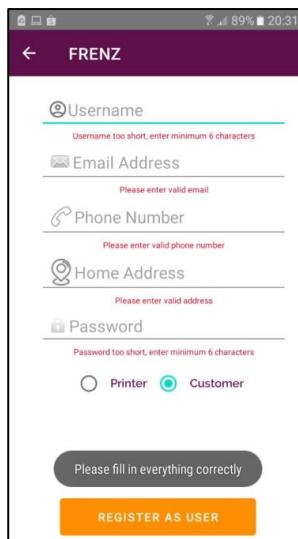


Figure 6-4-1-8: Validation Message for User Registration (Customer).

Figure 6-4-1-8 shows the validation message on creating a new account as a printer. This interface will be shown when the application validates that there is validation occurring when the user is creating an account. If user enter username with length less than 6 characters, a text stating “Username too short, enter minimum 6 characters” will show up. A text with content of “Please enter valid email” if user did not input valid email address. Application will display out texts stating “Please enter valid address” if user inputs invalid home address and “Password too short, enter minimum of 6 characters” if user inputs password with less than 6 characters. Besides this, if a user inputs the wrong format of phone number, a text stating “Invalid format of phone number” will show up. Eventually, a message of “Please fill in everything correctly” will prompt out.

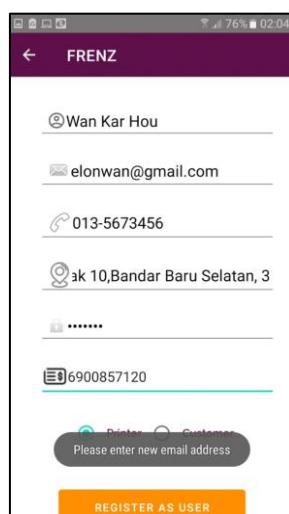


Figure 6-4-1-9: Validation Message for Duplicated Email during User Registration.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-1-9 shows the validation message for registration if user register with existed email address. If the system checks that the input email address existed in the database, it will return a message of “Please enter new email address”.

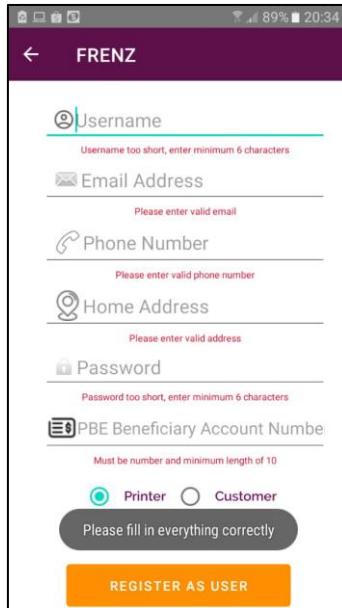


Figure 6-4-1-10: Validation Message for User Registration (Service Provider).

Figure 6-4-1-10 shows the validation message on creating a new account as a service provider. This interface will be shown when the application validates that there are validation errors occur when user is creating an account. If user enters username which length less than 6 characters, a text stating “Username too short, enter minimum 6 characters” will be appear. A text with content of “Please enter valid email” appears if user did not input valid email address. Application will display out text stating “Please enter valid address” show up if user inputs invalid home address and “Password too short, enter minimum of 6 characters” if user inputs password with less than 6 characters. Besides this, if a user inputs the wrong format of phone number, a text stating “Invalid format of phone number will appear. In the meantime, if a user inputs a PBE beneficiary account number with less than 10 numbers or contains a non-number, a message of “Must be number and minimum length of 10” will show up. Eventually, a message of “Please fill in everything correctly” will prompt out to remind user.

III. Logout

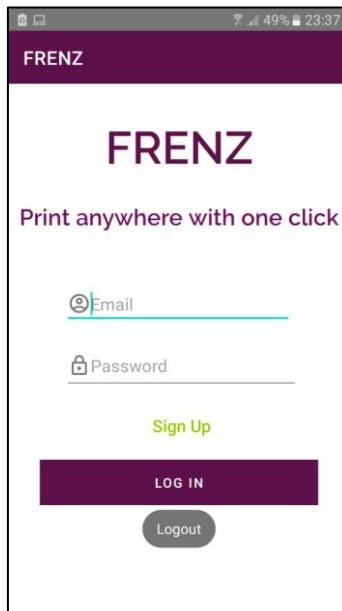


Figure 6-4-1-11: Interface of Logout.

Figure 6-4-1-11 shows the logout part of the mobile app. Firstly, user goes to the navigation bar as shown in figure 6-4-1-1, then press “Logout”, the system will navigate user to the login page and display a message of “Logout”.

3. Interfaces of Module for Edit Profile Setting

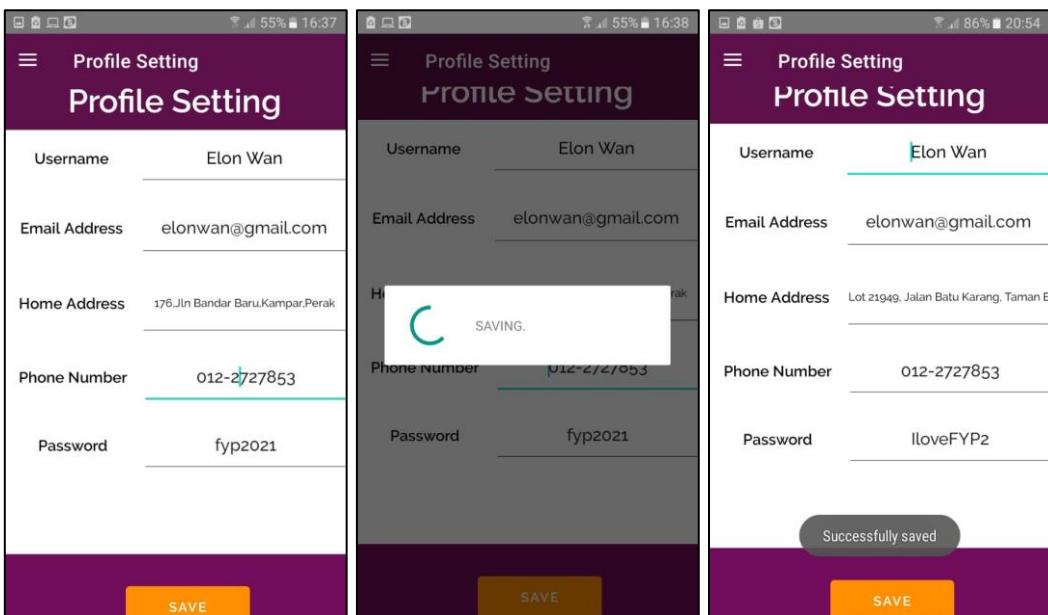


Figure 6-4-1-12: Interfaces for Edit Profile Setting of User (Customer).

Figure 6-4-1-12 shows the interfaces of edit profile setting for user in customer role. Firstly, user goes to the navigation drawer as shown in figure 6-4-1-1, then press “Profile Setting”, and the system will navigate to this interface. In this interface, user inputs a new username, email address, home address, phone number and password. Finally, the user presses the “SAVE” button to save data to the database. If every inputs validated successfully by the system, it is saved into the database. A message of “Successfully saved” will be displayed by the system.

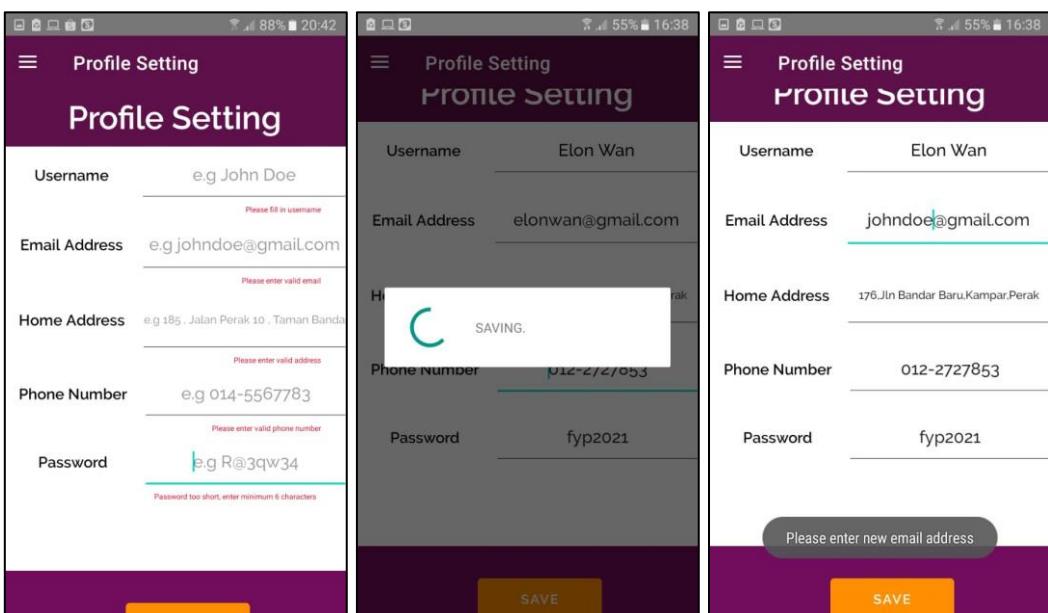


Figure 6-4-1-13: Validation Message for Edit Profile Setting of User (Customer).

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-1-13 shows the validation message for edit user profile setting as a user in customer role. These interfaces will be displayed when the application validates that there are validation errors occur when the user is creating an account. Application will display text with content of “Please fill in username” and “Please enter valid email” if user did not fill up both username and email. A text stating “Please enter valid address” if user inputs invalid home address and “Password too short, enter minimum of 6 characters” if user inputs password with less than 6 characters. Besides this, if a user inputs the wrong format of phone number, a text stating, “Please enter valid phone number” will appear. If the system validates that the input of email address exists in the database, it will return a message of “Please enter new email address” to the user.

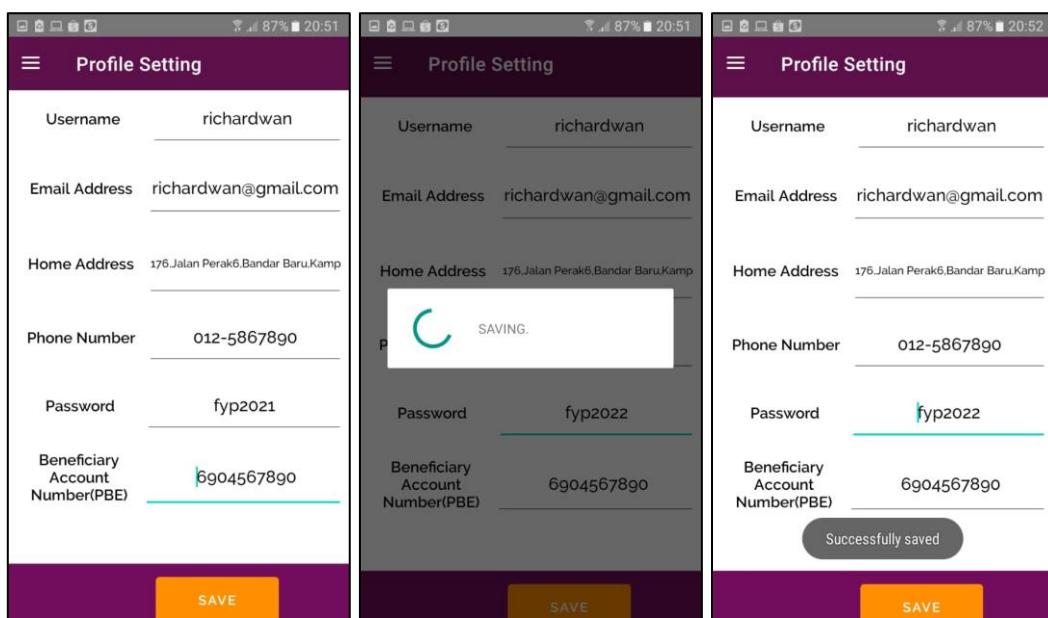


Figure 6-4-1-14: Interfaces for Edit Profile Setting of User (Service Provider).

Figure 6-4-1-14 shows the interfaces of edit profile setting for user in service provider role. Firstly, user goes to the navigation drawer as shown in figure 6-4-1-1, then press “Profile Setting”, and the system will navigate user to profile setting interface. In this interface, the user inputs a new username, email address, home address, phone number, password and PBE beneficiary account number. Finally, the user presses the “SAVE” button to save data to the database. If every input validated successfully by the system, it is saved into the database. A message of “Successfully saved” will be displayed by the system.

CHAPTER 6: SYSTEM IMPLEMENTATION



Figure 6-4-1-15: Validation Message for Edit Profile Setting of User (Service Provider).

Figure 6-4-1-15 shows the validation messages for edit user profile as a user in service provider role. These interfaces will be displayed when the application validates that there is validation occurring when the user is creating an account. Application will display text with content of “Please fill in username” and “Please enter valid email” if user did not fill up both username and email address. A text stating “Please enter valid address” if user inputs invalid home address and “Password too short, enter minimum of 6 characters” if user inputs password with less than 6 characters. Besides this, if a user inputs the wrong format of phone number, a message stating, “Please enter valid phone number” will appear. If the system validates that the input email address exists in the database, it will return a message of “Please enter new email address” to the user. As for the validation of beneficiary account number, text stating “Must be number and minimum length of 10” will show up if user inputs non-number or number with length less than 10.

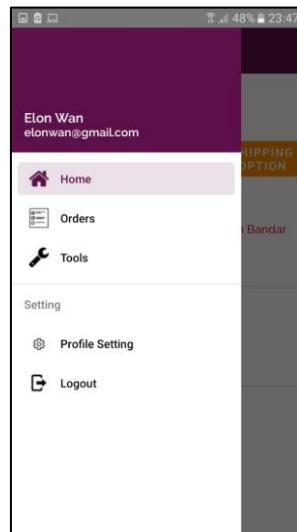
6.4.2 Graphical User Interface of Application for User as Customer**1. Interfaces of Application Navigation Drawer for User as Customer**

Figure 6-4-2-1: Navigation Drawer of Mobile App for User with Customer Role.

Figure 6-4-2-1 shows the navigation drawer of a mobile app for user with customer role. At the top of the navigation drawer, it displays username and email of user. Words such as “Home”, “Orders”, “Tools”, “Profile Setting” and “Logout” listed at the navigation drawer. Each of these words represents one specific section of application.

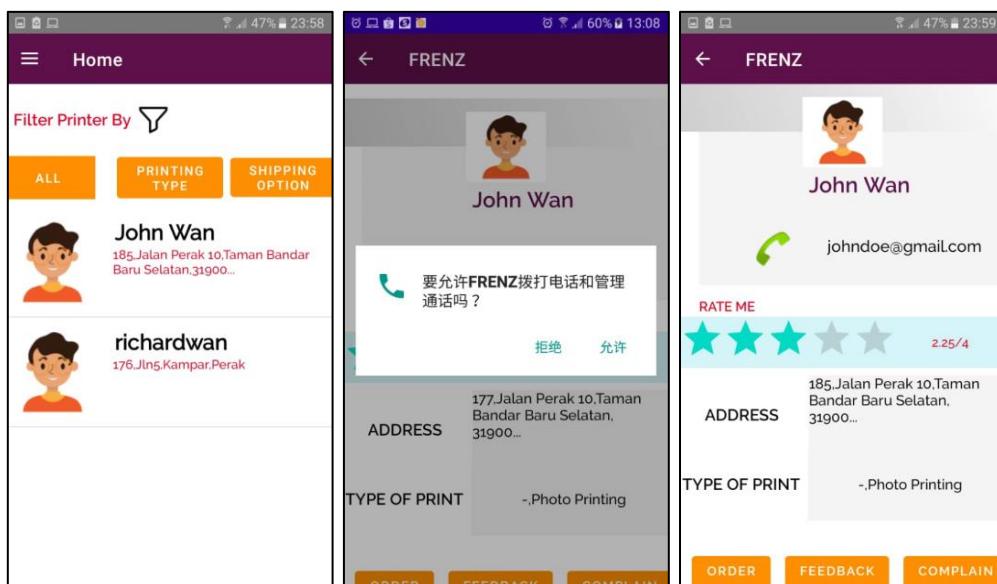
2. Interfaces of Module for Filter and Selection of Service Provider

Figure 6-4-2-2: Interfaces for List of Available Service Providers

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-2-2 shows the interfaces for list of available service providers. After user login as customer, user directed to “Home” section as shown in figure 6-4-2-1, only service providers that finished filling up document printing setting or photo printing setting, and business setting, will be listed here. User will be able to press on one of it and views the profile of the service provider. A notification shall prompt out, asking for permission to allow application accesses phone calls if user did not grant the permission in first place. After permission granted, user will be able to dial phone number of service provider if user presses on the phone icon.

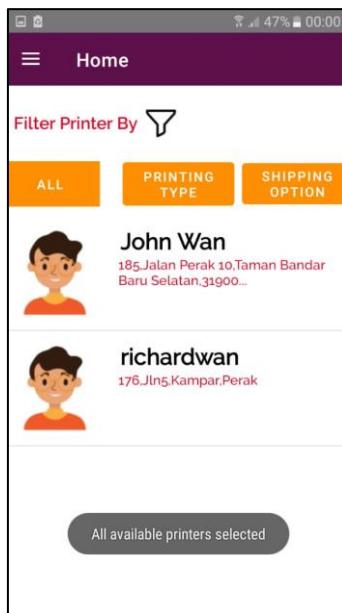


Figure 6-4-2-3: Interfaces that Display List of Available Service Providers After Presses “ALL” Button.

Figure 6-4-2-3 shows the interfaces of selecting all available service providers. After user presses on “ALL” button, application will fetch data for list of available service providers and display it out. In the meantime, a message stating “All available printers selected” will be display out.

CHAPTER 6: SYSTEM IMPLEMENTATION

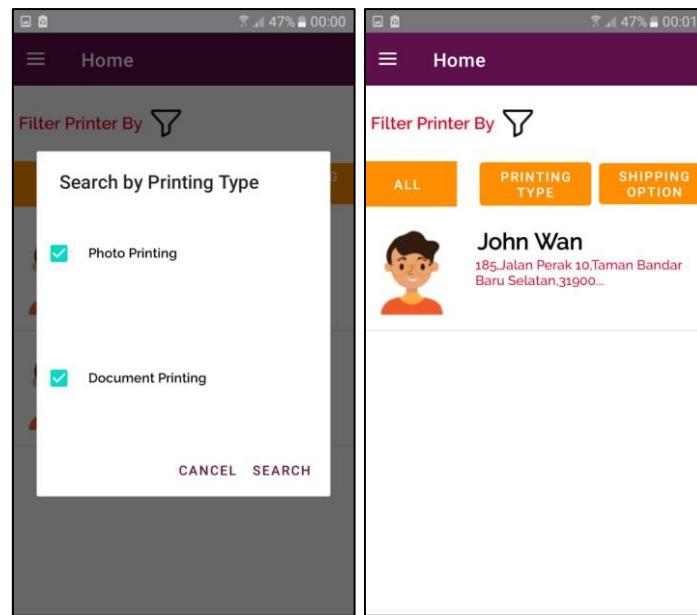


Figure 6-4-2-4: Interfaces for Filtering List of Available Service Providers Based on Printing Type.

Figure 6-4-2-4 shows the interfaces for filtering list of available service providers based on printing type. User can check “Photo Printing” checkbox and “Document Printing” checkbox, then press “SEARCH” button, then, application will perform query on database and return list of selected available services providers and display it out for user.

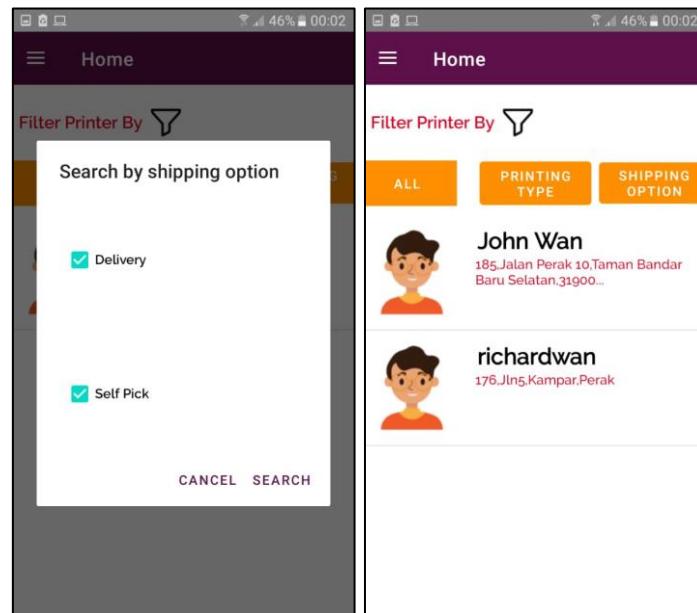


Figure 6-4-2-5: Interfaces for Filtering List of Available Service Providers Based on Shipping Options.

Figure 6-4-2-5 shows the interfaces for filtering list of available service providers based on shipping options. User checked “Delivery” checkbox and “Self Pick” checkbox, then press

CHAPTER 6: SYSTEM IMPLEMENTATION

“SEARCH”, application will perform query on database and return list of selected available services providers which provided shipping option of self-pick and delivery, then display it out for user.

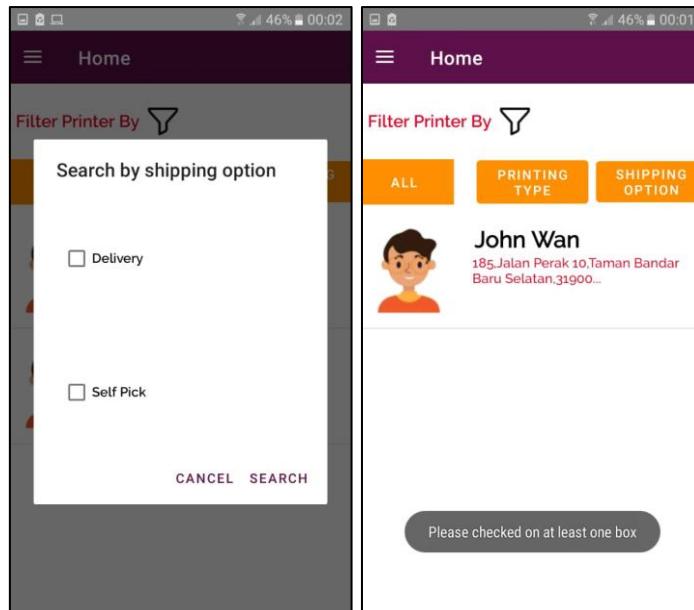


Figure 6-4-2-6: Interfaces for Filtering List of Available Service Providers Based on Shipping Options (Validation Message).

Figure 6-4-2-6 shows the interfaces for validation message on filtering service providers. If user did not check on any checkboxes and press “SEARCH” button, a message stating “Please checked on at least one box” will display out to remind user.

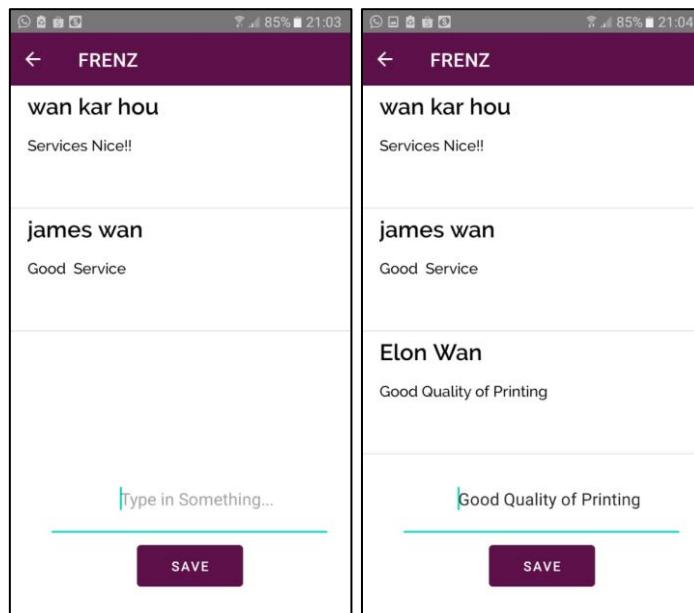
3. Interfaces for Module of Create and View Feedback

Figure 6-4-2-7: Interface for User to Provide Feedback.

Figure 6-4-2-7 shows the interfaces for user to provide feedback. Once user had selected a service provider from a list of service providers. User will be directed to the service provider profile page interface as show in Figure 6-4-2-2. Here, when the user clicks on the “FEEDBACK” button, the user will be directed to the feedback interface. In this interface, user can view feedback written by other users on this specific service provider. Besides this, user can input their own feedback. After clicking on the “SEND” button, the system will validate the input. If validated successfully, the system will save the feedback data into the database. User can only write one feedback for a specific service provider; thus, any new feedback shall only be update in the database.

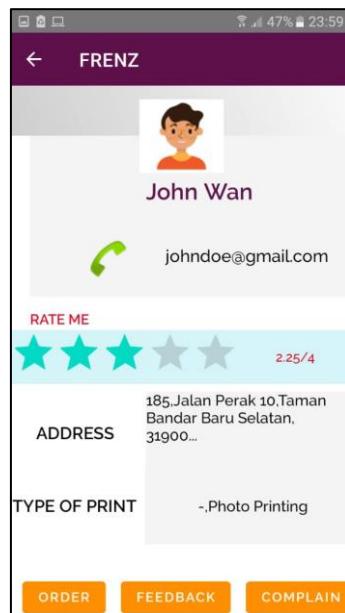
4. Interface for Module of Rating

Figure 6-4-2-8: Interface for User to Rate Service Provider.

Figure 6-4-2-8 shows the interface for user provides rating on service provider. Once a user had selected a service provider from a list of service providers. User will be directed to the printer profile page interface. Here, it will show total respondents on rating and average rating earned by the service provider. To update star rating, users just need to swipe from left to right on the rating bar. System will display new average rating value and update the rating data in database.

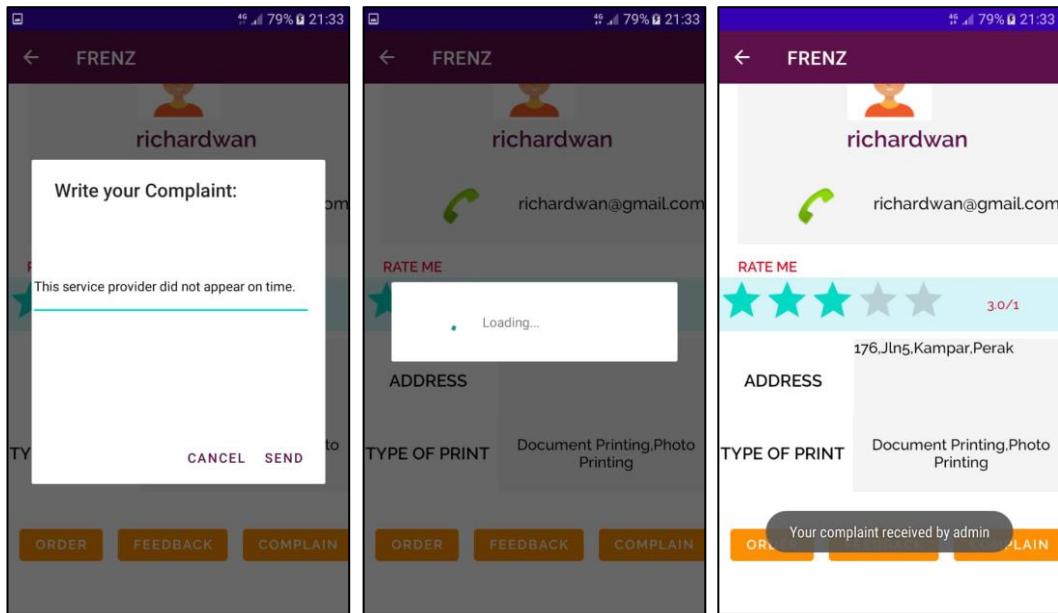
5. Interface of Module of File Complaint

Figure 6-4-2-9: Interface for User to File Complaint on Service Provider.

Figure 6-4-2-9 shows the interface for user files complaint on service provider. Once a user had selected a service provider from a list of service providers. Users will be directed to the printer profile page interface. Here, the user clicks on the “COMPLAINT” button, then an alert box will appear for the user to fill in the complaint content. After input is done, the user clicks on “SEND”, the system will save the complaint content into the database and the alert box will be close. Eventually, application will display a message of “Your complaint received by admin”. On the other hand, users can click on “CANCEL” to close the alert box.

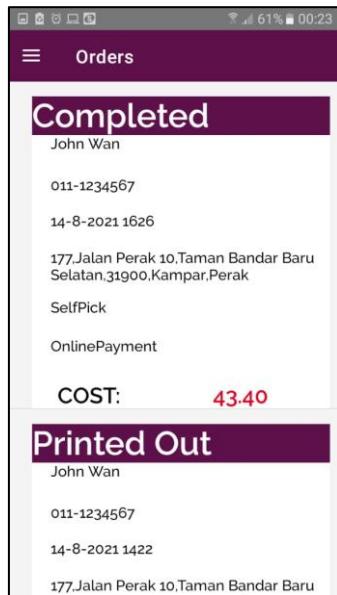
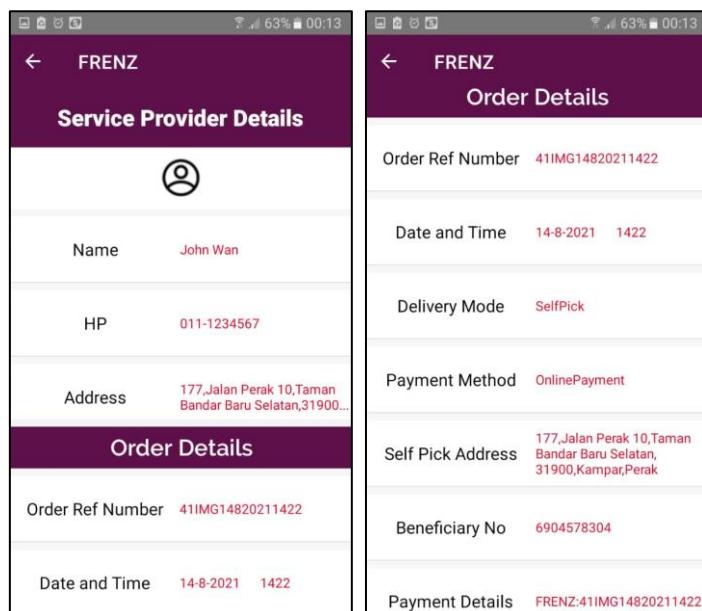
6. Interfaces of Module for Place and View Order.**I. View Orders**

Figure 6-4-2-10: Interface for List of Orders View by Customer.

Figure 6-4-2-10 shows the interface for the list of user orders. After the user clicks on “Orders” at the navigation drawer as shown in the figure 6-4-2-1, the user will be redirected to this interface that displays a list of orders. Details of order such as preparation status, name of service provider, phone number, date and time of order, shipping option, total cost, address, and payment method will be show at here.



CHAPTER 6: SYSTEM IMPLEMENTATION

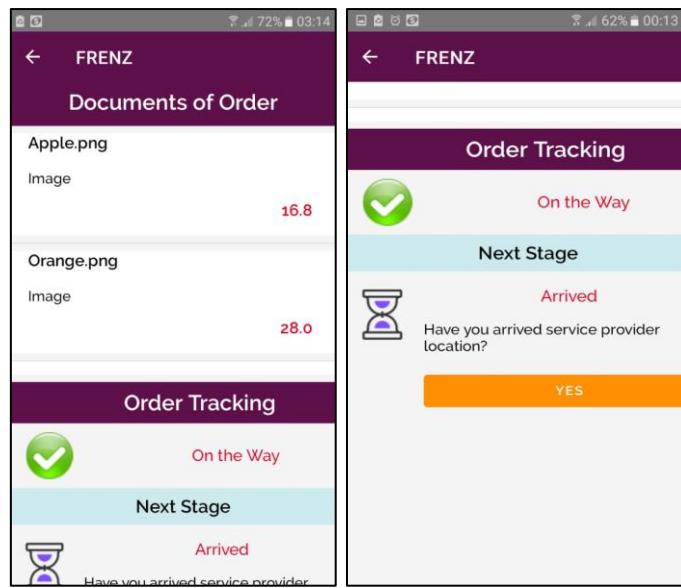


Figure 6-4-2-11: Interfaces that Show More Specific Details of an Order.

Figure 6-4-2-11 shows the interface for more details of a specific order. User will be directed to this interface after pressing on one of the orders as shown in figure 6-4-2-10. In this interface, there are four sections that represent different details of order: service provider details, order details, documents of order and order tracking. For the section of order details, it displays order reference number, date and time of order, shipping option, payment method and delivery address. If the payment method is online payment, beneficiary account number of PBE and payment detail for service provider will be shown here.

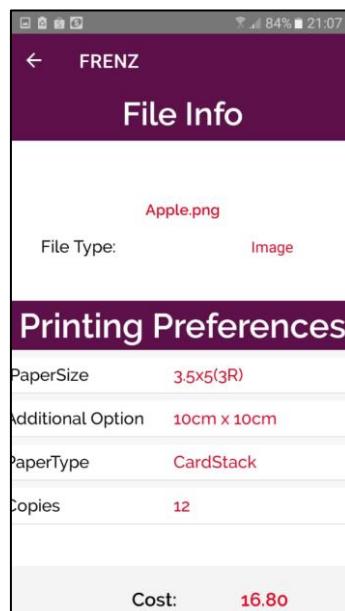


Figure 6-4-2-12: Interface that Displays Details of a Document in an Order.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-2-12 shows the interface that displays more details of a document in an order. After the user presses on one of the rows for document of order section as shown in the figure 6-4-2-11, the user will be directed to this interface. File name, cost and printing preferences for this document displayed out for the user to view.

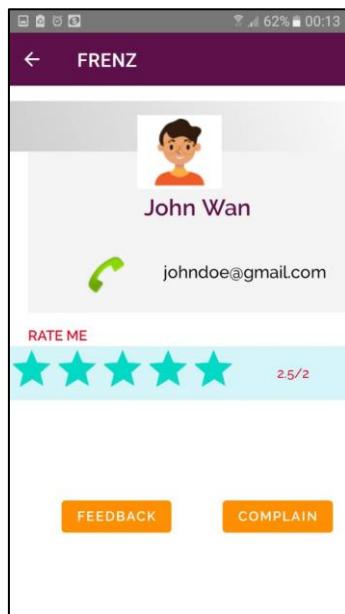


Figure 6-4-2-13: Interface for Showing Profile of Service Provider.

Figure 6-4-2-13 shows the interface for displaying profile of service provider. After user presses on the profile icon in section of service provider details as show in figure 6-4-2-11. User will be directed to this specific interface. In this interface, user was able to view name, email, average rating of service provider. Also, user could call, file complaint, rate and provide feedback on the service provider.

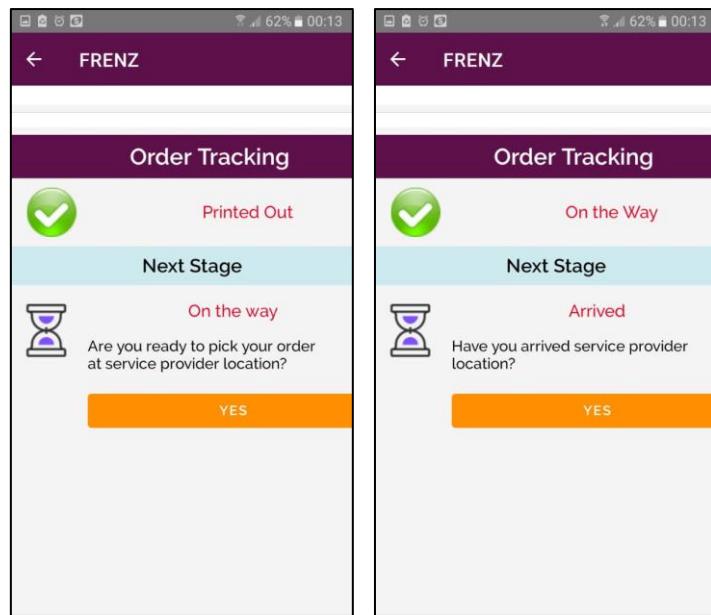


Figure 6-4-2-14: Interface of Order Tracking.

Figure 6-4-2-14 shows the interfaces of order tracking. This interface is part of the interface as shown in figure 6-4-2-11. The text next to the ‘tick’ icon shows the status of this order while the text and description below the ‘next stage’ banner shows the next stage of preparation status and the requirement to fulfil. To change the preparation status of the order, after the user fulfils the requirement, then user clicks on the “YES” button, the status and next stage of preparation status will change and updated in database.

II. Make Orders

As for the interfaces of placing orders, there are four main interfaces: main interface for placing order, printing selection interface, interface for display printing details and interface for selection of payment, shipping option.

CHAPTER 6: SYSTEM IMPLEMENTATION

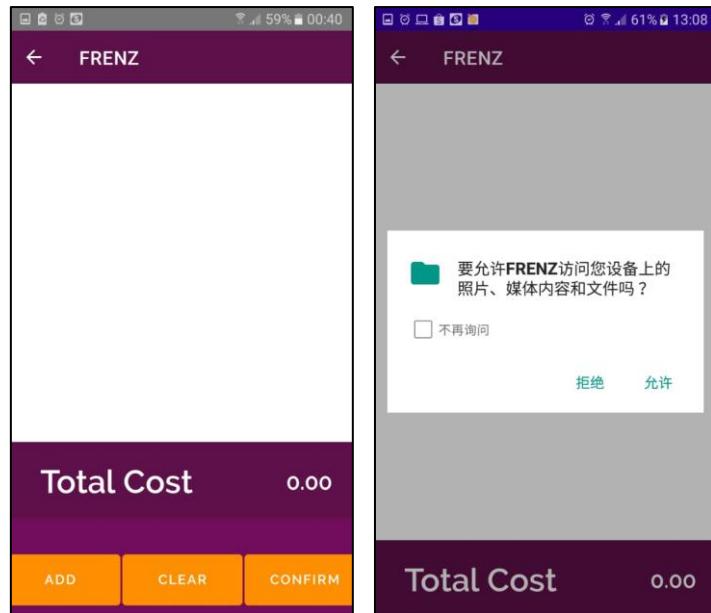


Figure 6-4-2-15: Main Interface for Placing Order.

Figure 6-4-2-15 shows the main interface for placing order. After the user presses on the “ORDER” button as shown in the figure 6-4-2-2. Users will be directed to this interface. To start placing an order, as soon as user presses on the “ADD” button, the application will display a notification that requires user granted permission to allow application writing and reading phone storage. After permission granted by user, the user is directed to the next interface which is the printing selection interface as show in figure 6-4-2-17.

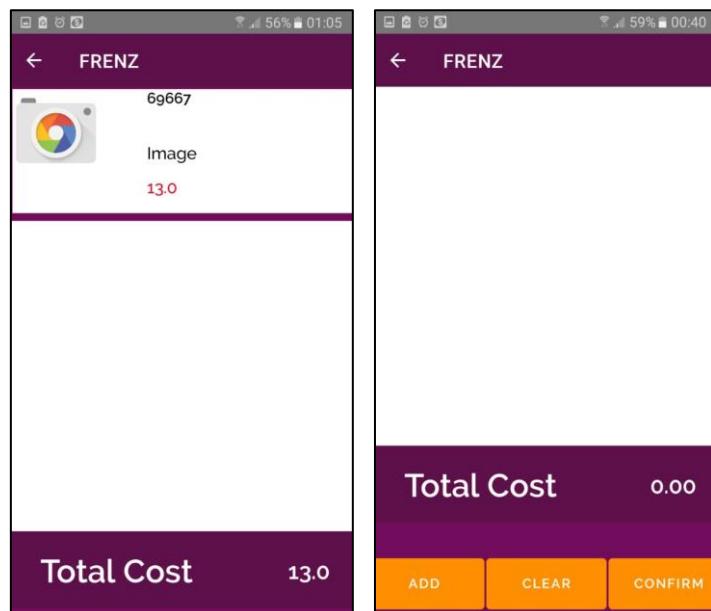


Figure 6-4-2-16: Clear Newly Placed Orders in Main Interface for Placing Orders.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-2-16 shows clearing orders in the main interface for placing orders. After the user presses on the “CLEAR” button, every newly placed order will be clear.

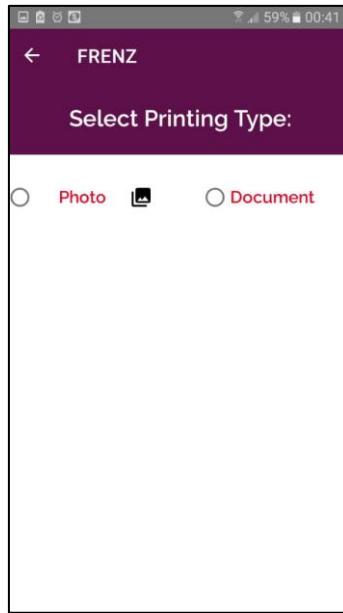


Figure 6-4-2-17: Interface for Printing Selection.

Figure 6-4-2-17 shows the printing selection interface. User selects any available printing services by clicking on the radio button.

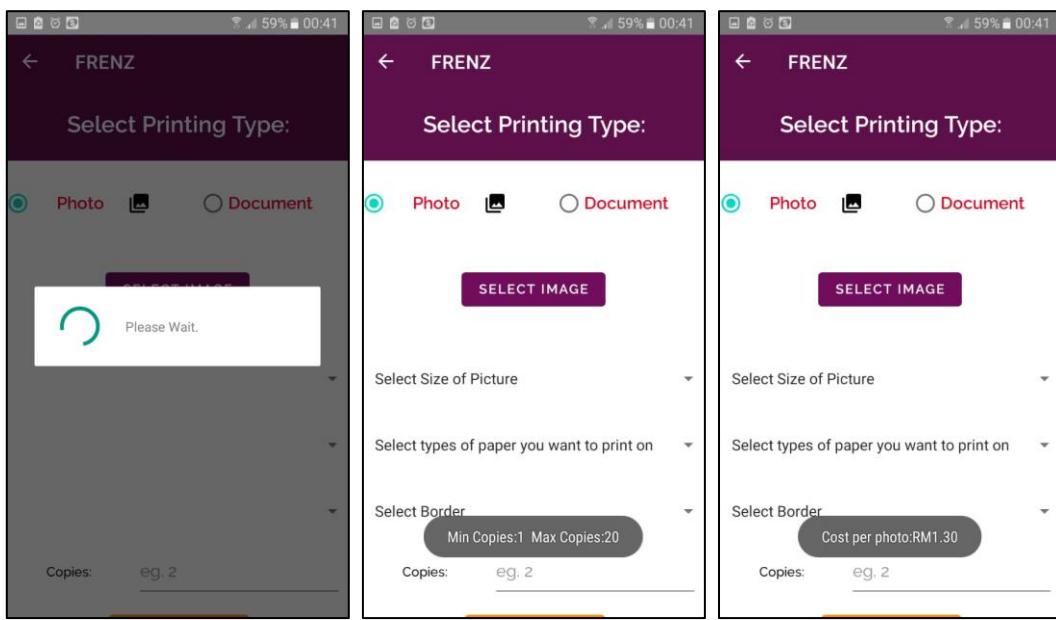


Figure 6-4-2-18: Interfaces for Photo Printing.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-2-18 is the continuation part from figure 6-4-2-17. If the user clicks on the “Photo” radio button, the application will display messages for the info of minimum copies, maximum copies, cost per photo set by the selected service provider, to remind the user.

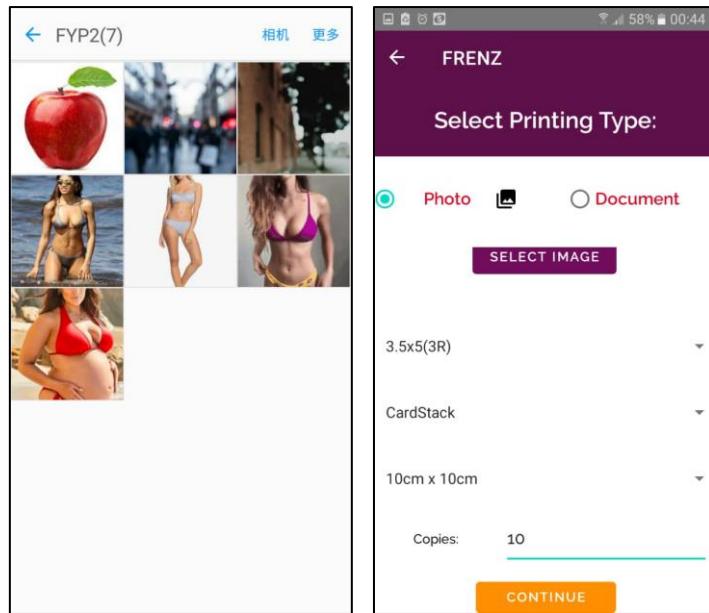


Figure 6-4-2-19: Interfaces for File Picker and Photo Printing Preferences Fill Up.

Figure 6-4-2-19 is the continuation part from figure 6-4-2-18. After that, user can press on “SELECT IMAGE” button to initiate file picker, then selects one image and fills up printing preferences.

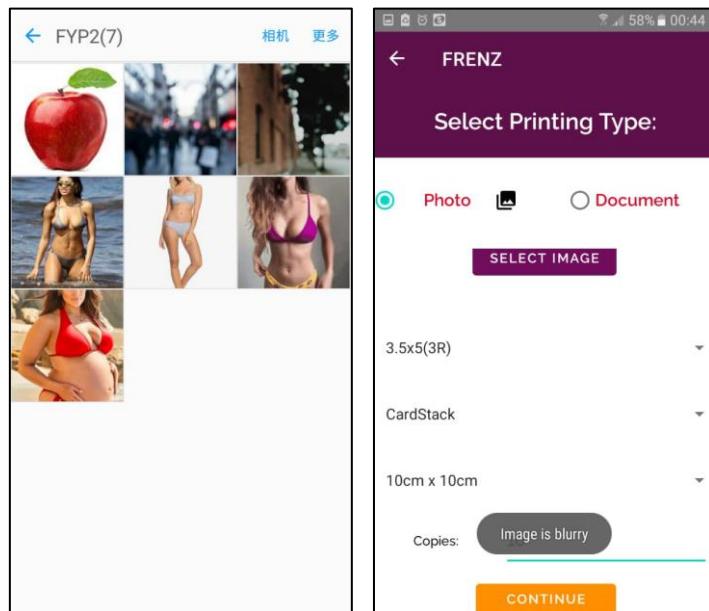


Figure 6-4-2-20: Validation Message for Images that Appears Blurry.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-2-20 is the continuation part from figure 6-4-2-19. Figure 6-4-2-20 shows the validation message for images that appear blurry. In a case where selected service provider had activated advanced function- reject blurry image, after the user fills up everything and uploads an image that appears blurry. As soon as the user presses on the “CONTINUE” button, the proposed application will display a message stating, “Image is blurry”, thus rejecting the image.

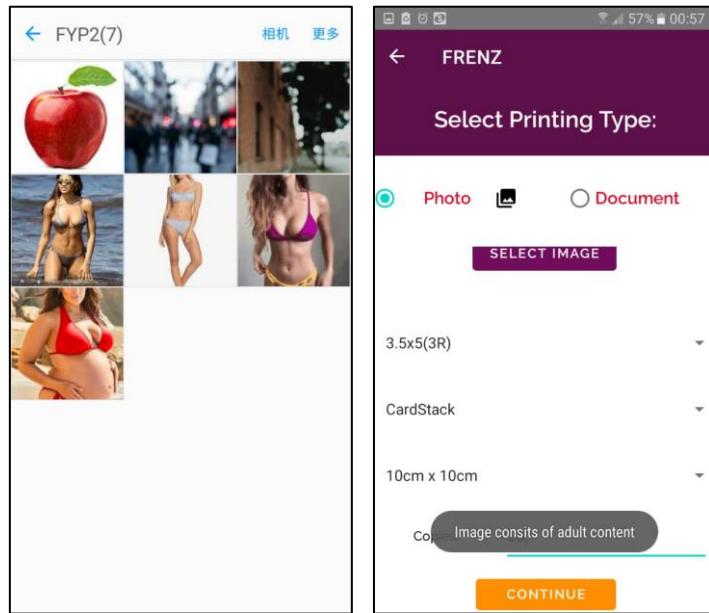


Figure 6-4-2-21: Validation Message for Images with Adult Content.

Figure 6-4-2-21 is the continuation part from figure 6-4-2-19. Figure 6-4-20 shows the validation message for image with adult content. In a case where selected service provider had activated advanced function for reject adult content image, after the user fills up everything, but uploads an image that consists of adult content. As soon as the user presses on the “CONTINUE” button, the proposed application will display a message stating “Image consists of adult content” to remind the user, thus rejecting the image.

CHAPTER 6: SYSTEM IMPLEMENTATION

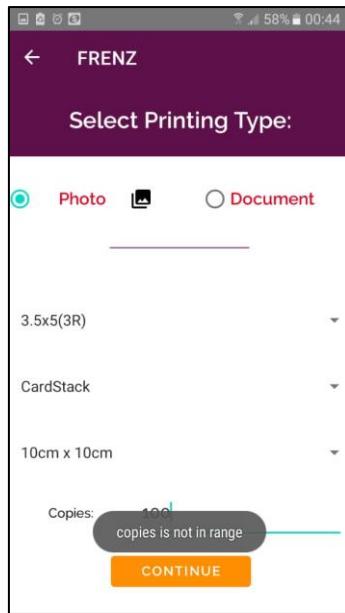


Figure 6-4-2-22: Validation Message for Copies Not in Range (Photo Printing).

Figure 6-4-2-22 is the continuation part from figure 6-4-2-19. Figure 6-4-2-22 shows the validation message for copies not in range.

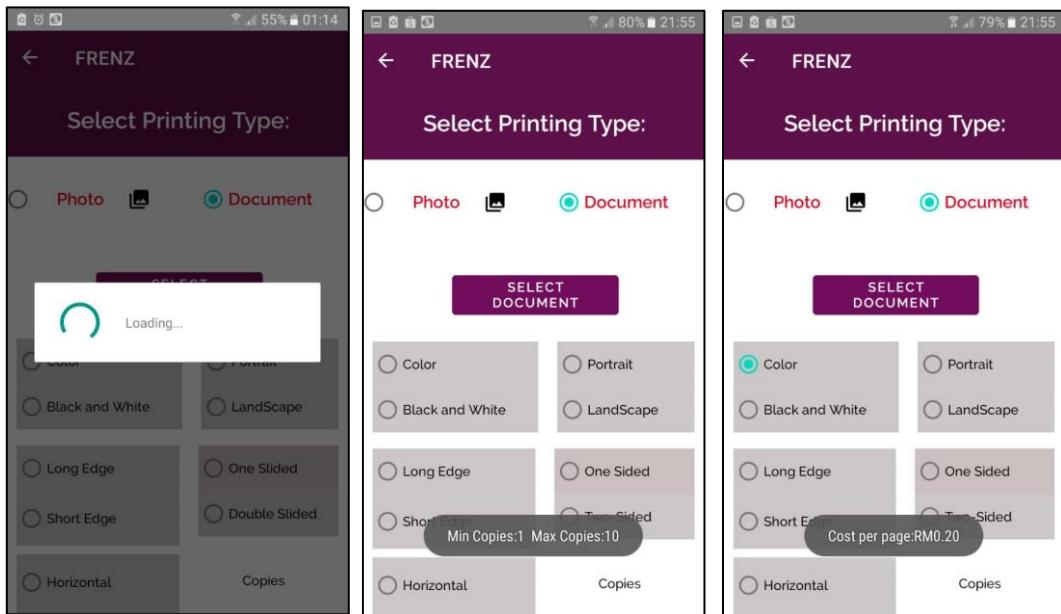


Figure 6-4-2-23: Interfaces for Document Printing.

Figure 6-4-2-23 is the continuation part from figure 6-4-2-17. If the user clicks on the “Document” radio button, the application will display info of minimum copies and maximum copies set by the selected service provider. After that, the user can select the pdf file from the file picker and fill up the required printing preferences. When the user presses on the

CHAPTER 6: SYSTEM IMPLEMENTATION

“BlackWhite” or “Color” radio button, a message stating cost per page shall be displayed to inform the user.

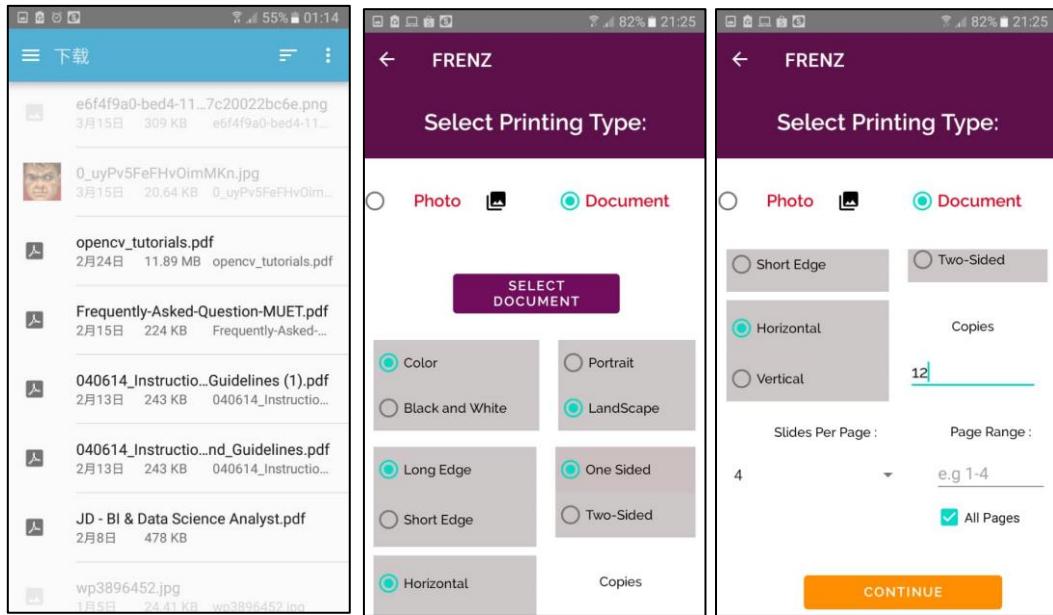


Figure 6-4-2-24: Interfaces for File Picker and Document Printing Preferences Fill Up.

Figure 6-4-2-24 is the continuation part from figure 6-4-2-23. After that, users can press on “SELECT DOCUMENT” button to initiate file picker, then select one document in pdf format and fill up printing preferences.

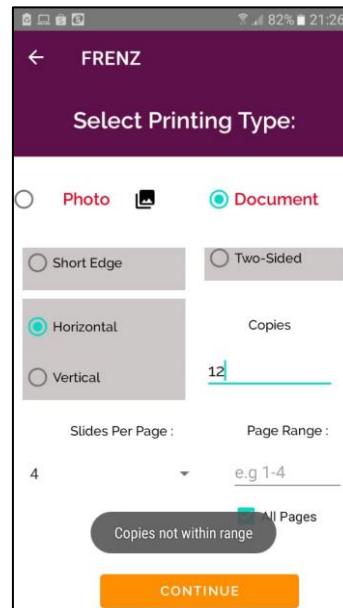


Figure 6-4-2-25: Validation Message for Copies Not in Range (Document Printing).

Figure 6-4-2-25 shows the validation message of copies not in range for document printing.

CHAPTER 6: SYSTEM IMPLEMENTATION

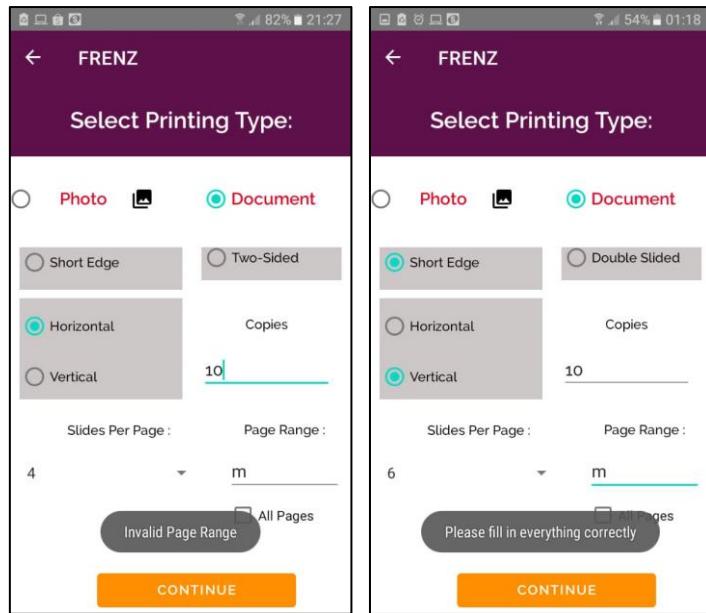


Figure 6-4-2-26: Validation Message for Invalid Page Range.

Figure 6-4-2-26 shows the validation message for invalid page range and reminds the user filling in everything correctly.

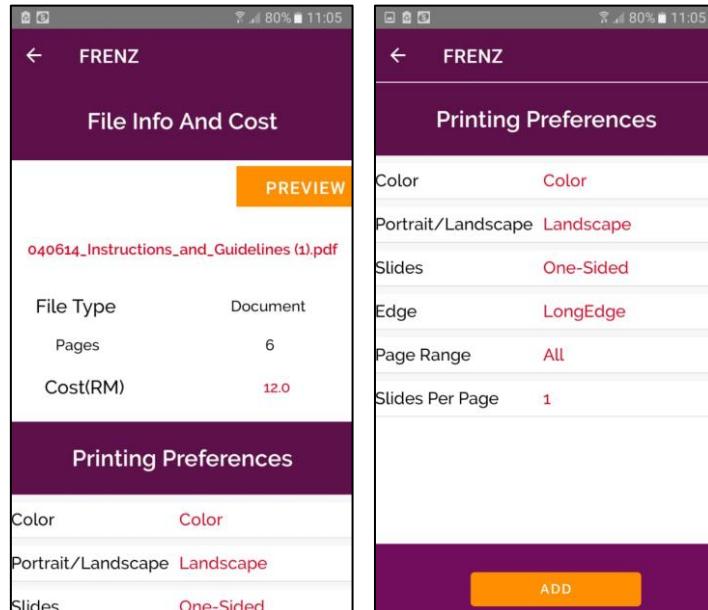


Figure 6-4-2-27: Interfaces of Displaying Printing Details for Document.

CHAPTER 6: SYSTEM IMPLEMENTATION

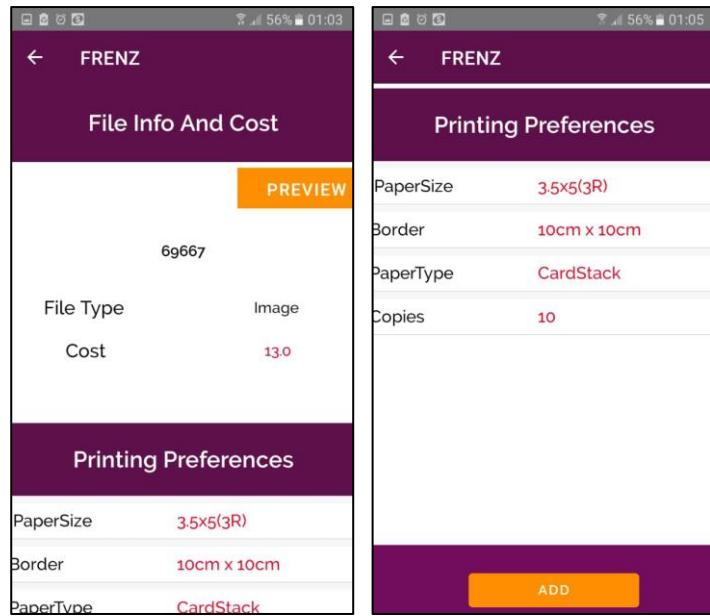


Figure 6-4-2-28: Interfaces of Displaying Printing Details for Photo.

Figure 6-4-2-27 and Figure 6-4-2-28 show interfaces of displaying printing details. After the user successfully fills up printing preferences and selects file or photo, then presses on the “CONTINUE” button in figure 6-4-2-19 or figure 6-4-2-24. User will be directed to this interface, through scrolling down this interface, it will show up name, type of selected file, page number for pdf document, total cost, and printing preferences that fill up earlier. As the user verifies everything and presses the “CONTINUE” button, the user will be directed back to the main interface for placing order as shown in figure 6-4-2-15.

CHAPTER 6: SYSTEM IMPLEMENTATION

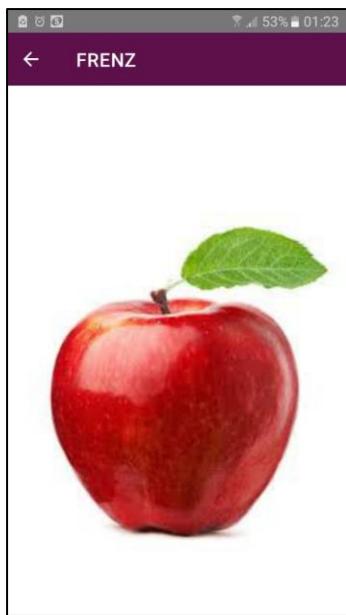


Figure 6-4-2-29: Interface of Previewing Image.



Figure 6-4-2-30: Interface of Previewing Document.

Figure 6-4-2-29 and Figure 6-4-2-30 are the continuation part from figure 6-4-2-27 and figure 6-4-2-28, after user presses on the “PREVIEW” button, user can view their selected PDF document or photo in any format.

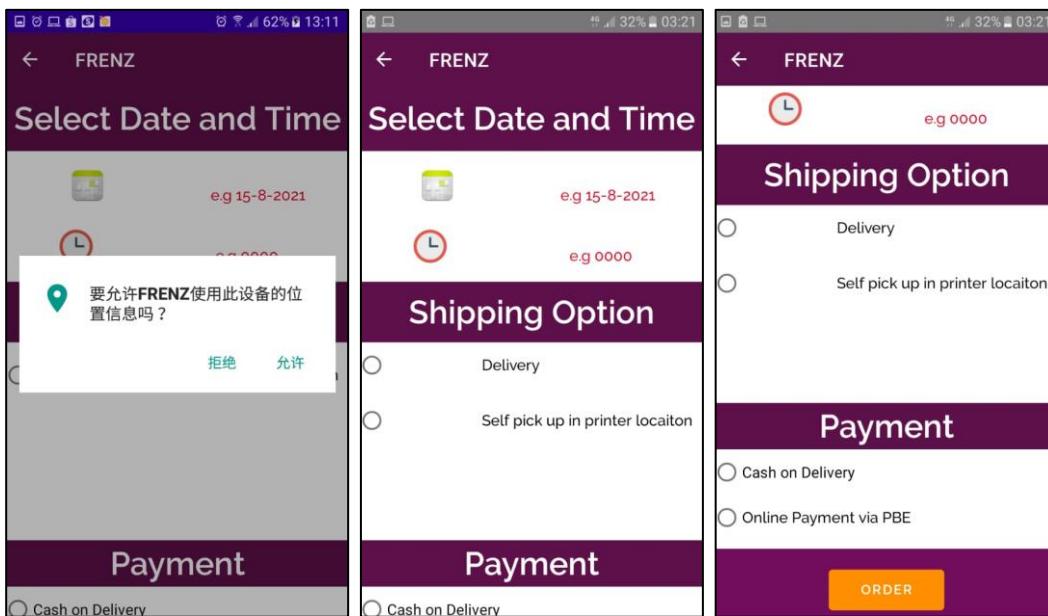


Figure 6-4-2-31: Interfaces for Selection of Date Time, Shipping Option and Payment.

Figure 6-4-2-31 shows interfaces for selection of date time, shipping option and payment. After the user presses on the “CONTINUE” button at the main interface for placing order as

CHAPTER 6: SYSTEM IMPLEMENTATION

show in figure 6-4-2-15. User will be directed to the last interface for placing orders. At first, a notification shall prompt out asking for permission to allow access of user location.

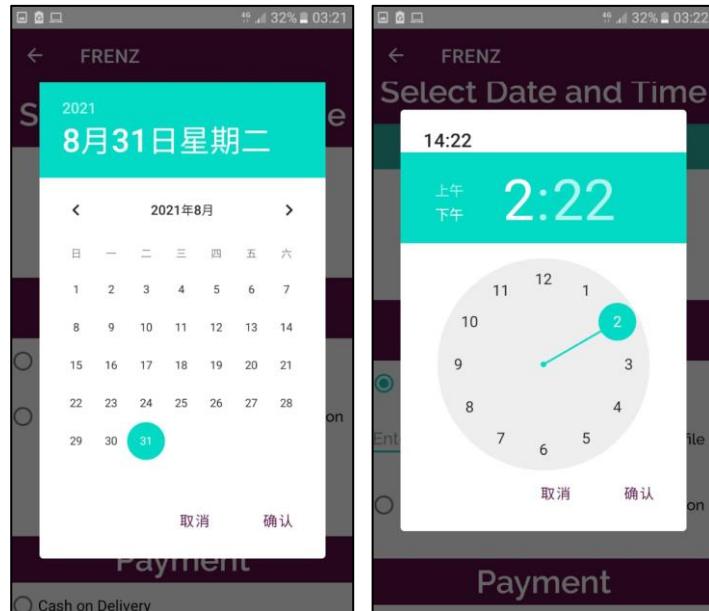


Figure 6-4-2-32: Interfaces for Selection of Date and Time.

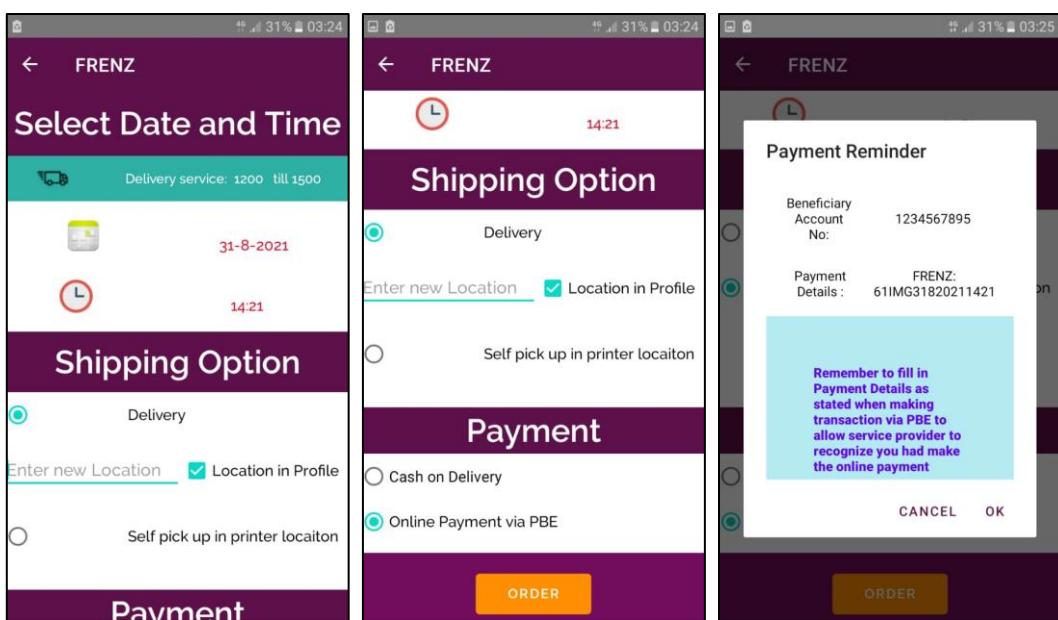


Figure 6-4-2-33: Interfaces for Filling Up Date Time, Shipping Option and Payment.

Figure 6-4-2-32 and Figure 6-4-2-33 are the continuation part from Figure 6-4-2-31. As show in figure 6-4-2-33, user is required to select date and time for order by clicking on calendar

CHAPTER 6: SYSTEM IMPLEMENTATION

icon and clock icon. Next, in a case where all options of payment and shipping set by the selected service provider are available, user able to click on the “Delivery” radio button, after that, delivery time range that is set by the selected service provider displayed on top of the interface. User checked “Location in profile” checkbox and clicks on “Online Payment via PBE” radio button. After finishing everything, the user presses on the “ORDER” button. Application will verify if everything fills up, location is valid and delivery time within range. Once verified successfully, an alert box with information of service provider PBE beneficiary account number, generated payment details and message that reminds users to input payment details during bank transactions. After the user clicks on “YES” in the alert box, the application saves new order data into the database, uploads selected images or files into firebase storage and directs the user back to the “Home” section.

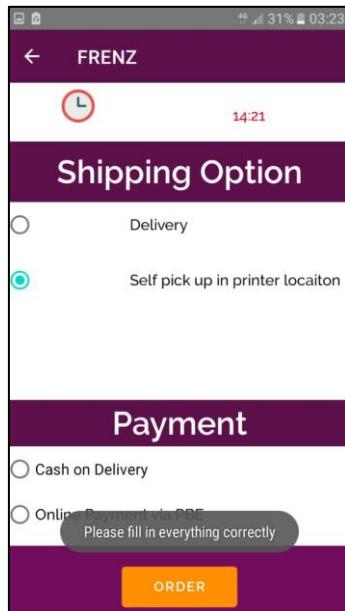


Figure 6-4-2-34: Validation Message of Interface for Selection of Date Time, Payment, Shipping Option.

Figure 6-4-2-34 shows the validation error message if user did not fill up everything. Once the user presses on the “ORDER” button, if the user did not fill up everything, a message stating “Please fill in everything correctly” displays out.

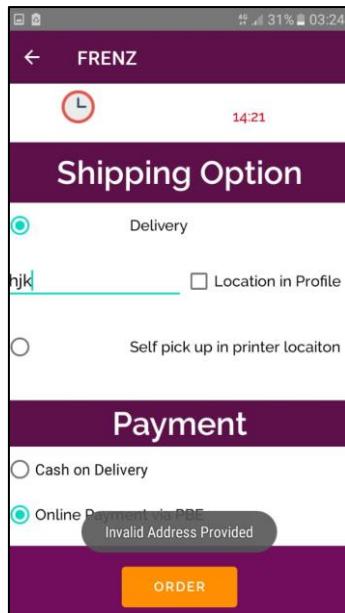


Figure 6-4-2-35: Validation Message of “Invalid Address Provided”.

Figure 6-4-2-35 shows the validation error message for invalid address. As soon as user presses on the “ORDER” button. If the user inputs an invalid address. Application displays a message stating, “Invalid Address Provided”.

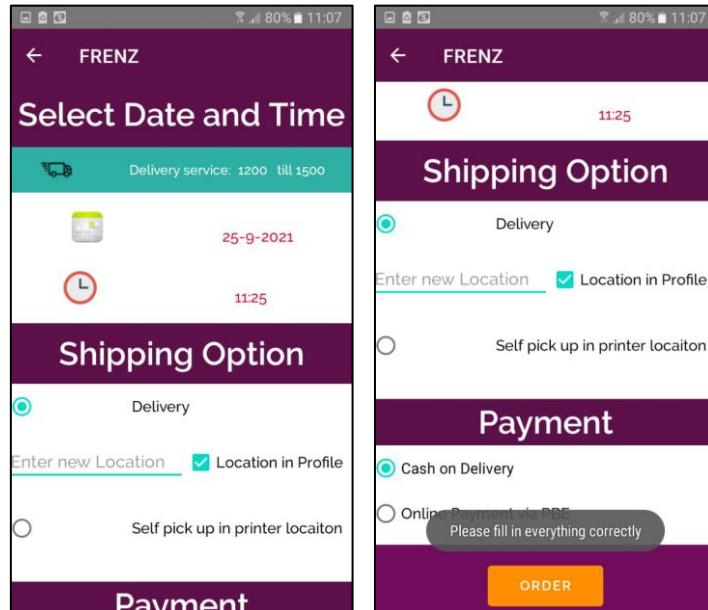


Figure 6-4-2-36: Validation Error Message for Selected Delivery Time Not Within the Time Range.

Figure 6-4-2-36 shows the validation error message for selected delivery time not within the time range which set by selected service provider. A message stating “Please fill in everything correctly” will be display out to remind user.

6. Interfaces for Module of Advanced Functionalities

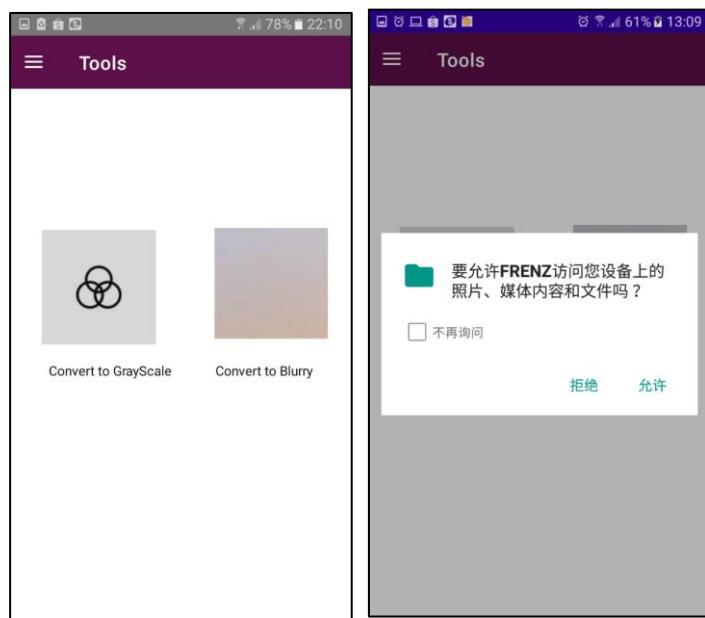
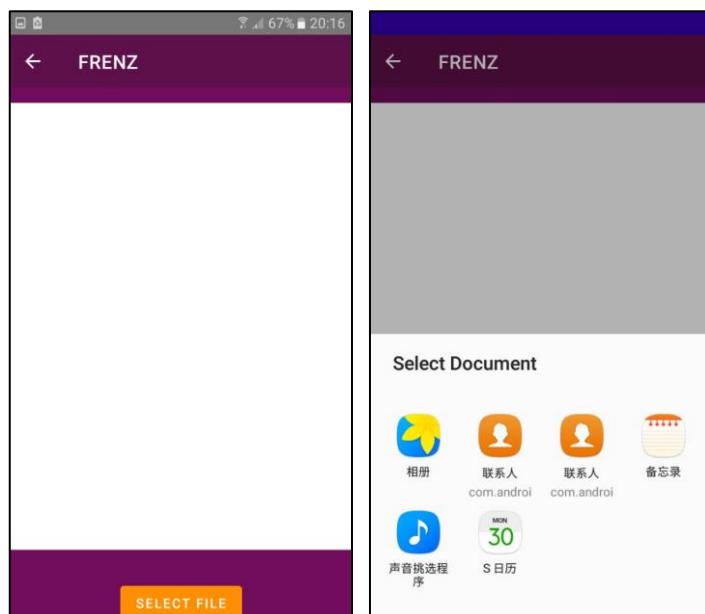


Figure 6-4-2-37: Interface for “Tools” Section.

Figure 6-4-2-37 shows interface for “Tools” section. After user clicks on “Tools” on navigation drawer bar as show in Figure 6-4-2-1, user will be directed to this section. If application does not have authority to write and read phone storage, the application will display a notification that requires user granted permission to allow application writing and reading phone storage.

I. Edit Image



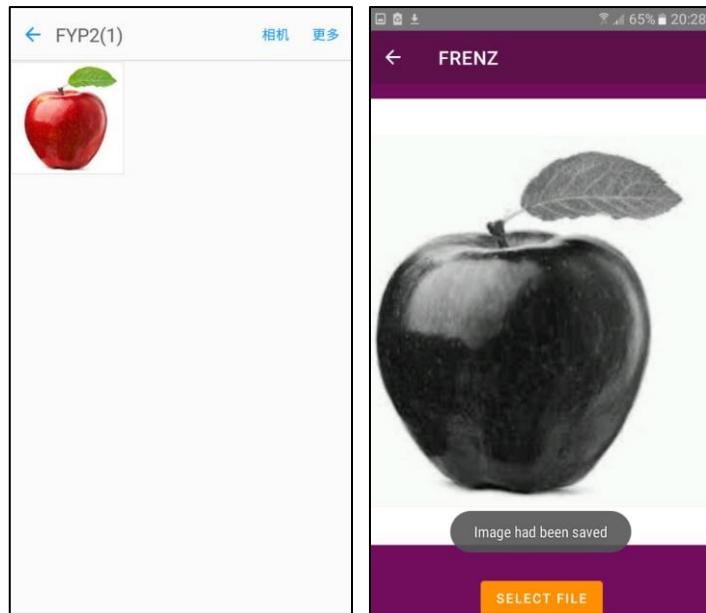
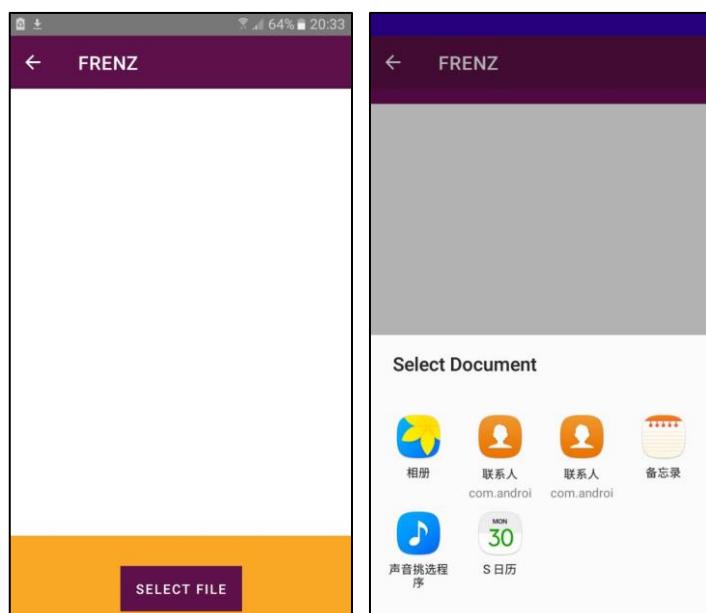


Figure 6-4-2-38: Interface for Editing Images-Grayscale.

Figure 6-4-2-38 shows the interface for editing image-Grayscale. At first, when the user clicks on “Tools” from the navigation bar, then user selects “Convert to Grayscale” image button, user will be navigated to edit image interface, user clicks on “SELECT FILE|” button, file picker will initiate, user selects one image. System will directly convert selected image to grayscale and display it on the interface. Converted image will automatically save in phone storage.



CHAPTER 6: SYSTEM IMPLEMENTATION

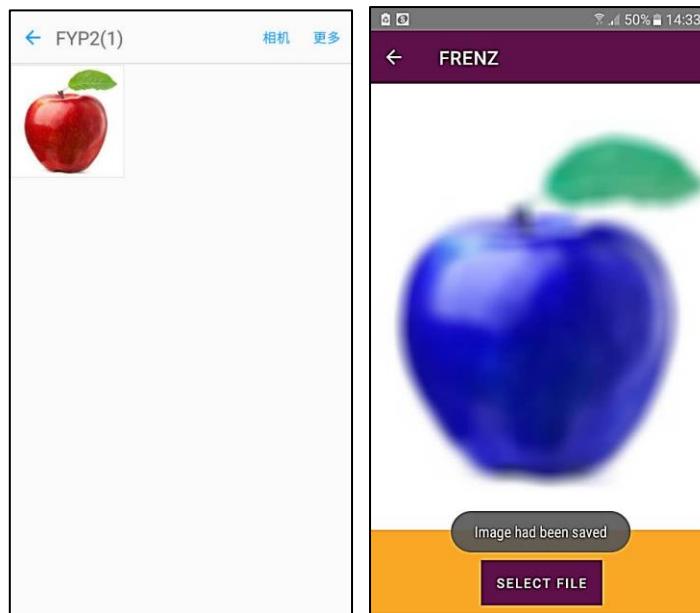


Figure 6-4-2-39: Interface for Editing Images-Blurry.

Figure 6-4-2-39 shows the interface for editing image-Blurry. At first, when the user clicks on “Tools” from the navigation bar, then user selects “Convert to Blurry” image button. Next user will be navigated to edit image interface, user clicks on “SELECT FILE|” button, file picker will be initiate, and user required to select one image. System will directly transform selected image to blurry and display it on the interface. Converted image will automatically save in phone storage.

6.4.3 Graphical User Interface of Application for User as Service Provider

1. Interface of Application Navigation Drawer for User as Service Provider

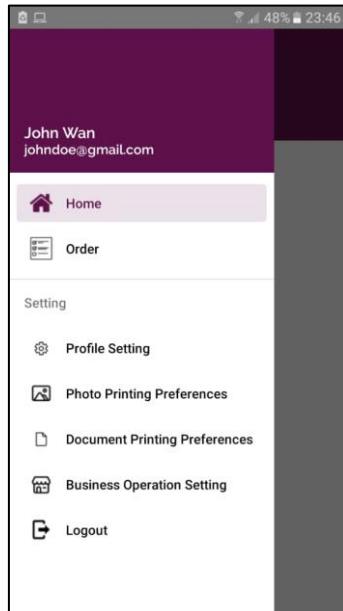


Figure 6-4-3-1: Navigation Drawer of Application for User in Service Provider Role.

Figure shows the navigation drawer of a mobile app for users with a service provider role. At the top of the navigation drawer, it displays username and email. Words such as “Home”, “Order”, “Profile Setting”, “Photo Printing Preferences Setting”, “Document Printing Preferences”, “Business Operation Setting”, “Logout” listed at the navigation drawer. Each of these words represent one specific section of application.

2. Interfaces of Module for Edit Printing Setting

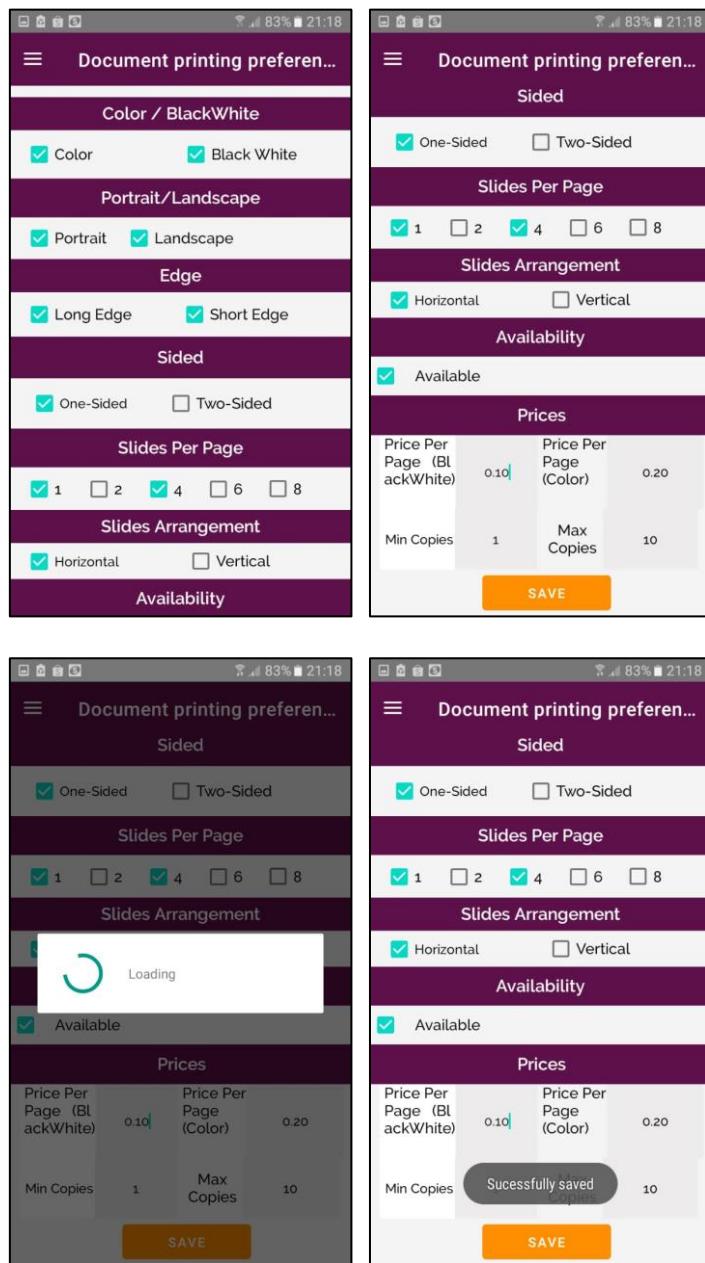


Figure 6-4-3-2: Interfaces for Editing Document Printing Setting

Figure 6-4-3-2 shows the interfaces for editing document printing setting by service provider. After the user clicks on “Document Printing Preferences Setting” as show in figure 6-4-3-1, the user will be directed to the interface. There are 11 sections for setting of document printing preferences which are Color/BlackWhite, Portrait /Landscape, Edge, Sided, Slides Per Page, Slides Arrangement, Availability, Prices, Copies. After user fills up everything, then presses the “SAVE” button, the system will validate all these inputs. If validation is successful, the system will save data to the database and display a message of “SAVED”.

CHAPTER 6: SYSTEM IMPLEMENTATION

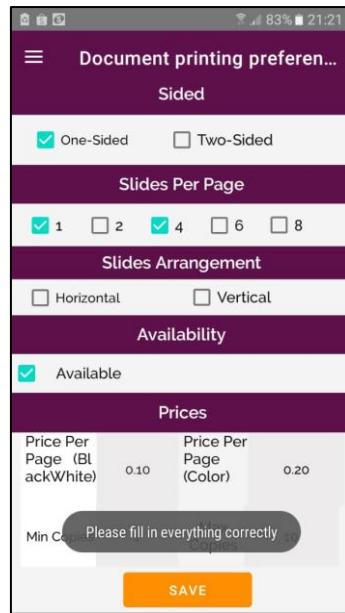


Figure 6-4-3-3: Validation Message of Edit Document Printing Setting.

Figure 6-4-3-3 shows the interface for validation message of edit document printing setting by service provider. If the user left one section empty except availability, the system displays “Please fill in everything correctly” to remind the user.

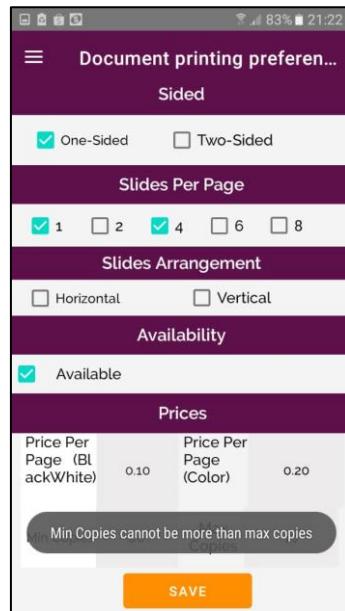


Figure 6-4-3-4: Validation Message of “Min Copies cannot be more than max copies” (Document Printing Setting).

Figure 6-4-3-4 shows the interface for validation message on edit document printing setting by service provider. If the user inputs maximum copies that are less than maximum copies, the system displays a message of “Min Copies cannot be more than max copies”.

CHAPTER 6: SYSTEM IMPLEMENTATION

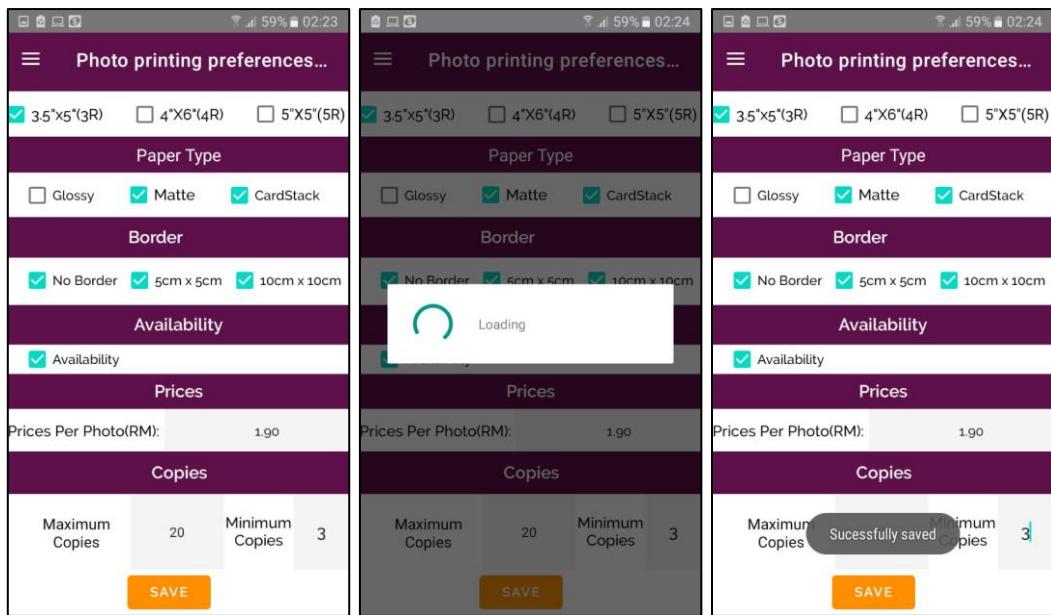


Figure 6-4-3-5: Interfaces for Editing Photo Printing Setting.

Figure 6-4-3-5 shows the interface for editing photo printing setting by service provider. There are 5 sections for setting of photo printing preferences which are size, paper type, border, price, availability, and copies. After everything fill in, then user presses the “SAVE” button, the system will validate all these inputs. If validation is successful, the system will save data to the database and display a message of “Successfully saved ”.

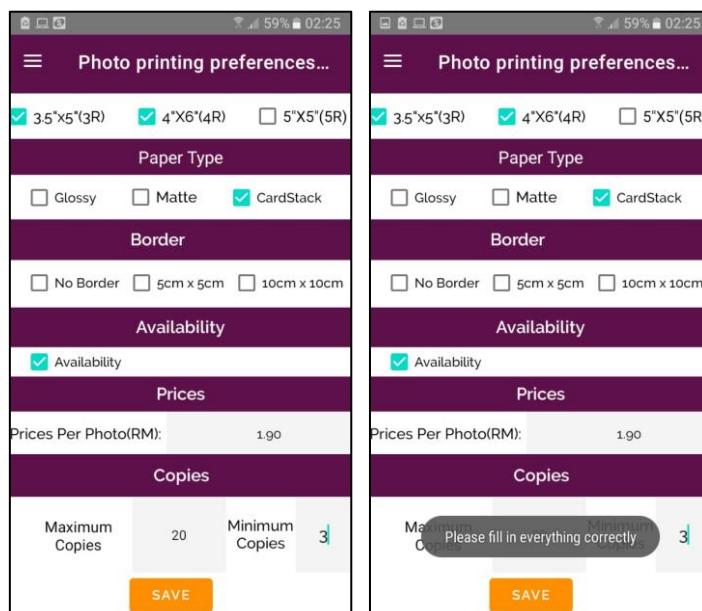


Figure 6-4-3-6: Validation Message of Edit Photo Printing Setting.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure shows the interface for validation message on edit photo printing setting by service provider. If a user leaves any section empty besides availability, the system displays “Please fill in everything correctly” to remind the user.

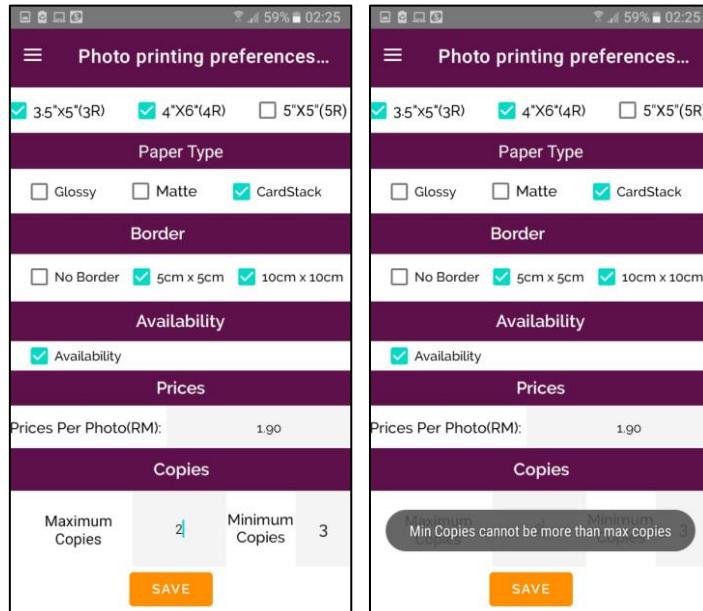


Figure 6-4-3-7: Validation Message of “Min Copies cannot be more than max copies”
(Photo Printing Setting).

Figure 6-4-3-7 shows the interfaces for validation message on edit photo printing setting by service provider. If the user provides max copies that are less than min copies, the system displays a message of “Min Copies cannot be more than max copies”.

3. Interfaces of Module for Edit Business Setting

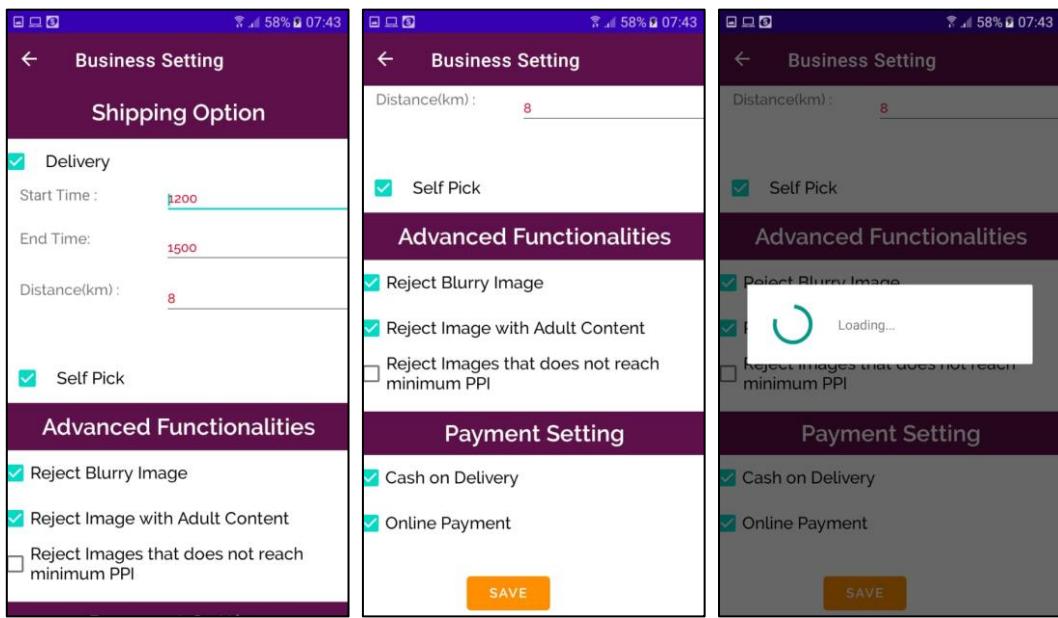


Figure 6-4-3-8: Interfaces for Edit Business Setting.

Figure 6-4-3-8 shows the interface for business settings of printing services. Users will be directed to this interface after clicking on "Business Operation Setting" on the navigation drawer as shown in figure 6-4-3-1. There are three sections for setting of business operations which are shipping option, advanced functionalities, and payment setting. User checks the checkbox in each section. If the delivery checkbox in the shipping option section is checked, the user is required to fill in the start time, end time and distance. After the user presses the "SAVE" button, the system will validate all inputs. If validation successful, the system will update all data in the database.

CHAPTER 6: SYSTEM IMPLEMENTATION

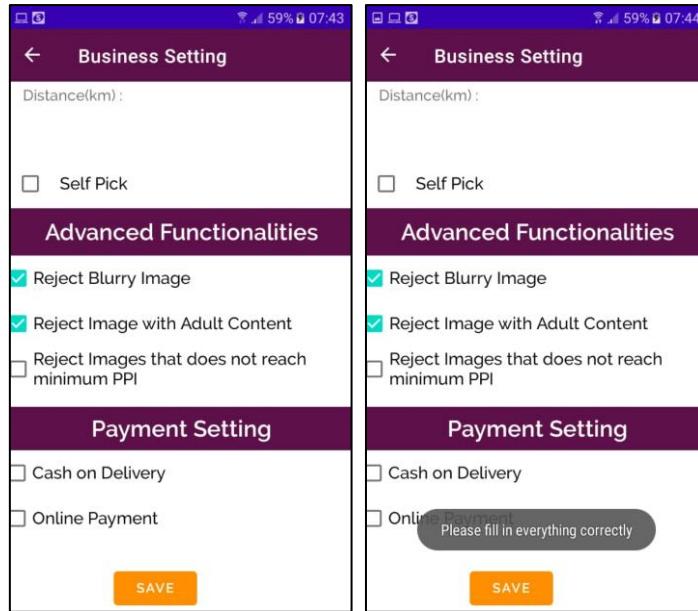


Figure 6-4-3-9: Validation Message of Edit Business Setting.

Figure 6-4-3-9 shows the interface for validation message of edit business setting for printing services by service provider. If the user left any sections empty except the advanced functionalities section, the system will display a message stating, “Please fill in everything correctly”.

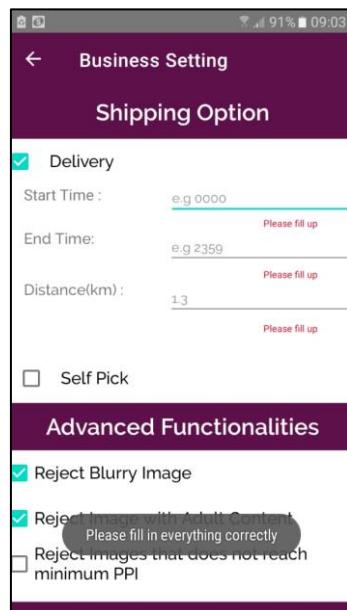


Figure 6-4-3-10: Validation Message of Start Time, End Time, and Distance (Edit Business Setting).

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-3-10 shows the interface for validation message of edit business setting for printing services by service provider. If the user did not fill up Start Time, End Time and distance, the system will display a message stating, “Please fill in everything correctly”. “Please fill up” text will be shown below the edit text of Start Time, End Time and distance.

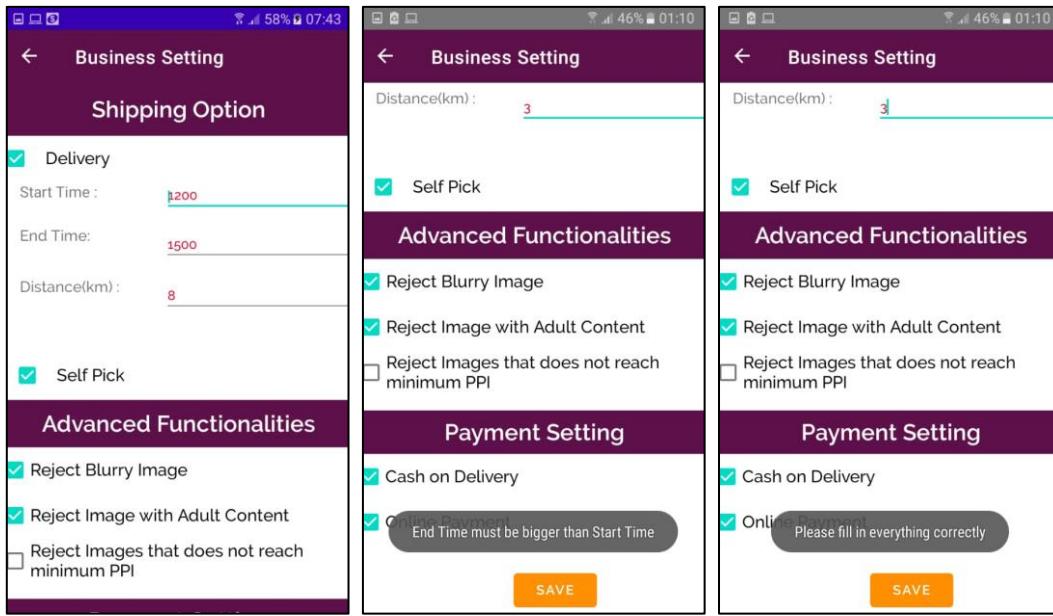


Figure 6-4-3-11: Validation Message of “End Time must be bigger than Start Time”
(Edit Business Setting).

Figure 6-4-3-11 shows the interface for validation message of edit business setting for printing services by service provider. If the user inputs End Time smaller than Start Time, and presses the “SAVE” button, the application will display a message stating, “End Time must be bigger than Start Time”, follow by a message of “Please fill in everything correctly”.

4. Interfaces of Module for View Customer Printing Order



Figure 6-4-3-12: Interface of Displaying List of New Customer Printing Orders.

Figure 6-4-3-12 shows the interface of displaying list of new customer printing orders by proposed application. After user login as service provider, user will be directed to the “Home” section as shown in figure 6-4-3-1. In this interface, the application will display a list of new customer orders with “Pending” preparation status.

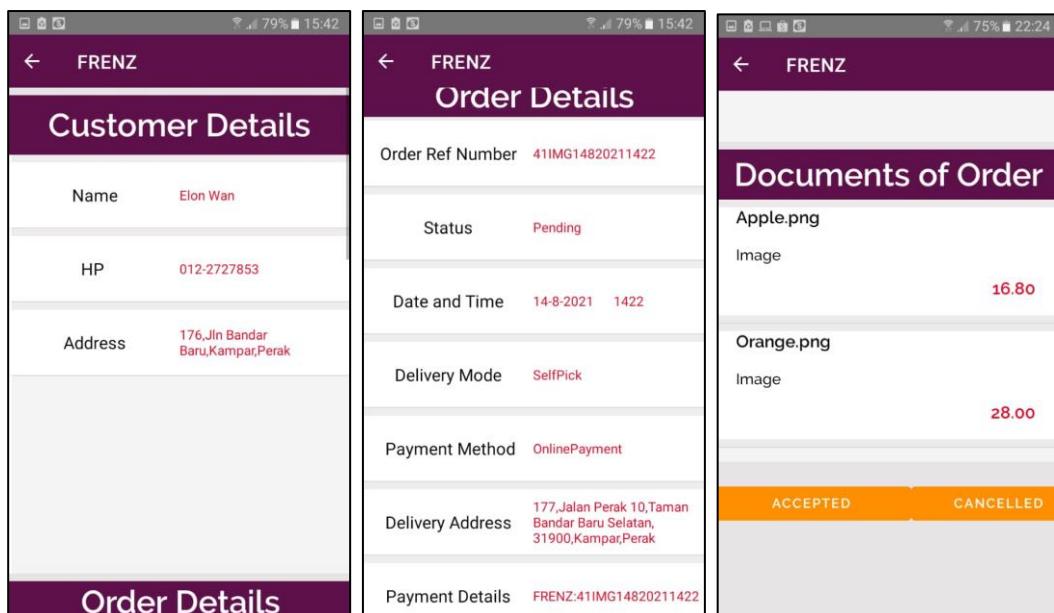


Figure 6-4-3-13: Interface of Displaying Details on Selected New Customer Printing Order.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-3-13 shows the interface of displaying details on selected new customer printing order. As soon as user clicks on one of the orders as shown in the figure 6-4-3-12, the user will be directed to this interface. In this interface, there are three main sections which represent different details of orders: customer details, order details and documents details. If user want to accept order, user shall press on “ACCEPT” button, application will update the preparation status of order in database to “ACCEPTED” and redirect user back to “Home” section. Otherwise, the user can press on the “CANCEL” button to reject the order.

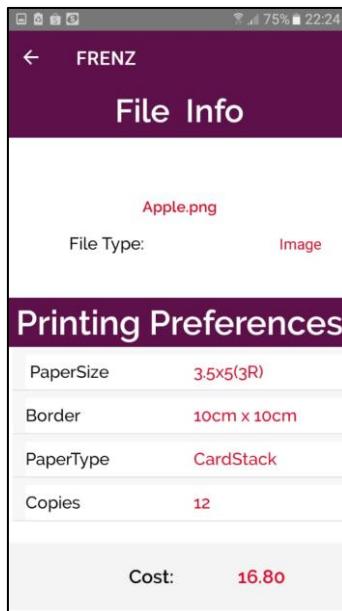


Figure 6-4-3-14: Interface of Displaying Document Detail for New Order.

Figure 6-4-3-14 is the continuation part from Figure 6-4-3-13. Once user presses on one of the rows in “Documents of Order” section, user will be directed to this interface, which display details of documents.

CHAPTER 6: SYSTEM IMPLEMENTATION

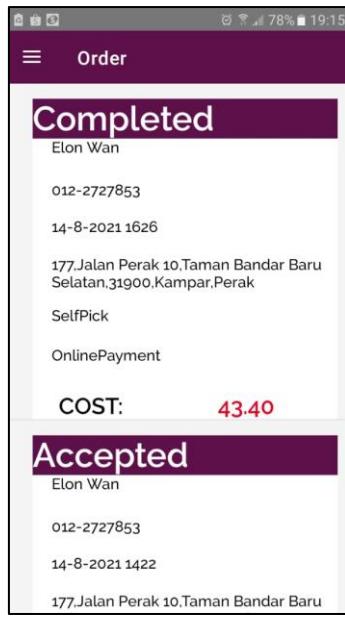
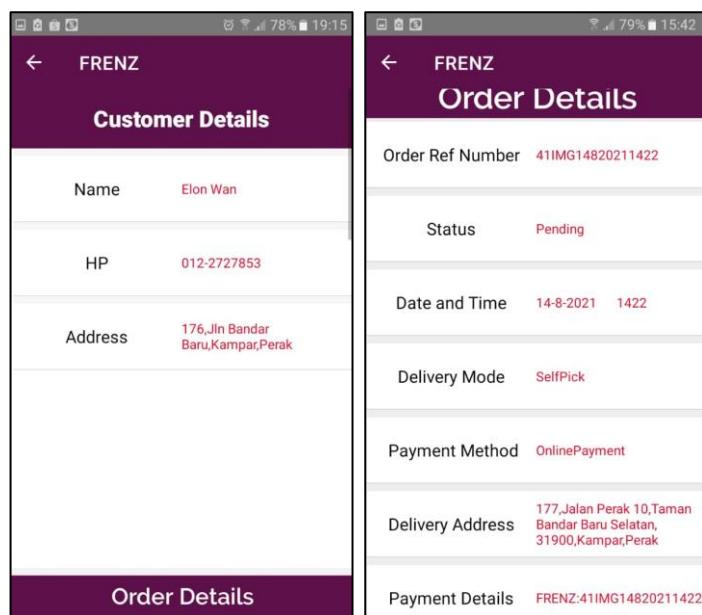


Figure 6-4-3-15: Interface of Displaying List of Customer Printing Orders.

Figure 6-4-3- 15 shows the interfaces of displaying list of customer printing orders of the proposed application. Once the user presses on “Order” in the navigation drawer as show in the figure 6-4-3-1, the user will be directed to this interface. In this interface, the application displays a list of orders. Details of order such as preparation status, name of customer, phone number, date and time of order, shipping option, total cost, address, and payment method are display here.



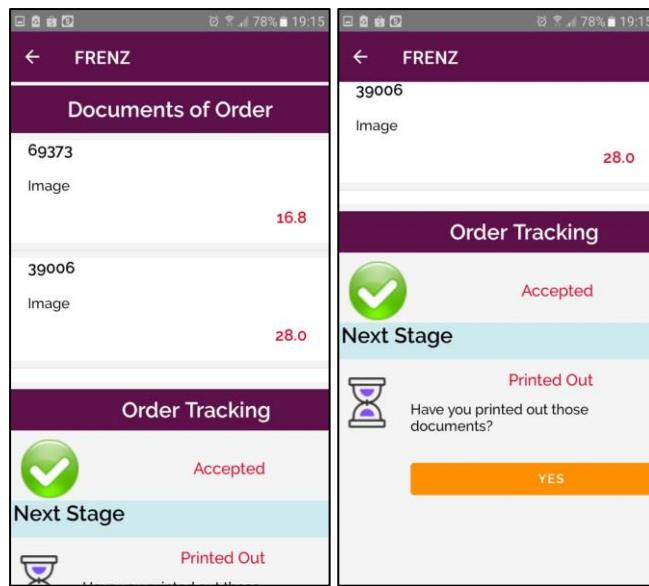


Figure 6-4-3-16: Interfaces for Displaying Details of a Specific Order.

Figure 6-4-3-16 shows the interface for displaying details of a specific order. User will be directed to this interface after pressing on one of the orders as shown in figure 6-4-3-15. Through scrolling down this interface, there are four sections that represent different details of orders: customer details, order details, documents of order and order tracking. For the section of order details, it displays order reference number, order status, date and time of order, shipping option, payment method, delivery address. If the payment method is online payment, beneficiary account no of PBE and payment details for service provider will be shown here.

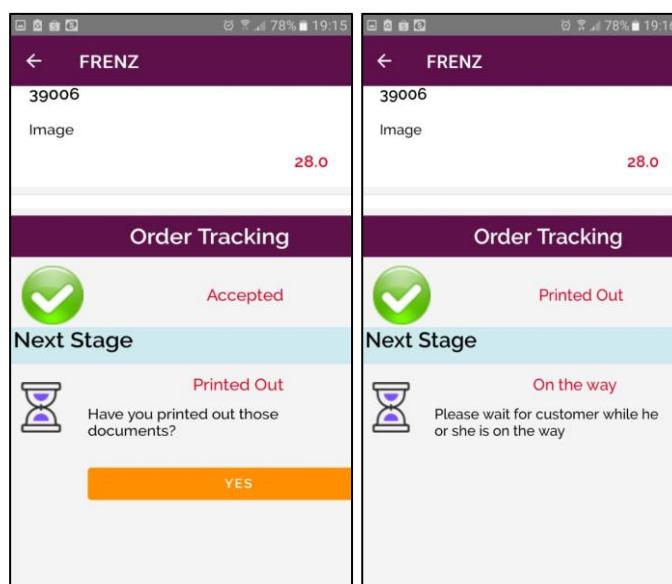


Figure 6-4-3-17: Interface of Order Tracking.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-3-17 shows the interface of order tracking. This interface is part of the interface as shown in figure 6-4-3-16. The text next to the ‘tick’ icon shows the current preparation status of this order while the text and description below the ‘next stage’ banner shows the preparation status for next stage and the requirement to fulfil. To change the preparation status of the order, after the user fulfils the requirement, user clicks on the “YES” button.

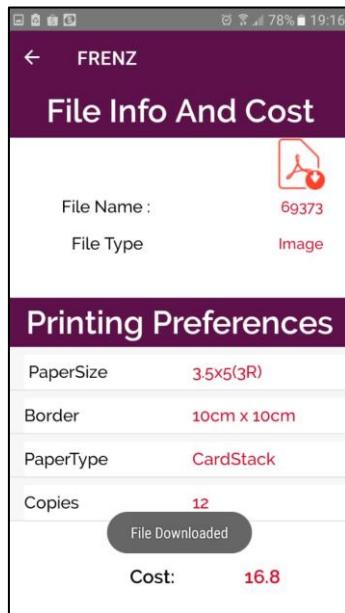


Figure 6-4-3-18: Interface of displaying details of a document.

Figure 6-4-3-18 shows the interface for displaying details of a document in an order. After the user presses on one of the documents as shown in the figure 6-4-3-16, the user will be directed to this interface. File name, cost and printing preferences for this document will be displayed for the user to view. To download the file, user clicks on the “download file” icon.

6.4.4 Graphical User Interface of Application for User as Admin

1. Interface of Application Navigation Drawer for Admin

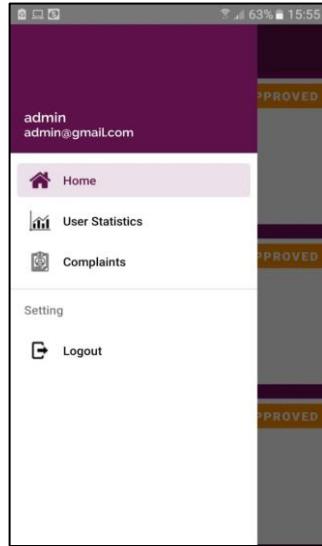


Figure 6-4-4-1: Navigation Drawer of Application for Admin.

Figure 6-4-4-1 shows the navigation drawer of mobile app for user with admin role. At the top of the navigation drawer, it displays username and email. Words such as “Home”, “User Statistics”, “Complaints”, “Logout” listed at the navigation drawer. Each of these words represents one specific section of application.

2. Interfaces of Module for Management of Application Activities

I. View Statistics of User’s Number Based on Their Roles.



Figure 6-4-4-2: Interface for Statistics of User’s Number Based on Their Roles.

CHAPTER 6: SYSTEM IMPLEMENTATION

Figure 6-4-4-2 shows interface for statistics of user's number based on their roles. Firstly, users go to the navigation drawer as shown in figure 6-4-4-1, click "User Statistics".

Application displays a pie chart for the number of service provider and customer. Total number of customers, printers and users displayed as well.

II. Block or Approve Users from Access



Figure 6-4-4-3: Interface for Blocking or Approving Users from Access.

Figure 6-4-4-3 shows the interface for blocking or approving users from access. In this interface, the user can view the details of the user such as username, user id, phone number, e-mail, access status and role of the user. The text on the button shows the current access status of the user. To change the access status of a user, user just need to click the button, the text of the button will change which shows the new access status of the listed user. The system will update the access status of user in the database.

III. View Complaint Record

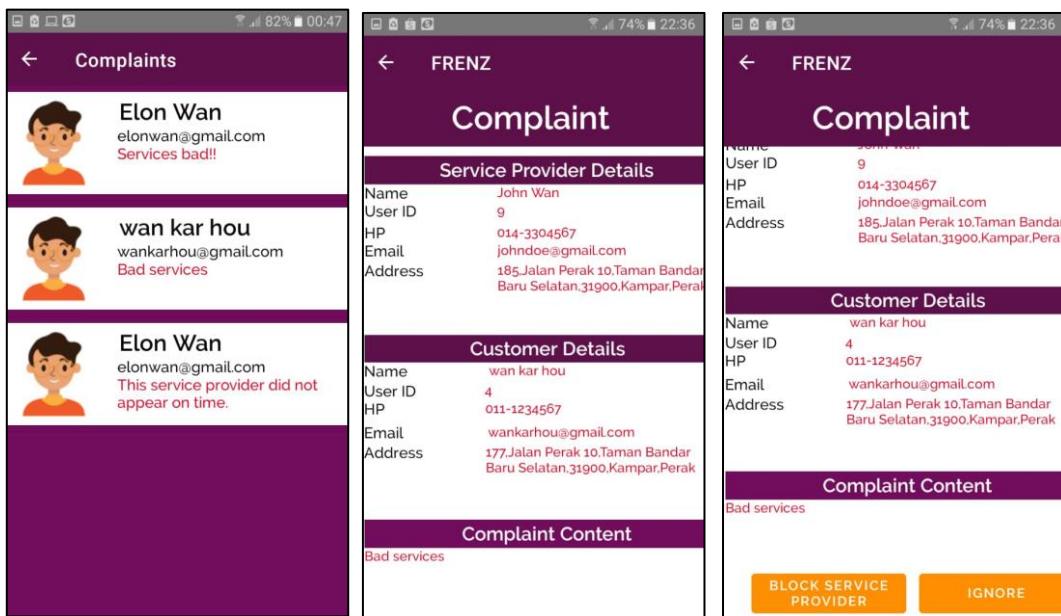


Figure 6-4-4-4: Interfaces for Displaying Complaints Records.

Figure 6-4-4-4 shows the interfaces for viewing complaint records. Firstly, user goes to the navigation drawer as show in figure 6-4-4-1, click “Complaints”. In this interface, user can view lists of complaints filed by customers. User presses on one of the complaints, system will direct user to interface for more specific details of selected complaint, user able to view service provider details, complaint content and customer details. Eventually, if the user decided to block service provider from access their account, admin just had to click on the “BLOCK SERVICE PROVIDER” button, otherwise click on “IGNORE” to ignore the complaint. The system will update the access status of user and complaint status in the database.

CHAPTER 7

System Testing and Result

7.1 Testing on Modules of Proposed Application

7.1.1 Test Case for Module of User Authentication

Table 7-1-1-1: Test Case (TC_UA_Login_1) for Module of User Authentication-Login.

Module Name	User Authentication – Login		
Date of creation	15/08/2021		
Test Case ID	TC_UA_Login_1		
Test Scenario	To verify the functionality of user logins into account.		
Test Case Description	Test the functionality of user successfully login into account.		
Pre-Requirements	1. Users presses on the icon of the application in their mobile phone. 2. Animated splash screen appears for three seconds.		
Result	1. Application displays “Login Success”. 2. Application directs user to the home page.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Inputs correct email.	“elonwan@gmail.com”	Done
2.	Inputs correct password.	“Fyp2021”	Done
2	Presses the “LOGIN” button.	N/A	Done

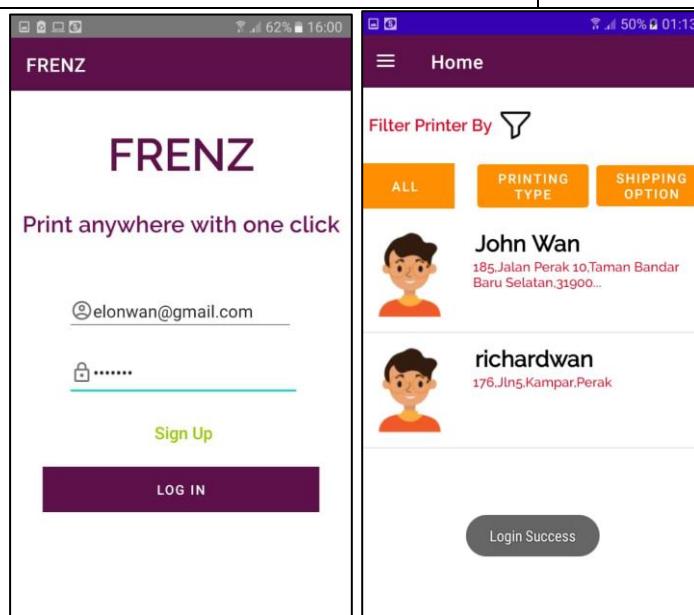


Figure 7-1-1-1: Test Result of Test Case “TC_UA_Login_1”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-1-2: Test Case (TC_UA_Login_2) for Module of User Authentication-Login.

Module Name	User Authentication-Login		
Date of creation	15/08/2021		
Test Case ID	TC_UA_Login_2		
Test Scenario	To verify the validation of user logins into account.		
Test Case Description	Test the validation of user logins into account.		
Pre-Requirements	1. User presses on the app icon on mobile phone. 2. Animated splash screen displays for 3 seconds.		
Result	1. Application displays message of “Login Fail”.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1.	Inputs wrong username.	elapwan@gmail.com	Done
2.	Inputs wrong password.	Fyt2021	Done
3,	Presses “LOGIN” button.	N/A	Done

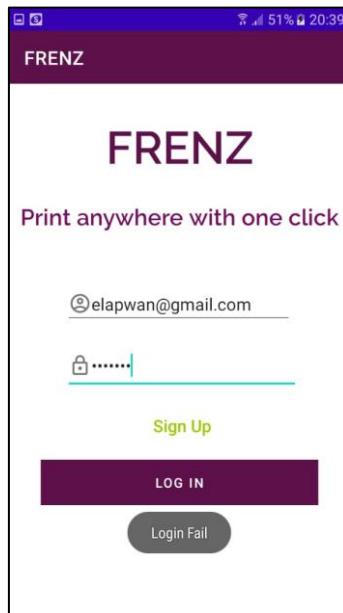


Figure 7-1-1-2: Test Result of Test Case “TC_UA_Login_2”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-1-3: Test Case (TC_UA_Register_1) for Module of User Authentication-Registration.

Module Name	User Authentication- Registration		
Date of creation	15/08/2021		
Test Case ID	TC_UA_Register_1		
Test Scenario	To verify the functionality of user registration as customer and validation message display.		
Test Case Description	Test the user registration as customer and validation message display.		
Pre-Requirements	1. User presses on the app icon on mobile phone. 2. Animated splash screen displays for 3 seconds. 3. User presses “SIGN UP” at the login page and directed to user registration interface.		
Result	1. Application displays message of “Please fill in everything correctly”. 2. Application displays text of “Username too short, enter minimum of 6 characters”. 3. Application displays text of “Please enter valid email”. 4. Application displays text of “Please enter valid phone number”. 5. Application displays text “Please enter valid address”. 6. Application displays text of “Password too short, enter minimum of 6 characters.”		
Test Result			
Case	Test Action	Test Data	Status
1.	Presses “Customer” radio button.	N/A	Done
2.	Presses “REGISTER AS USER” button.	N/A	Done

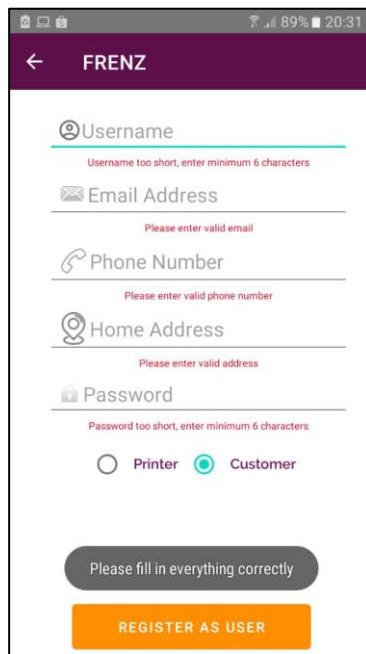


Figure 7-1-1-3: Test Result of Test Case “TC_UA_Register_1”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-1-4: Test Case (TC_UA_Register_2) for Module of User Authentication-Registration.

Module Name	User Authentication- Registration		
Date of creation	15/08/2021		
Test Case ID	TC_UA_Register_2		
Test Scenario	To verify the functionality of user registration as service provider and validation message display.		
Test Case Description	Test the user registration as printer and validation message display.		
Pre-Requirements	1. User presses on the app icon on mobile phone. 2. Animated splash screen displays for 3 seconds. 3. User presses “SIGN UP” at the login page and directed to user registration page		
Result	1. Application displays of “Please fill in everything correctly”. 2. Application displays text of “Username too short, enter minimum of 6 characters”. 3. Application displays text of “Please enter valid email”. 4. Application displays text of “Please enter valid phone number”. 5. Application displays text “Please enter valid address”. 6. Application displays text of “Password too short, enter minimum of 6 characters.” 7. Application displays text of “Must be number and minimum length of 10.”		
Test Result			
Case	Test Action	Test Data	Status
1.	Presses on “Printer” radio button.	N/A	Done
2.	Presses on “REGISTER AS USER” button.	N/A	Done

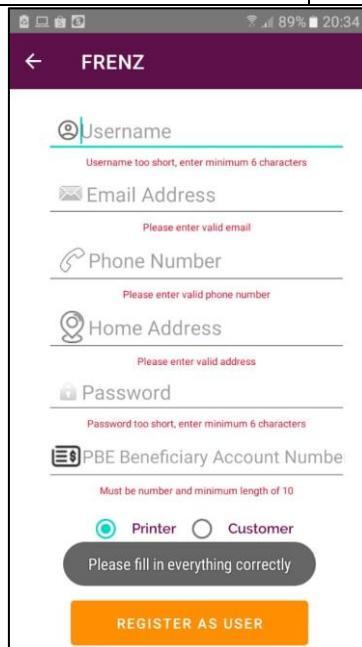


Figure 7-1-1-4: Test Result of Test Case “TC_UA_Register_2”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-1-5: Test Case (TC_UA_Register_3) for Module of User Authentication-Registration.

Module Name	User Authentication – Registration		
Date of creation	15/08/2021		
Test Case ID	TC_UA_Register_3		
Test Scenario	To verify the functionality of user registration as service provider.		
Test Case Description	Test the function of user registration as service provider.		
Pre-Requirements	1. User presses on the app icon on mobile phone. 2. Animated splash screen display for 3 seconds. 3. User presses “SIGN UP” at the login page and directed to user registration page		
Result	1. Application displays “Register successfully!” and save registration data into database. 2. Users redirected back to the login page.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on “Printer” radio button.	N/A	DONE
2	Inputs username.	GilbertWan	DONE
3	Inputs email.	gilbertwan@gmail.com	DONE
4	Inputs phone number.	013-4476344	DONE
5	Inputs address.	132,Jalan Mewah,Taman Bandar Baru, 31900,Kampar,Perak	DONE
6	Inputs password.	Fyp2021	DONE
7	Inputs PBE beneficiary account number.	6905472905	DONE
8	Presses on “REGISTER AS USER” button.	N/A	DONE

CHAPTER 7: SYSTEM TESTING AND RESULT

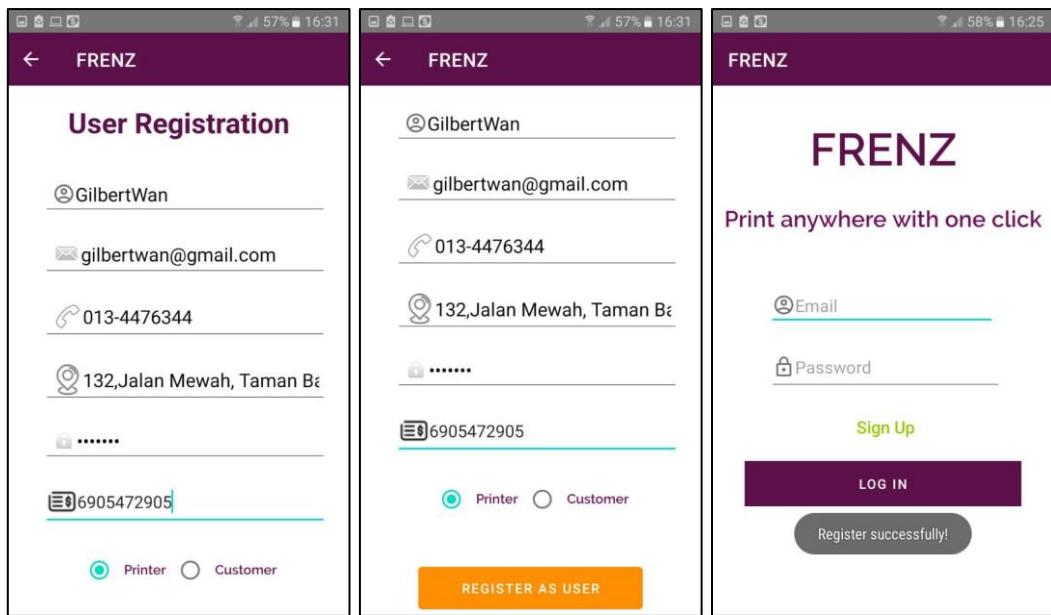


Figure 7-1-1-5: Test Result of Test Case “TC_UA_Register_3:”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-1-6: Test Case (TC_UA_Register_4) for Module of User Authentication-Registration.

Module Name	User Authentication –Registration		
Date of creation	15/08/2021		
Test Case ID	TC_UA_Register_4		
Test Scenario	To verify the functionality of user registration as customer.		
Test Case Description	Test the function of user registration as a customer.		
Pre-Requirements	1. User presses on the app icon on mobile phone. 2. Animated splash screen displays for 3 seconds. 3. User presses “SIGN UP” at the login page and directed to user registration page.		
Result	1. Application displays “Register successfully”. 2. Registration data saved into the database. 3. Users redirected back to the login page.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on “Customer” radio button.	N/A	DONE
2	Inputs username.	KelvinWan	DONE
3	Inputs email.	kelvinwan@gmail.com	DONE
4	Inputs phone number.	013-7745678	DONE
5	Inputs address.	134,Jalan Mewah,Taman Bandar Baru, 31900,Kampar,Perak	DONE
6	Inputs password.	Fyp2021	DONE
7	Presses on “REGISTER AS USER” button.	N/A	DONE

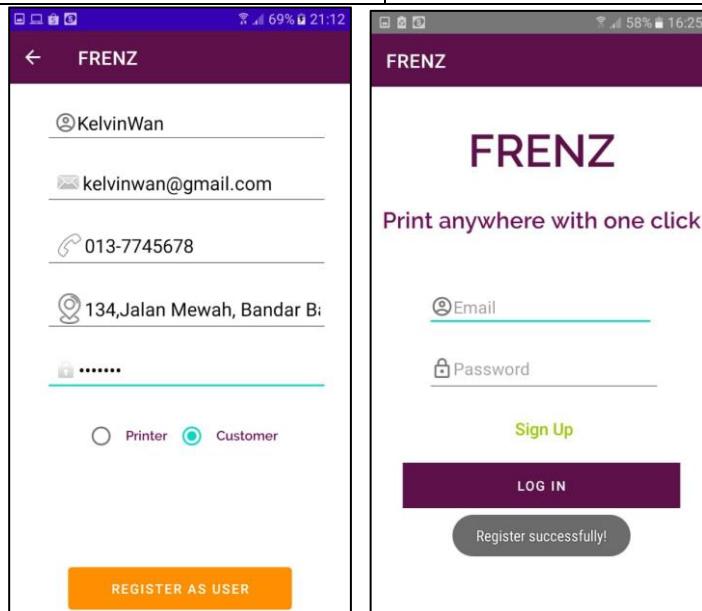


Figure 7-1-1-6: Test Result of Test Case “TC_UA_Register_4”.

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.2 Test Case for Module of Create and View Feedback

Table 7-1-2-1: Test Case (TC_FB_1) for Module of Create and View Feedback-View Feedback.

Module Name	Create and View Feedback-View Feedback		
Date of creation	15/08/2021		
Test Case ID	TC_FB_1		
Test Scenario	To verify the functionality of the user views other feedbacks on specific service providers.		
Test Case Description	Test the function of the user views list of feedbacks on a specific service provider.		
Pre-Requirements	1. User logs in as “customer”. 2. User selects a service provider and views their profile.		
Result	1. Application fetches data of feedback from database. 2. Application displays a list of feedbacks from other users for the user to view.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on “FEEDBACK” button	N/A	DONE

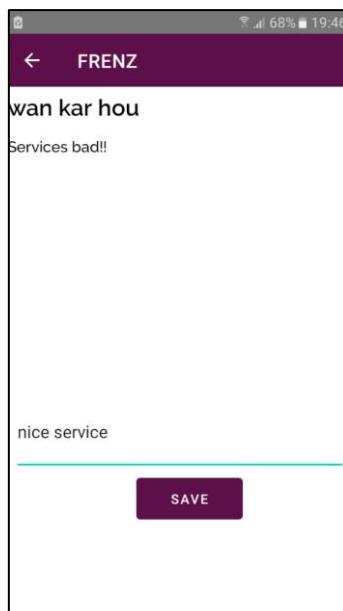


Figure 7-1-2-1: Test Result of Test Case “TC_FB_1”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-2-2: Test Case (TC_FB_2) for Module of Create and View Feedback-Create Feedback.

Module Name	Create and View Feedback-Create Feedback		
Date of creation	15/08/2021		
Test Case ID	TC_FB_2		
Test Scenario	To verify the functionality of the user provides feedback on a specific service provider.		
Test Case Description	Testing the function of the user provides feedback on a specific service provider.		
Pre-Requirements	1. User logins as “customer”. 2. User selects a service provider and view their profile. 3. User presses the “FEEDBACK” button.		
Result	1. Application saves feedback content into database. 2. Application displays a list of new feedbacks.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Inputs feedback content.	Nice Services	DONE
2	Presses “SAVE”.	N/A	DONE

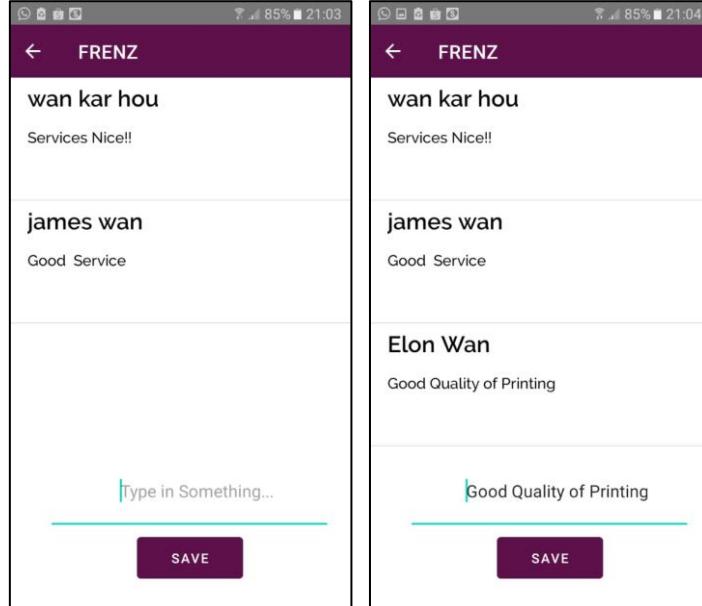


Figure 7-1-2-2: Test Result of Test Case “TC_FB_2”.

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.3 Test Case for Module of Rating

Table 7-1-3-1: Test Case (TC_RA_1) for Module of Rating – View Average Rating.

Module Name	Rating – View Average Rating		
Date of creation	15/08/2021		
Test Case ID	TC_RA_1		
Test Scenario	To verify the functionality of user views average rating of specific service provider.		
Test Case Description	Test the case of user views average rating of specific service provider.		
Pre-Requirements	1. User logins as “customer”. 2. User selects a service provider and view their profile.		
Result	1. Application calculates average rating of specific service provider. 2. Application displays average ratings for user to view.		
Test Result	Pass		
Case	Test Action	Test Data	Status
N/A	N/A	N/A	N/A

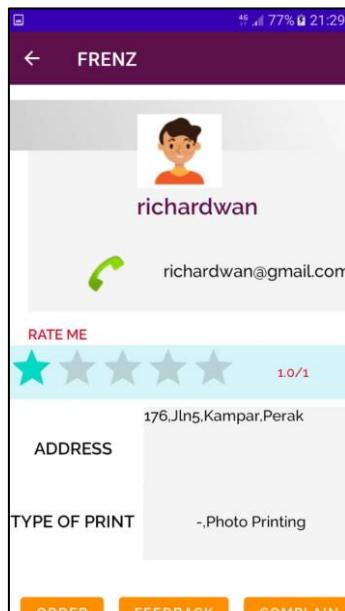


Figure 7-1-3-1: Test Result of Test Case "TC_RA_1".

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-3-2: Test Case (TC_RA_2) for Module of Rating-Provide Rating.

Module Name	Rating-Provide Rating		
Date of creation	15/08/2021		
Test Case ID	TC_RA_2		
Test Scenario	To verify the functionality of a user rates specific service provider.		
Test Case Description	Test the case of a user rates specific service provider.		
Pre-Requirements	1. User logins as “customer”. 2. User selects a service provider and view their profile.		
Result	Application displays a new average rating of the service provider and saves the user rating on the database.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Swipe from left to right on rating bar	3	DONE

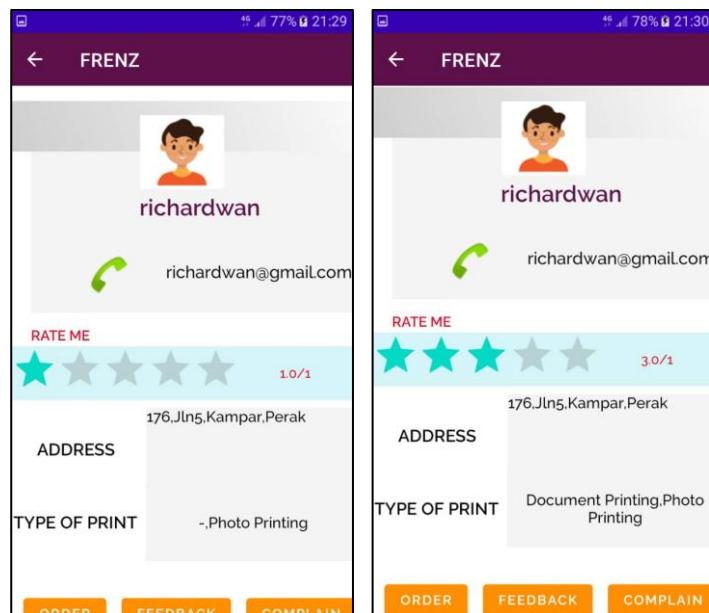


Figure 7-1-3-2: Test Result of Test Case "TC_RA_2".

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.4 Test Case for Module of File Complaint

Table 7-1-4-1: Test Case (TC_COM_1) for Module of File Complaint.

Module Name	File Complaint		
Date of creation	15/08/2021		
Test Case ID	TC_COM_1		
Test Scenario	To verify the functionality of a user files complaint on a service provider.		
Test Case Description	Test the case of a user files complaint on a specific service provider.		
Pre-Requirements	1. User logins as “customer”. 2. User selects a service provider and view their profile.		
Result	Application prompt out alert box for user to fill in complaint content and saved the complaint content file into the database. Application displays a message of “Your complaint received by admin”		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses the “COMPLAINT” button.	N/A	DONE
2	Inputs complaint content.	This service provider did not appear on time.	DONE
3	Presses “SEND”	N/A	DONE

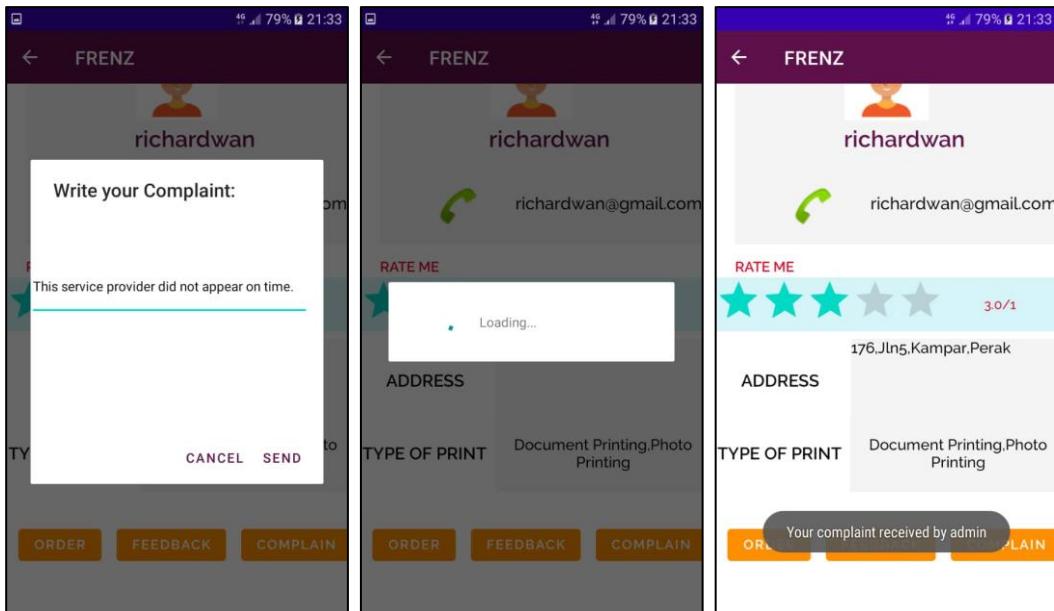


Figure 7-1-4-1: Test Result of Test Case "TC_COM_1".

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.5 Test Case for Module for Place and View Order

Table 7-1-5-1: Test Case (TC_PV_1) for Module for Place and View Order-View Order.

Module Name	Place and view order-View Order		
Date of creation	15/08/2021		
Test Case ID	TC_PV_1		
Test Scenario	To verify the functionality of viewing orders by user as a customer role.		
Test Case Description	Test function of viewing order by user as a customer role.		
Pre-Requirements	1.User logins as customer. 2.User presses “Order” at the navigation bar.		
Result	Before Case 1, the application displays a list of orders with preparation status, service provider details, payment detail, shipping option and total cost. In Case 1, the application displays four sections that represent different details of orders, service provider details, order details, documents of order and order tracking. In Case 2, profile of service provider is displayed.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on one of the orders.	N/A	DONE
2	Presses on the profile icon in service provider details section.	N/A	DONE



Figure 7-1-5-1: Test Result of Test Case”TC_PV_1” (Before Case 1).

CHAPTER 7: SYSTEM TESTING AND RESULT

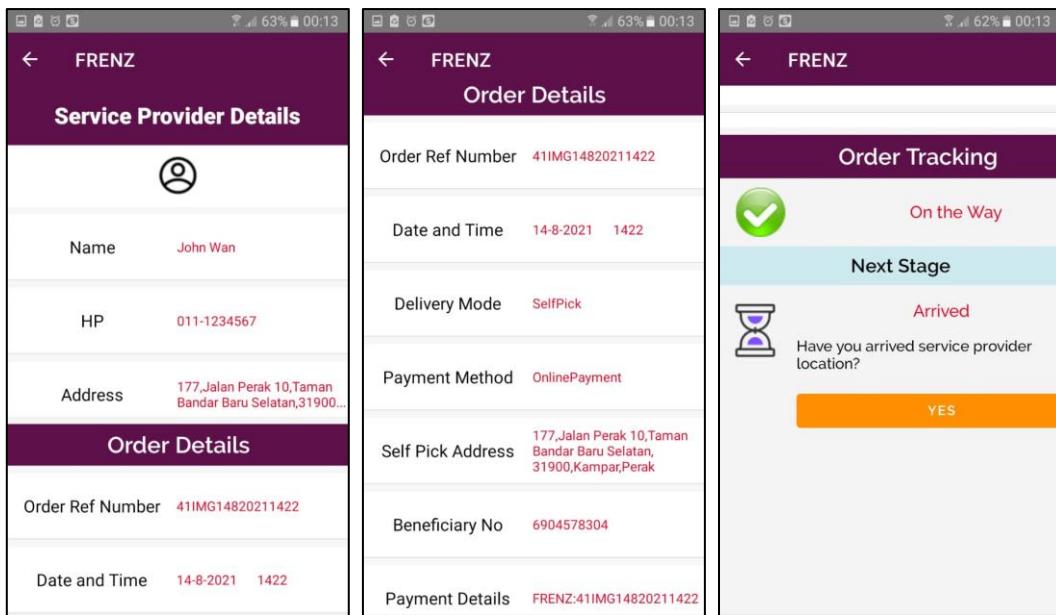


Figure 7-1-5-2: Test Result of Test Case"TC_PV_1" (Case 1).

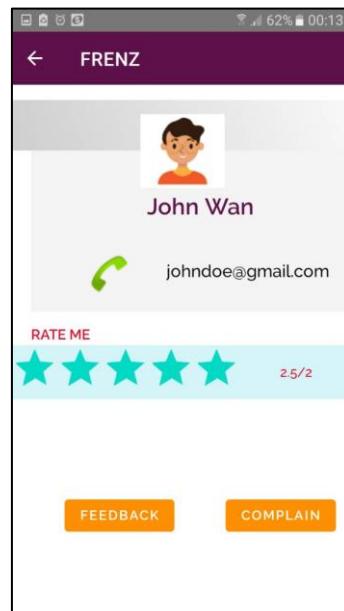


Figure7-1-5-3: Test Result of Test Case"TC_PV_1" (Case 2).

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-5-2: Test Case (TC_PV_2) for Module for Place and View Order- View Customer Printing Order.

Module Name	Place and View Order-View Customer Printing Order		
Date of creation	15/08/2021		
Test Case ID	TC_PV_2		
Test Scenario	To verify the functionality of user viewing details for new printing order.		
Test Case Description	Test the function of viewing details for new printing order.		
Pre-Requirements	1.User logins as service provider. 2.User directed to the “Home” section by application.		
Result	In case 2, Application displays customer details, order details and documents detail of order, order tracking. In case 3, Application directs user to an interface which display details of file.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Clicks on one of the existing orders.	N/A	DONE
2	Scrolling down from top to bottom.	N/A	DONE
3	Presses on one of the rows in section of Documents of order.	N/A	DONE

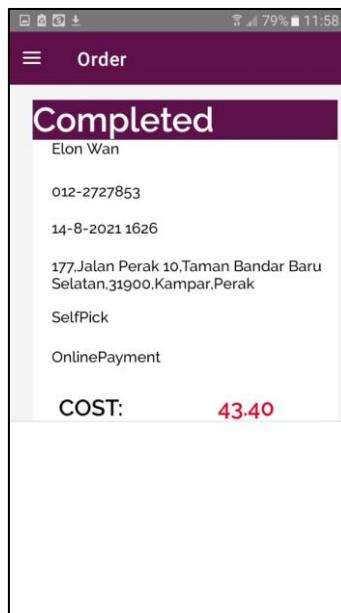


Figure 7-1-5-4: Test Result of Test Case "TC_PV_2" (Before Case 1).

CHAPTER 7: SYSTEM TESTING AND RESULT

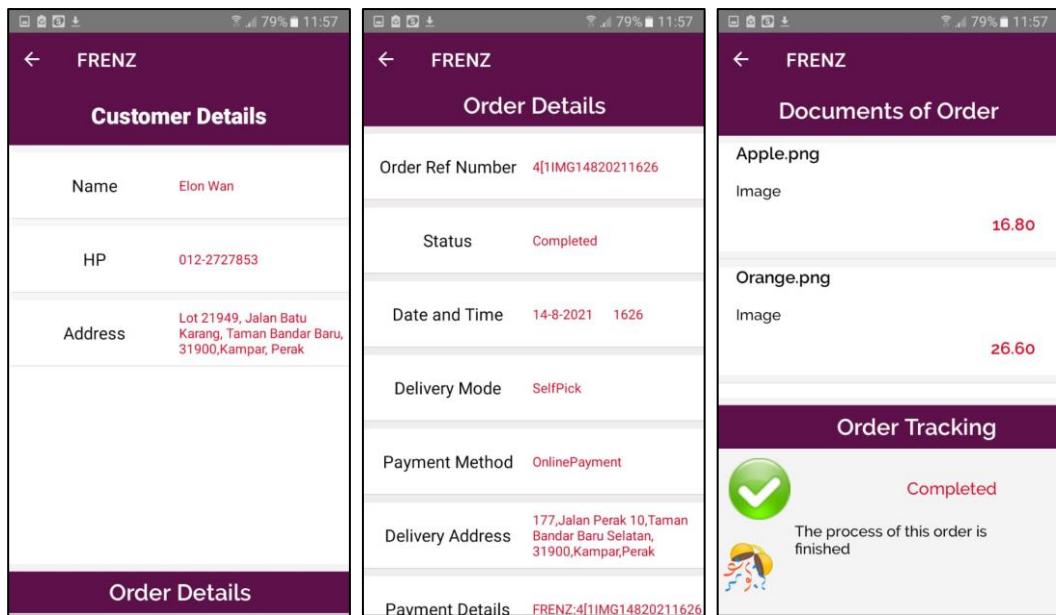


Figure 7-1-5-5: Test Result of Test Case "TC_PV_2" (Case 2).



Figure 7-1-5-6: Test Result of Test Case "TC_PV_2" (Case 3).

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-5-3: Test Case (TC_PV_3) for Module for Place and View Order- View Customer Printing Order.

Module Name	Place and View Order-View Customer Printing Order		
Date of creation	15/08/2021		
Test Case ID	TC_PV_3		
Test Scenario	To verify the functionality of user accepted order successfully.		
Test Case Description	Test the function of user accepting order successfully.		
Pre-Requirements	1.User logins as service provider. 2.User directed to the “Home” section by application. 3.User clicks on one of the existing new orders.		
Result	Application updates the preparation status of order in database to “ACCEPTED”.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Scrolling down from top to bottom.	N/A	DONE
2	Presses on “ACCEPT” button.	N/A	DONE



Figure 7-1-5-7: Test Result of Test Case”TC_PV_3” (Before Case 1).

CHAPTER 7: SYSTEM TESTING AND RESULT

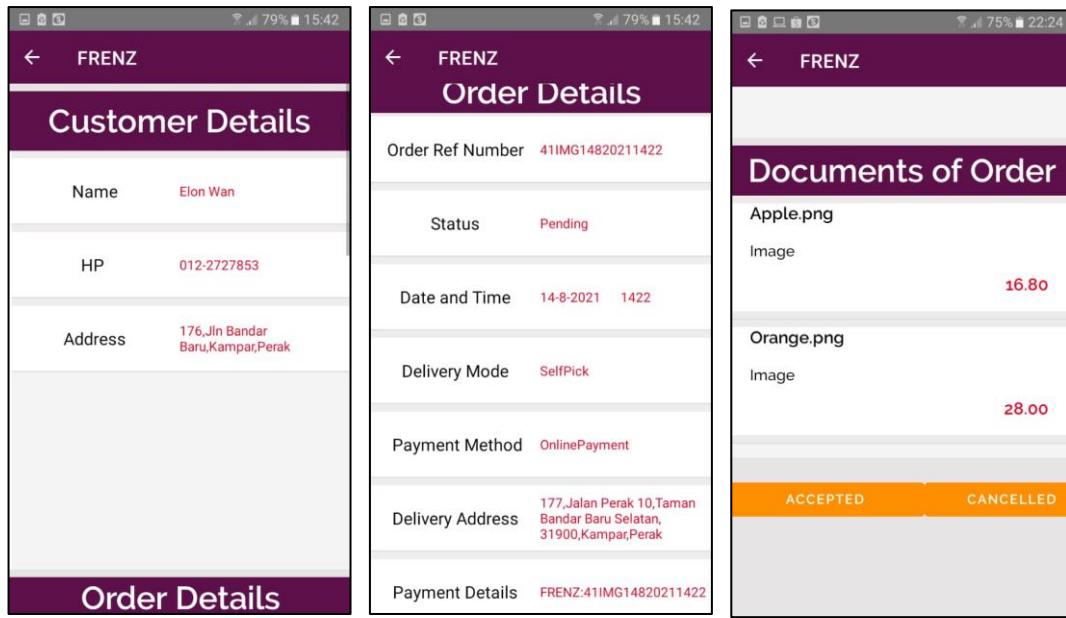


Figure 7-1-5-8: Test Result of Test Case "TC_PV_3" (Case 1).

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-5-4: Test Case (TC_PV_4) for Module for Place and View Order- View Customer Printing Order.

Module Name	Place and View Order-View Customer Printing Order		
Date of creation	15/08/2021		
Test Case ID	TC_PV_4		
Test Scenario	To verify the functionality of user views document details of order.		
Test Case Description	Test the function of viewing details for order documents.		
Pre-Requirements	1.User logins as service provider. 2.User directed to the “Home” section by application. 3.User clicks on one of the existing new orders.		
Result	In Case 3, Application directs user to another interface which displays the file name, file type, printing preferences of selected order document. In Case 4, Application downloads specific pdf file or image from firebase storage and display message of “File Downloaded”.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Scrolling down to “Documents of Order”.	N/A	DONE
2	Presses on existing row of document.	N/A	DONE
3	Presses on “Download PDF” icon.	N/A	DONE

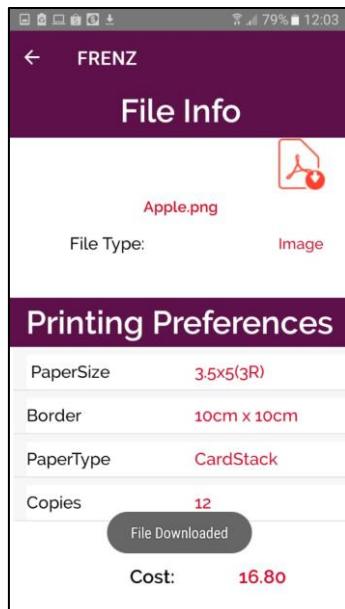


Figure 7-1-5-9 : Test Result of Test Case "TC_PV_4".

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-5-5: Test Case (TC_PV_5) for Module for Place and View Order-Place Order.

Module Name	Place and View Order-Place Order.		
Date of creation	15/08/2021		
Test Case ID	TC_PV_5		
Test Scenario	To verify the function of user as customer role placing order successfully.		
Test Case Description	Test for function of user as customer role placing order successfully.		
Pre-Requirements	1. User logins as customer. 2. User selects service provider with photo and document printing. 3. User views profile of a service provider from list. 4. User presses “ORDER” button.		
Result	In case 1, the application fetches all data of the selected service provider from the database and prompt an alert box to verify the permission to allow access to storage. In case 2, messages stating cost per page, minimum and maximum copies set by the service provider show up. In case 3, the application prompts out file picker. In case 8, user directed to another interface that display printing preferences, name, and type of selected file. In case 9, application previews the selected photo. In case 10, application directs user back to order main interface. In case 11, application directs user back to final interface of placing order. In case 17, application displays an alert box with info of service provider PBE beneficiary account no number, payment details and reminder. In case 18, the application saved new order data into the database and uploaded selected the file into firebase storage.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses “ADD” button.	N/A	DONE
2	Clicks “Photo” radio button.	N/A	DONE
3	Presses “SELECT IMAGE” and select photo.	N/A	DONE
4	Selects “3.5x5(3R)” for “Select Size of Picture spinner.	N/A	DONE
5	Selects “Card Stack” for “Select types of paper you want to print on” spinner.	N/A	DONE
6.	Selects “No border” for “Select Border” spinner.	N/A	DONE
7	Inputs copies.	10	DONE
8	Presses “CONTINUE” button.	N/A	DONE
9	Presses “PREVIEW” button.	N/A	DONE

CHAPTER 7: SYSTEM TESTING AND RESULT

10	Presses “ADD” button.	N/A	DONE
11	Presses “CONFIRM” button.	N/A	DONE
12	Clicks on calendar icon and select date.	31/08/2021	DONE
13	Clicks on time icon and select time.	1421	DONE
14	Clicks on “Delivery” radio button.	N/A	DONE
15	Checked on “Use profile address” checkbox.	N/A	DONE
16	Clicks on “Online Payment” radio button	N/A	DONE
17	Clicks on “ORDER” button.	N/A	DONE
18	Presses “YES” at alert box.	N/A	DONE

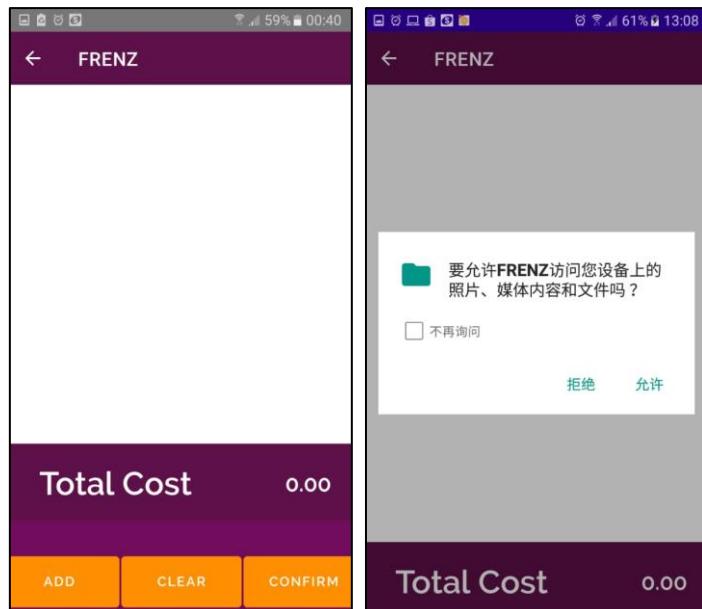


Figure 7-1-5-10: Test Result of Test Case”TC_PV_5” (Case 1)

CHAPTER 7: SYSTEM TESTING AND RESULT

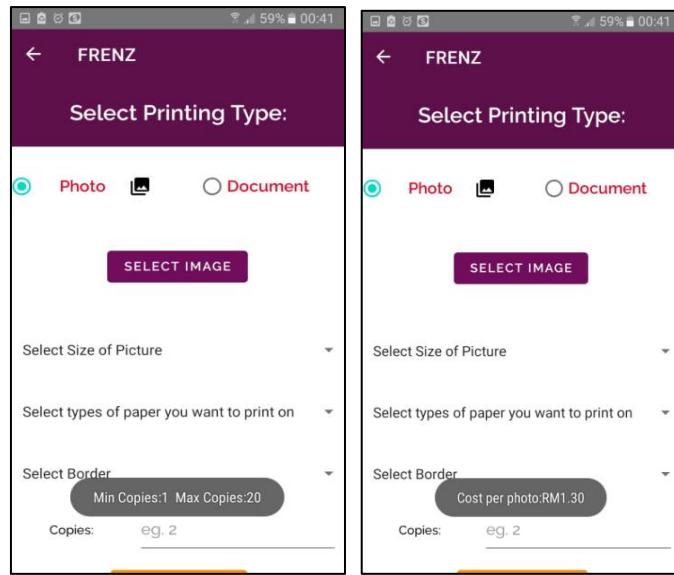


Figure 7-1-5-11: Test Result of Test Case"TC_PV_5" (Case 2).

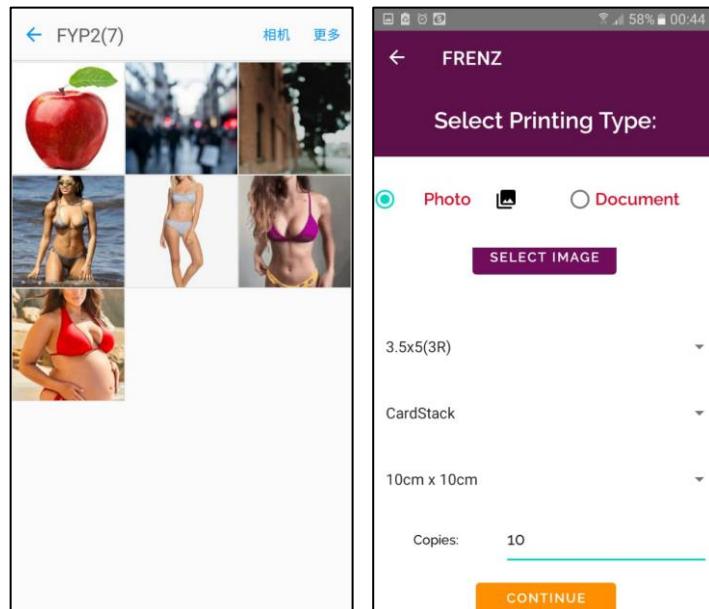


Figure 7-1-5-12: Test Result of Test Case"TC_PV_5"(Case 3-7)

CHAPTER 7: SYSTEM TESTING AND RESULT

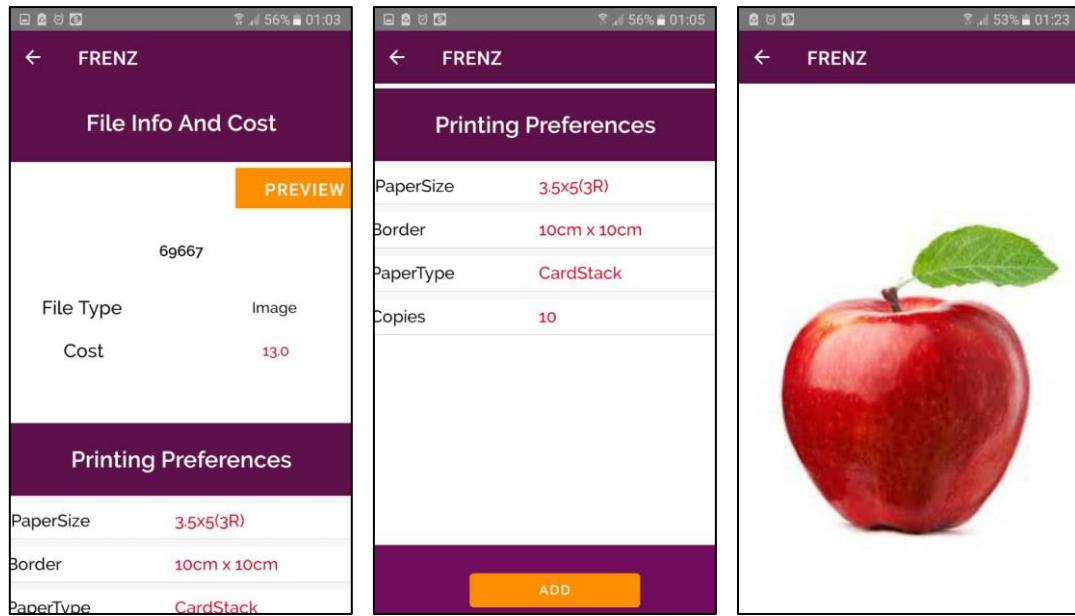


Figure 7-1-5-13: Test Result of Test Case "TC_PV_5" (Case 8-9).

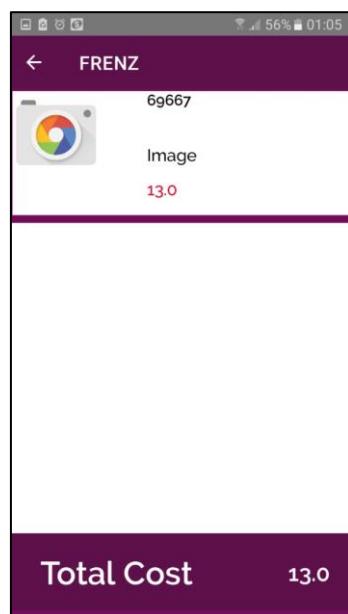


Figure 7-1-5-14: Test Result of Test Case "TC_PV_5" (Case 10).

CHAPTER 7: SYSTEM TESTING AND RESULT

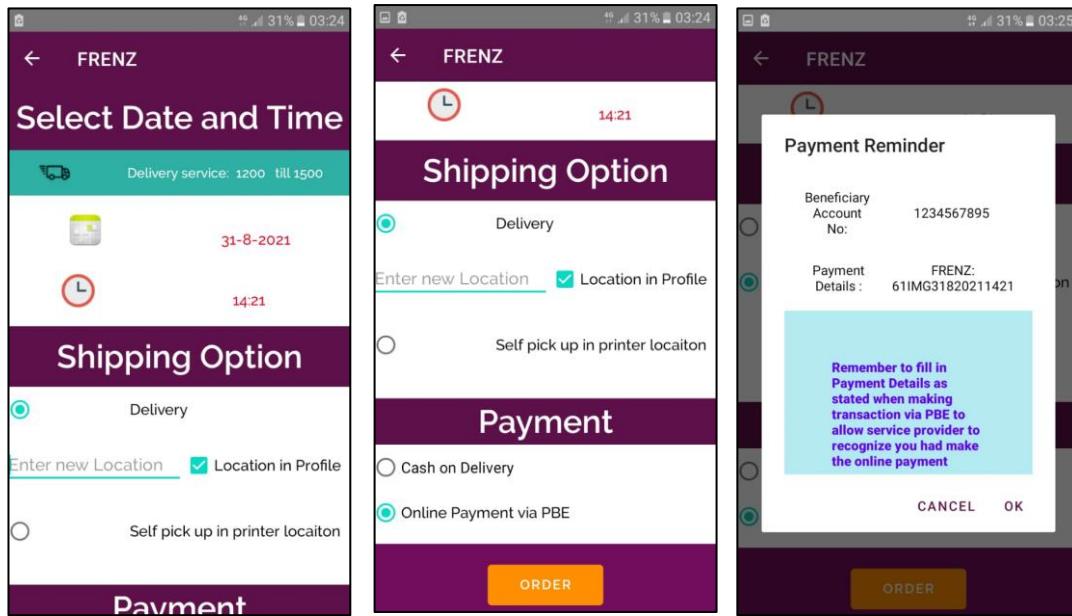


Figure 7-1-5-15: Test Result of Test Case "TC_PV_5" (Case 11-18).

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.6 Test Case of Module for Filter and Selection of Service Provider

Table 7-1-6-1: Test Case (TC_FS_1) of Module for Filter and Selection of Service Provider

Module Name	Filter and Selection of Service Provider		
Date of creation	15//08/2021		
Test Case ID	TC_FS_1		
Test Scenario	To verify the functionality of selection of service provider through filtering based on printing type.		
Test Case Description	Test function of selection of service provider through filtering based on printing type.		
Pre-Requirements	1.User logins as customer. 2.User directed to “home” section.		
Result	Application displays list of available service provider which providing photo printing and document printing services.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses “PRINTING TYPE” button.	N/A	DONE
2	Checked “Document” checkbox.	N/A	DONE
3	Checked “Image” checkbox.	N/A	DONE
4	Presses “SEARCH”.	N/A	DONE

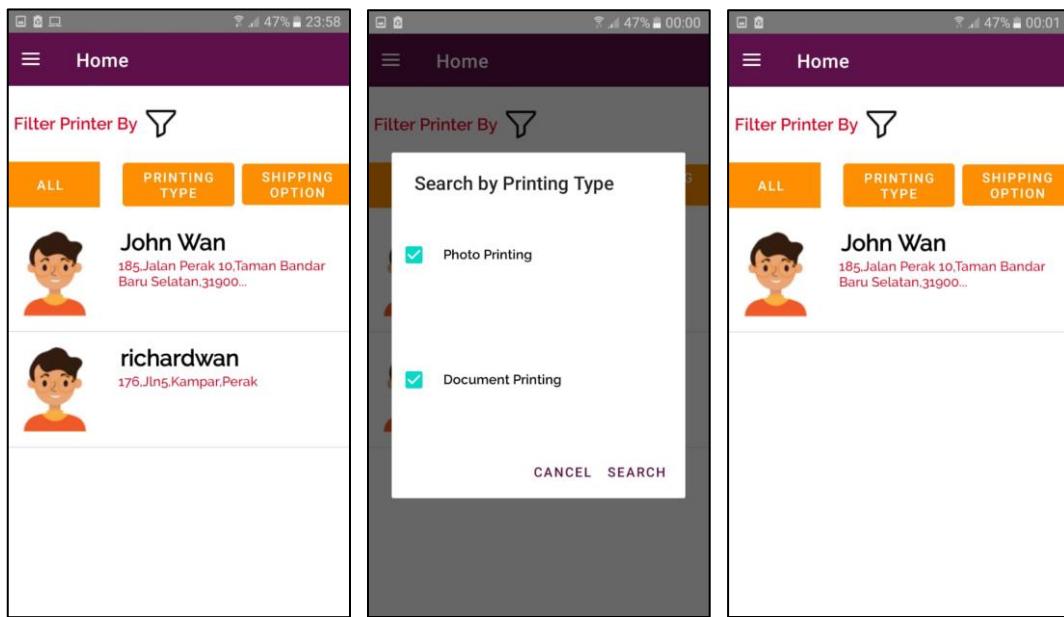


Figure 7-1-6-1: Test Result of Test Case “TC_FS_1”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-6-2: Test Case (TC_FS_2) of Module for Filter and Selection of Service Provider

Module Name	Filter and Selection of Service Provider		
Date of creation	15//08/2021		
Test Case ID	TC_FS_2		
Test Scenario	To verify the functionality of selection of service provider through filtering based on shipping options.		
Test Case Description	Test function of selection of service provider through filtering based on shipping options.		
Pre-Requirements	1.User logins as customer 2.User directed to “home” section		
Result	Application displays a list of service providers which provide delivery service and self-pick up options.		
Result	Application displays a list of service providers which provide delivery service and self-pick up options.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses “SHIPPING OPTION” button.	N/A	DONE
2	Checked “Delivery” checkbox.	N/A	DONE
3	Checked “Self-pick up” checkbox.	N/A	DONE
4	Presses “SEARCH” button.	N/A	DONE

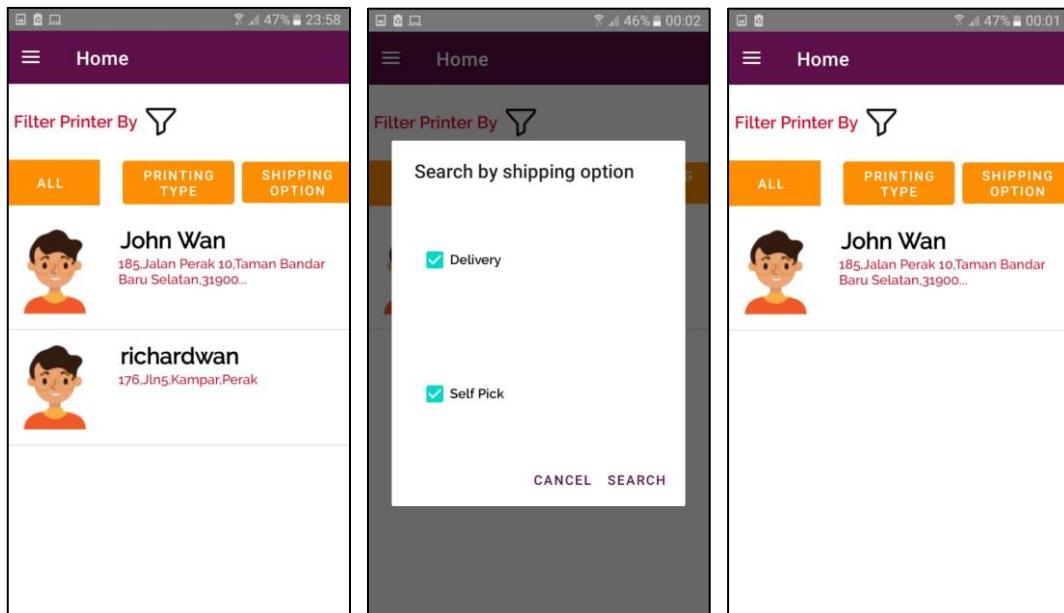


Figure:7-1-6-2: Test Result of Test Case "TC_FS_2".

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.7 Test Case of Module for Edit Profile Setting

Table 7-1-7-1: Test Case (TC_EP_1) of Module Edit Profile Setting

Module Name	Edit Profile Setting		
Date of creation	15/08/2021		
Test Case ID	TC_EP_1		
Test Scenario	To verify the functionality of edit profile info by user with customer role.		
Test Case Description	Test functionality of edit profile by user with customer role.		
Pre-Requirements	1. User logins as customer. 2. User presses “Profile Setting” at the navigation drawer.		
Result	The application displays message of “Successfully Saved” and update the new data for the user profile in the database.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Inputs username.	Elon Wan	DONE
2	Inputs email Address.	elonwan@gmail.com	DONE
3	Inputs address.	Lot 21949, Jalan Batu Karang, Taman Bandar Baru,, 31900 Kampar, Perak	DONE
4	Inputs phone number.	012-2727853	DONE
5	Inputs password.	IloveFYP2	DONE
6	Presses “SAVED” button.	N/A	DONE

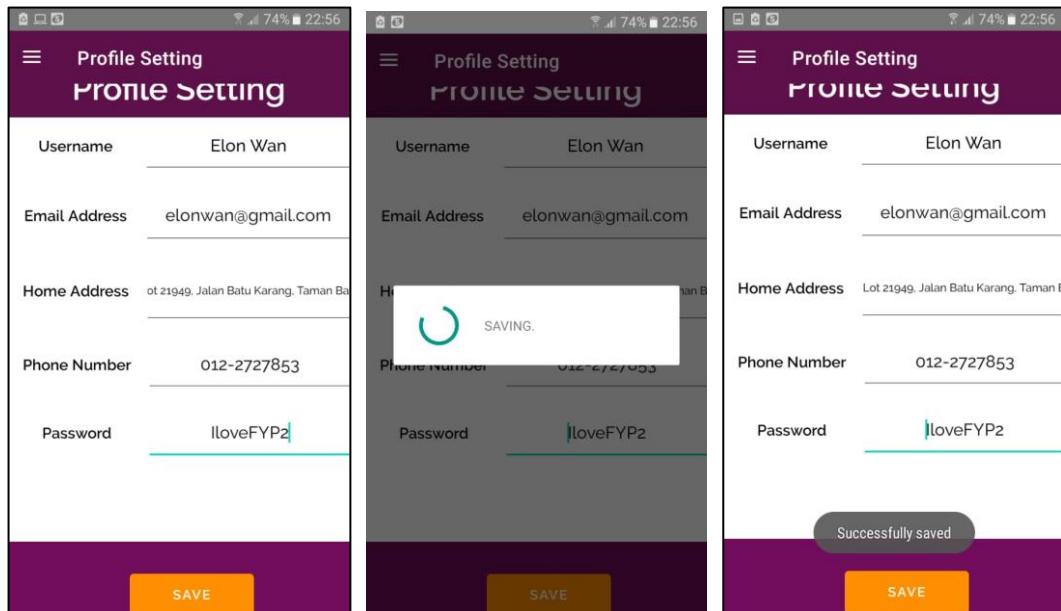


Figure 7-1-7-1: Test Result of Test Case “TC_EP_1”.

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-7-2: Test Case (TC_EP_2) of Module Edit Profile Setting

Module Name	Edit Profile Setting		
Date of creation	15/08/2021		
Test Case ID	TC_EP_2		
Test Scenario	To verify the functionality of edit profile by user with service provider role successfully.		
Test Case Description	Test functionality of edit profile by user with service provider role successfully.		
Pre-Requirements	1. User logins as printer. 2. User presses “Profile Setting” at the navigation drawer.		
Result	The application displays “Successfully Saved” and updated the new data for the user profile in the database.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Inputs username.	John Doe	DONE
2	Inputs email address.	johndoe@gmail.com	DONE
3	Inputs phone number.	014-3304567	DONE
4	Inputs password.	IloveFYP2	DONE
5	Inputs PBE beneficiary account number.	6904578304	DONE
6	Presses “SAVED” button.	N/A	DONE

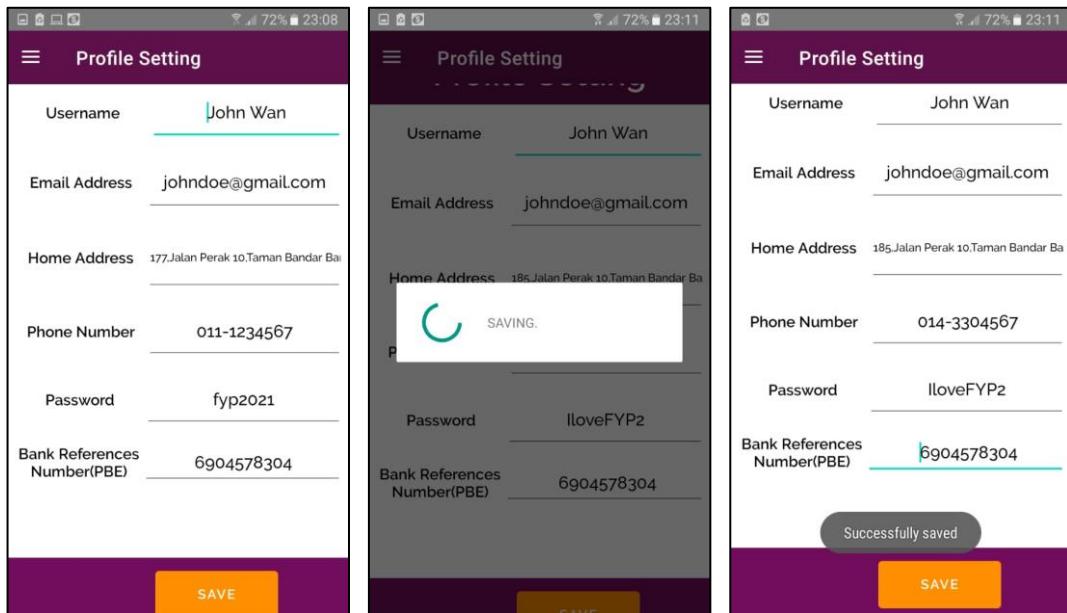
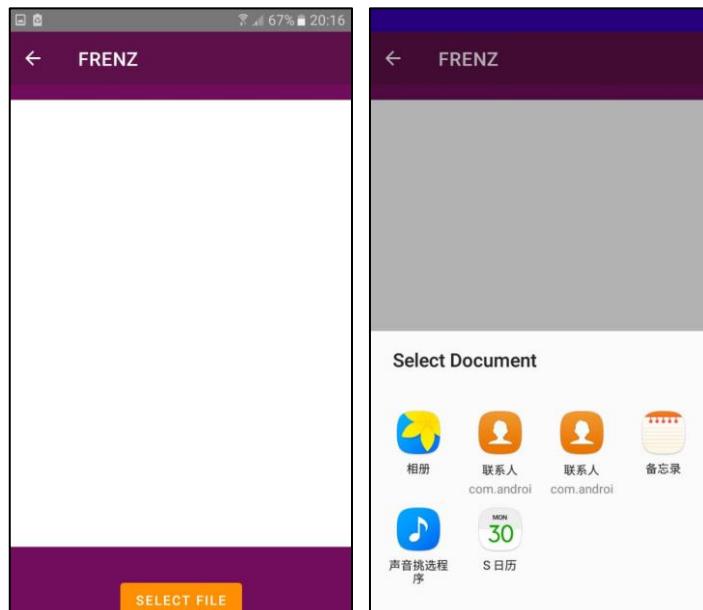


Figure 7-1-7-2: Test Result of Test Case “TC_EP_2”.

7.1.8 Test Case for Module of Advanced Functionalities

Table 7-1-8-1: Test Case (TC_AF_1) of Module Advanced Functionalities.

Module Name	Advanced Functionalities		
Date of creation	15/08/2021		
Test Case ID	TC_AF_1		
Test Scenario	To verify the function of application in converting image to grayscale and saved it into mobile phone storage.		
Test Case Description	Test case for converting image to grayscale and save it successfully.		
Pre-Requirements	1. User logins as customer. 2. User presses “Tools” at the navigation drawer. 3. User clicks on the “Convert to Grayscale” image button.		
Result	Image converted to grayscale and saved into mobile phone storage successfully.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on “Select File”.	N/A	DONE
2	Selects one photo.	N/A	DONE



CHAPTER 7: SYSTEM TESTING AND RESULT

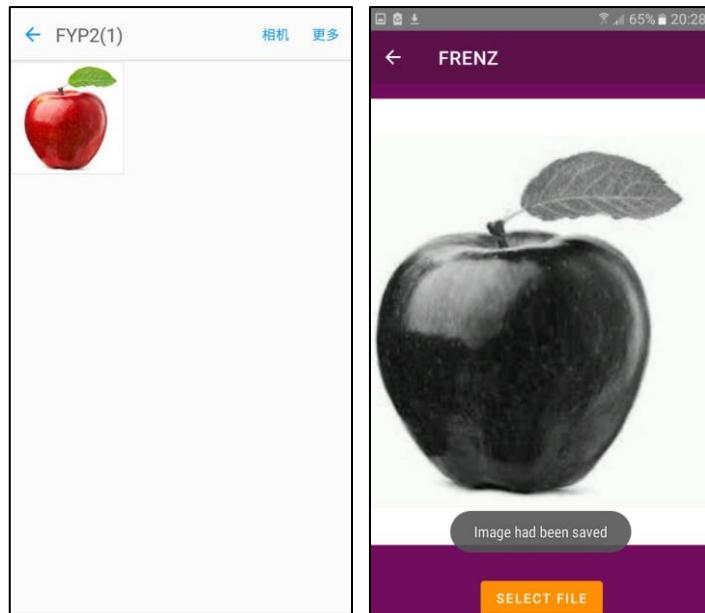
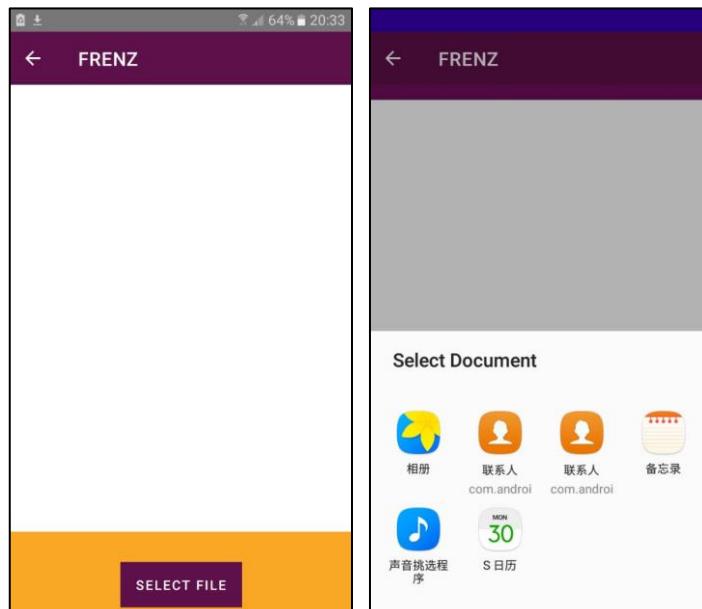


Figure 7-1-8-1: Test Result of Test Case "TC_AF_1".

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-8-2: Test Case (TC_AF_2) of Module Advanced Functionalities

Module Name	Advanced Functionalities		
Date of creation	15/08/2021		
Test Case ID	TC_AF_2		
Test Scenario	To verify the function of application in converting image to blurry and save it into mobile phone storage.		
Test Case Description	Test case for converting image to blurry and save it into mobile phone successfully.		
Pre-Requirements	1. User logins as customer. 2. User presses “Tools” at the navigation drawer. 3. User clicks on the “Convert to Blurry” image button.		
Result	Image converted to blurry and saved into mobile phone storage successfully.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on “Select File”.	N/A	DONE
2	Selects photo.	N/A	DONE



CHAPTER 7: SYSTEM TESTING AND RESULT

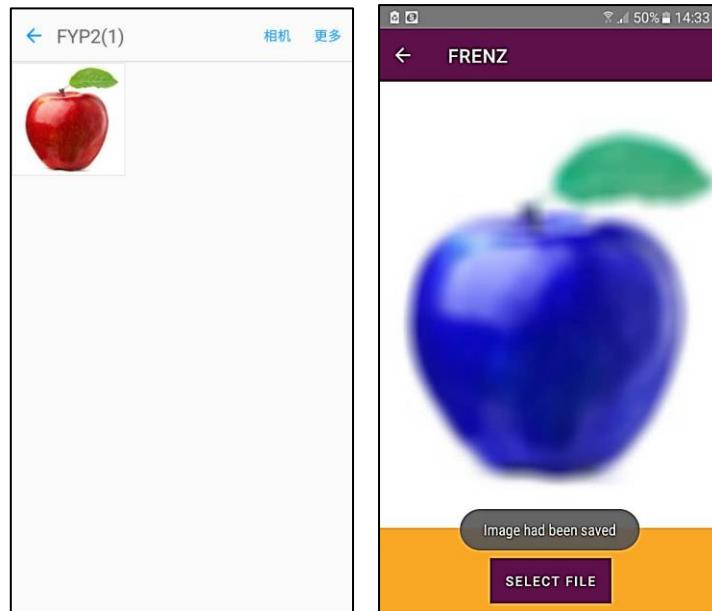


Figure 7-1-8-2: Test Result of Test Case "TC_AF_2".

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.9 Test Case of Module for Edit Printing Setting

Table 7-1-9-1: Test Case (TC_ES_1) of Module for Edit Setting for Printing Services

Module Name	Edit Setting for Printing Services-Document Printing Setting		
Date of creation	15/08/2021		
Test Case ID	TC_ES_1		
Test Scenario	To verify the functionality of edit document printing setting by user with printer role successfully.		
Test Case Description	Test functionality of edit document printing setting.		
Pre-Requirements	1.User logins as service provider. 2.User presses “Document Printing Preferences” at the navigation drawer.		
Result	The application prompts a message of “Successfully Saved” and updated the new data for document printing preferences setting in the database.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Checked “Color”, “BlackWhite” checkboxes.	N/A	DONE
2	Checked “Long Edge”, “Short Edge” checkboxes.	N/A	DONE
3	Checked “Portrait”, “Landscape” checkboxes.	N/A	DONE
4	Checked “One Sided” checkbox.	N/A	DONE
5	Checked “1”, “4” checkbox.	N/A	DONE
6	Checked “Horizontal” checkbox.	N/A	DONE
7	Checked “Available” checkbox.	N/A	DONE
7	Inputs for Price Per Page(BlackWhite).	0.1	DONE
8	Inputs for Price Per Page(Color).	0.2	DONE
9	Inputs for Minimum Copies.	1	DONE
10	Inputs for Maximum Copies.	10	DONE
11	Presses “SAVE” button.	N/A	DONE

CHAPTER 7: SYSTEM TESTING AND RESULT

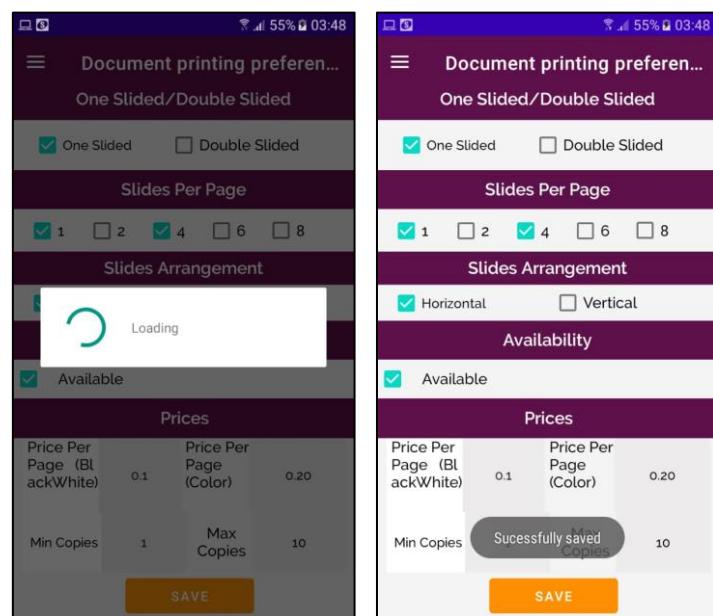
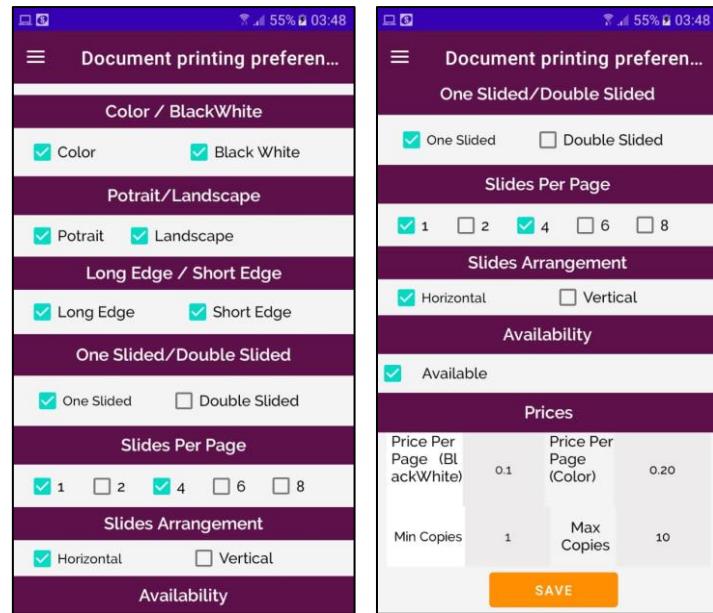


Figure 7-1-9-1: Test Result of Test Case "TC_ES_1".

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-9-2: Test Case (TC_ES_2) of Module for Edit Setting for Printing Services.

Module Name	Edit Setting for Printing Services -Photo Printing Setting		
Date of creation	15/08/2021		
Test Case ID	TC_ES_2		
Test Scenario	To verify the functionality of edit photo printing setting by user successfully.		
Test Case Description	Test functionality of edit photo printing setting.		
Pre-Requirements	1.User logins as service provider. 2.User presses “Photo Printing Preferences” at the navigation drawer.		
Result	The application displays message of “Successfully Saved” and updated the new data for photo printing preferences in the database.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Checked “3.5”x5” (3R)” checkbox.	N/A	DONE
2	Checked “Matte”, “CardStack” checkboxes.	N/A	DONE
3	Checked “No Border”, “5cm x 5cm”, “10cm x10cm” checkboxes.	N/A	DONE
4	Checked “Availability” checkbox.	N/A	DONE
5	Inputs Prices Per Photo.	1.90	DONE
6	Inputs Maximum Copies.	20	DONE
7	Inputs Minimum Copies.	3	DONE
8	Presses “SAVE” button.	N/A	DONE

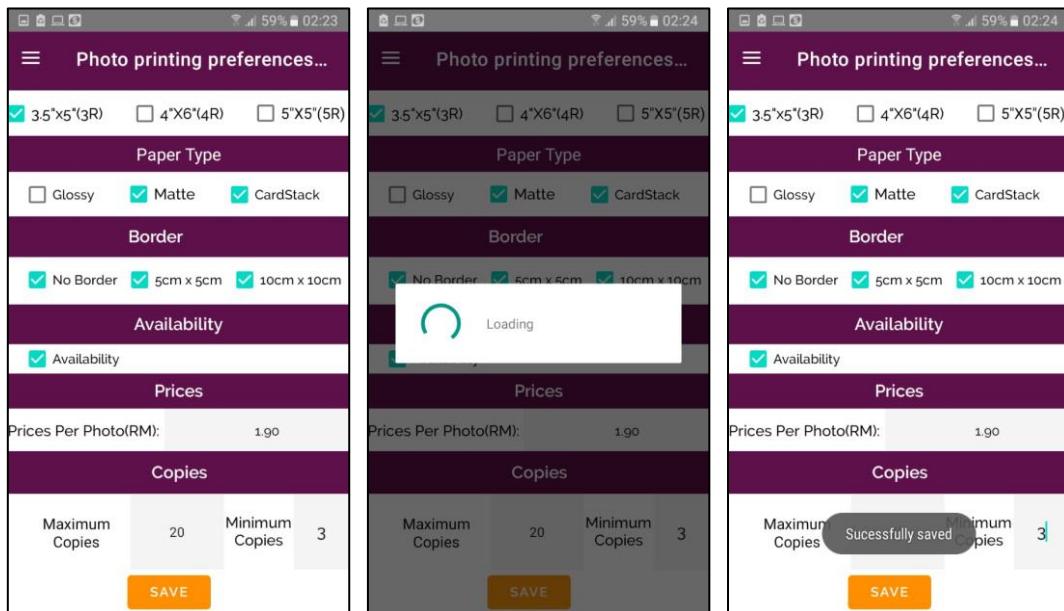


Figure 7-1-9-2: Test Result of Test Case”TC_ES_2”.

CHAPTER 7: SYSTEM TESTING AND RESULT

7.1.10 Test Case of Module for Edit Business Setting

Table 7-1-10-1: Test Case (TC_BS_1) of Module for Edit Business Setting.

Module Name	Edit Business Setting		
Date of creation	15/08/2021		
Test Case ID	TC_BS_1		
Test Scenario	To verify the functionality of edit business setting by user.		
Test Case Description	Test functionality of edit business setting by user.		
Pre-Requirements	1. User logins as service provider. 2. User presses “Business Operation Setting” at the navigation drawer.		
Result	In Case 1, application prompts out edit texts for user to fill in start time, end time and distance. In Case 4, The application updates the new data for business setting in the database.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Checked “Self-Pick”, “Delivery” checkboxes.	N/A	DONE
2	Inputs Start Time.	1200	DONE
3	Inputs End Time.	1500	DONE
4	Inputs distance.	8	DONE
2	Checked “Reject Blurry Image”, “Reject Image with Adult Content” checkboxes.	N/A	DONE
3	Checked “Cash on Delivery”, “Online Payment” checkboxes.	N/A	DONE
4	Presses “SAVE” button.	N/A	DONE

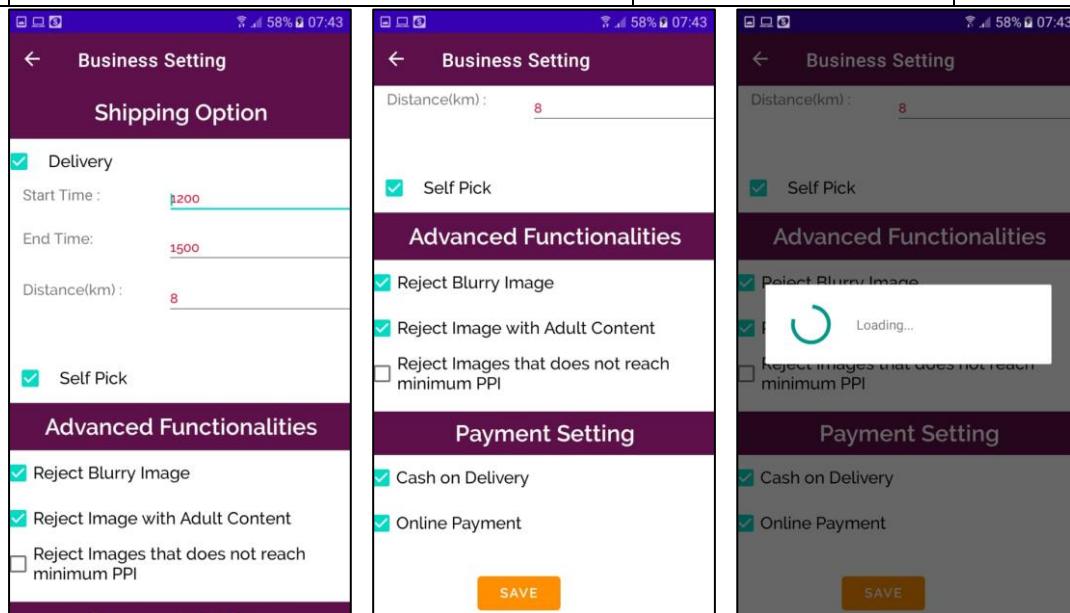


Figure 7-1-10-1: Test Result of Test Case”TC_BS_1”.

7.1.11 Test Case on Module for Management of Mobile App Activities

Table 7-1-11-1: Test Case (TC_MA_1) of Module for Management of Mobile App Activities

Module Name	Management of mobile app activities		
Date of creation	15/08/2021		
Test Case ID	TC_MA_1		
Test Scenario	To verify the functionality of viewing statistics of user's numbers based on user role.		
Test Case Description	Test case on viewing statistics of user's numbers based on user role.		
Pre-Requirements	1. User logins as admin. 2. User presses "User Statistics" at the navigation bar.		
Result	<ol style="list-style-type: none"> 1. Application displays a pie chart for number of customers and service providers. 2. Application displays the total number of customers, service providers and users. 		
Test Result	Pass		
Case	Test Action	Test Data	Status
N/A	N/A	N/A	N/A



Figure 7-1-11-1: Test Result of Test Case "TC_MA_1".

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-11-2: Test Case (TC_MA_2) of Module for Management of Mobile App Activities

Module Name	Management of Mobile App Activities		
Date of creation	15/08/2021		
Test Case ID	TC_MA_2		
Test Scenario	To verify the functionality of block or approve users from access.		
Test Case Description	Test case for block or approve users from access.		
Pre-Requirements	1. User logins as admin. 2. User directed to the home page.		
Result	Button that shows current access status of user will change once clicked, application updated the access status of specific user in database.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on button with access status on it.	N/A	DONE

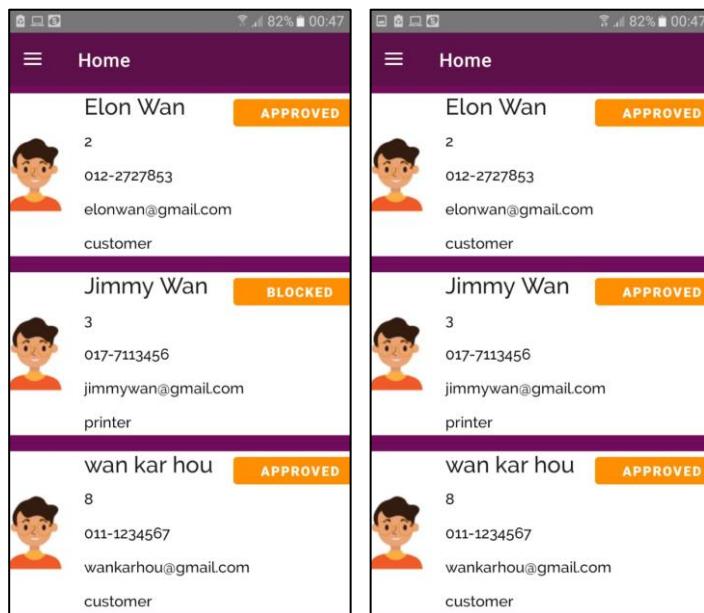


Figure 7-1-11-2: Test Result of Test Case "TC_MA_2".

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-1-11-3: Test Case (TC_MA_3) of Module for Management of Mobile App Activities

Module Name	Management of Mobile App Activities -View complaint record		
Date of creation	15/08/2021		
Test Case ID	TC_MA_3		
Test Scenario	To verify the functionality of the user viewing list of complaint records.		
Test Case Description	Test case on user viewing the complaint content filed by customer on specific service provider.		
Pre-Requirements	1.User logins as admin. 2.User presses “Complaint” at the navigation bar.		
Result	Application displays list of complaints filed by customer on service provider.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	N/A	N/A	N/A



Figure 7-1-11-3: Test Result of Test Case "TC_MA_3".

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-11-4: Test Case (TC_MA_4) of Module for Management of Mobile App Activities

Module Name	Management of Mobile App Activities		
Date of creation	15/08/2021		
Test Case ID	TC_MA_4		
Test Scenario	To verify the functionality of user viewing the complaint content and user block the service provider.		
Test Case Description	Test case on user viewing the complaint content filed by customer on specific service provider and block the service provider.		
Pre-Requirements	1.User logins as admin. 2.Presses “Complaint” at the navigation bar. 3.User selects a row from the list of complaint records.		
Result	Application updated the status of complaint in database to “read” and block specific service provider from access, then redirect user back to main page.		
Test Result	Pass		
Case	Test Action	Test Data	Status
1	Presses on “BLOCK SERVICE PROVIDER” button.	N/A	DONE

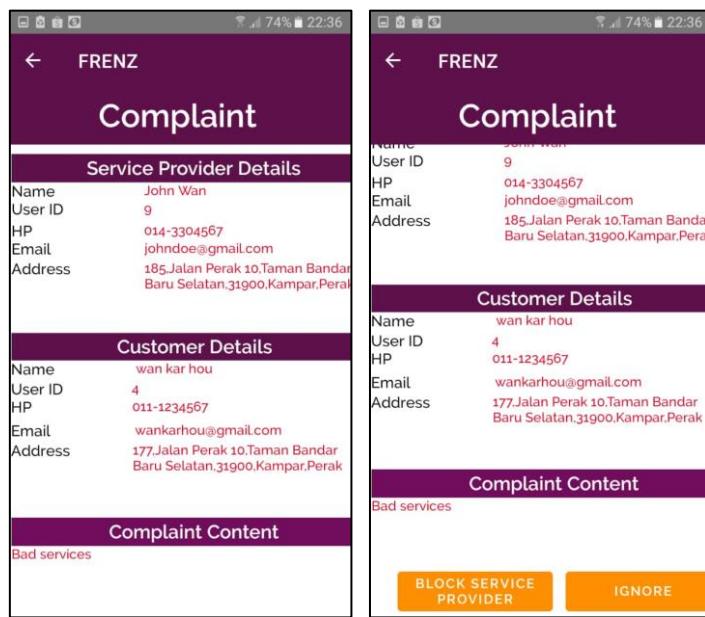


Figure 7-1-11-4: Test Result of Test Case”TC_MA_4”.

7.2 CNN Model Performance on Detection of Images with Adult Content

Table 7-2-1: Table for training accuracy and testing accuracy of CNN model.

Training accuracy	90%
Testing accuracy	70%

Training accuracy for CNN model achieved 90% while testing accuracy achieved a percentage of 70%. Although the model is slightly overfitting, yet the model performs well in detection of images with adult content in mobile application.

7.3 Performance of Application on Detection of Blurry Image

For the testing on performance of application in detection of blurry image, non-blurry image and blurry image are selected as shown in figure 7-3-1 and figure 7-3-2.



Figure 7-3-1. Non-blurry image for testing



Figure 7-3-2. Blurry image for testing

CHAPTER 7: SYSTEM TESTING AND RESULT

Table 7-3-1: Table on baseline, testing on blurry and non-blurry images.

	Value for Variance of Laplacian	Result	Pass/Fail
Baseline	12.5	N/A	N/A
Blurry Image	9.3	Blurry	Pass
Non-blurry Image	290	Non-Blurry	Pass

From the figure 7-3-1, the baseline is 12.5. Variance of the Laplacian for blurry image is 9.3, which is smaller than baseline, the testing result is blurry. On the other hand, the variance of the Laplacian for non-blurry images is 290, the testing result is non-blurry. Overall, the performance of application on detection of blurry images is excellent.

CHAPTER 8

Conclusion

8.1 Project Review and Discussion

The trend of the service industry moving online is rising since the pandemic period, digital printing services are not exceptional. This project aims to tackle the uncultivated niche market of local printing services by building a better version of online digital printing service mobile app with new advanced functionalities and solved problems faced by both customer and service provider during online digital printing services carry out.

This mobile app allows customers to search for an ideal printing service provider and make printing orders by uploading documents, filling in printing preferences, selecting shipping option and payment option, yet it allows printing service providers to accept or reject orders, mark preparation status of orders. In the meantime, benefits of service providers are protected as certain advanced functions in mobile apps prevent service providers from receiving images with adult content, blurry images, and low-resolution images for a certain size of printing material.

Objective of this project which is to develop interactive online digital printing mobile application with advanced functionalities is achieved with the utilisation of various technology such as computer vision, Global Positioning System (GPS). Certain software or libraries like Android Studio, online web service – 000webhost, XAMPP, MySQL, phpMyAdmin, Firebase, OpenCV were involved to realize the completed system of this project. Efficient communication between database of system and mobile app is setup using PHP script. Besides this, well-trained and tested CNN model- MobileNetV2 is implemented in mobile app through PyTorch Mobile framework to build up advanced functionalities of this mobile app.

8.2 Project Contribution

Due to the pandemic, most printing services providers in the local market (Malaysia) are struggling in daily business operations because of the pandemic, most of them are eager to move their business online. By completing this project, an online digital printing service mobile application which connects directly between online printing service customers and online printing service providers was born. It marks a huge contribution to the sharing economy, opening more businesses and job opportunities to the public. The concept of

CHAPTER 8: CONCLUSION

uberization applied in the design of this mobile application can be applied to more service industries that have not yet been fully uberized such as the gas delivery industry and so on.

8.3 Future Work

Throughout this project, there are few improvements that can be made. First, the type of printing of the project can be expanded to poster printing and flyer printing, not just limited to document and photo printing. Through this improvement, it could allow more printing options for both printing service providers and online printing services customers of this mobile app. Besides this, function to allow user setting up profile picture in the mobile application can be setup to improve user interface of mobile application.

Secondly, due to time constraints, online payment settings in this mobile app were limited in online bank transactions between the customer and service provider, which created a risk during business carried out. In the future, E-wallet can be built up and integrated in this mobile app to create a more secure payment method, allowing the administrator of the mobile app to manage the financial transaction.

Thirdly, improvement can be done on the advanced function of this mobile app, which is the detection of images with adult content. Through training the MobileNetV2 with larger datasets, it would increase the accuracy of the model in detecting images with adult content.

Lastly, sentiment analysis on customer feedbacks can be implemented into the mobile application to allow admin performs a better analysis and judgement on certain service provider.

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APPENDIX

APPENDIX

```
//Calculate ppi
private int VerificationOfPPI(){
    int valid = 1; //True = 1, False = 0
    double diagonal = 0.0;
    double d0 = 0.0;
    if(paperSize.equals("3R")){
        diagonal = 15.5923;
    }else if(paperSize.equals("4R")){
        diagonal = 18.31;
    }else{
        diagonal = 21.87;
    }
    d0 = Double.parseDouble(sharedPreferences.getString("d0", ""));
    double ppi = d0 / diagonal;
    System.out.println("PPI"+ppi);

    //Check if image are in 300ppi
    if(ppi>300){
        valid = 1;
    }else{
        valid=0;
        Global.displayToast(getActivity(), message: "Not Suitable For Printing in this size ,might appear blurry",Toast.LENGTH_SHORT, color: "red");
    }
    return valid;
}
```

Screenshot of Code for Advanced Function- Detection of Image that not Suitable for Certain Size of Printing Based on PPI of Image.

```
private int VerificationOfBlurry(){
    int valid =1;
    double LaplaVar =0.0;
    //=====
    //Comparing Blurriness
    //=====
    Mat srcMat1 = Imgcodecs.imread(Global.FileRealPath);
    Mat dst = new Mat();
    // Applying GaussianBlur on the Image
    Imgproc.Laplacian(srcMat1, dst, ddepth: 10);
    MatOfDouble median = new MatOfDouble();
    MatOfDouble std= new MatOfDouble();
    Core.meanStdDev(dst, median , std);
    System.out.println("Laplacian :" +Math.pow(std.get( row: 0, col: 0)[0],2));
    LaplaVar = Math.pow(std.get( row: 0, col: 0)[0],2);

    if(LaplaVar>12.5){
        valid =1;
    }else{
        Global.displayToast(getContext(), message: "Image is blurry",Toast.LENGTH_SHORT, color: "red");
        valid =0;
    }
    return valid;
}
```

Android Studio Arctic
Update...

Screenshot of Code for Advanced Function- Detection of Blurry Image.

APPENDIX

```
private String convert(Bitmap bitmap){  
    Module module = Module.Load(assetFilePath(getApplicationContext(), assetName: "mobilenet-v2.pt"));  
  
    Tensor inputTensor = TensorImageUtils.bitmapToFloat32Tensor(bitmap,  
        TensorImageUtils.TORCHVISION_NORM_MEAN_RGB, TensorImageUtils.TORCHVISION_NORM_STD_RGB);  
    Tensor outputTensor = module.forward(IValue.from(inputTensor)).toTensor();  
    float[] scores = outputTensor.getDataAsFloatArray();  
  
    float maxScore = -Float.MAX_VALUE;  
    int maxScoreIdx = -1;  
    for (int i = 0; i < scores.length; i++) {  
        if (scores[i] > maxScore) {  
            maxScore = scores[i];  
            maxScoreIdx = i;  
        }  
    }  
    String className = Constants.IMAGENET_CLASSES[maxScoreIdx];  
    System.out.println("ClassName"+className);  
    return className;  
}
```

Screenshot of Code for Integrated CNN Model-MobileNetV2 to Detect if an Image Consists of Adult Content.

```
@RequiresApi(api = Build.VERSION_CODES.LOLLIPOP)  
public static ArrayList<Bitmap> pdfToBitmap(File pdfFile) throws Exception, IllegalStateException {  
  
    ArrayList<Bitmap> bitmaps = new ArrayList<>();  
  
    try {  
        PdfRenderer renderer = new PdfRenderer(ParcelFileDescriptor.open(pdfFile, ParcelFileDescriptor.MODE_READ_ONLY));  
  
        final int pageCount = renderer.getPageCount();  
        System.out.println("HERE Page Count"+pageCount);  
        Bitmap bitmap;  
  
        if(pageCount!=0) {  
            for (int i = 0; i < 1; i++) {  
                PdfRenderer.Page page = renderer.openPage(i);  
  
                int width = page.getWidth();  
                int height = page.getHeight();  
  
                bitmap = Bitmap.createBitmap(width, height, Bitmap.Config.ARGB_8888);  
                page.render(bitmap, destClip null, transform null, PdfRenderer.Page.RENDER_MODE_FOR_DISPLAY);  
  
                bitmaps.add(bitmap);  
                page.close();  
            } // close the renderer  
        }  
        System.out.println("SIZE:"+bitmaps.size());  
        renderer.close();  
    } catch (Exception ex) {  
        ex.printStackTrace();  
    }  
}
```

Screenshot of Code for Converting PDF to Bitmaps and Displays PDF File on Application.

```
@RequiresApi(api = Build.VERSION_CODES.LOLLIPOP)  
private int PageCount(File pdfFile) {  
    int pageCount=0;  
    try {  
        PdfRenderer renderer = new PdfRenderer(ParcelFileDescriptor.open(pdfFile, ParcelFileDescriptor.MODE_READ_ONLY));  
  
        pageCount = renderer.getPageCount();  
        System.out.println("HERE Page Count:"+pageCount);  
  
        // close the renderer  
        renderer.close();  
    } catch (Exception ex) {  
        ex.printStackTrace();  
    }  
    return pageCount;  
}
```

Screenshot of Code for Calculating Number of Pages for a PDF File.

APPENDIX

```
private void UploadFileToFirebase(){
    String foldername="";
    Uri fileURL=null;

    //=====
    // Create folder and add file to Firebase Storage
    //=====

    for(int i=0;i<order.getSub_orders().size();i++){
        int position=0;
        //Get the Location of file Link from list
        for(int j=0;j<Global.FileNameList.size();j++){
            position = j;
            if(order.getSub_orders().get(i).getResourcesRecord().getFile_name().equals(Global.FileNameList.get(j))){
                break;
            }
        }
        document_URI = Global.FileURLList.get(position);
        fileName = order.getSub_orders().get(i).getResourcesRecord().getFile_name();

        //CREATE FolderName
        StringBuilder stringBuilder = new StringBuilder();
        stringBuilder.append(order.getOrderId());
        stringBuilder.append("@");
        stringBuilder.append(order.getSub_orders().get(i).getSubOrderId());
        stringBuilder.append("@");
        stringBuilder.append(order.getSub_orders().get(i).getResourcesRecord().getresources_id());

        foldername=stringBuilder.toString();

        //Store it in firebase
        StorageReference Folder = FirebaseStorage.getInstance().getReference()
            .child("FYP").child("Document of printer").child(foldername);

        final StorageReference file_name = Folder.child(order.getSub_orders().get(i).getResourcesRecord().getFile_name());
        file_name.putFile(fileURL).addOnSuccessListener(new OnSuccessListener<UploadTask.TaskSnapshot>() {
            @Override
            public void onSuccess(UploadTask.TaskSnapshot taskSnapshot) {
                file_name.getDownloadUrl().addOnSuccessListener(new OnSuccessListener<Uri>() {
                    @Override
                    public void onSuccess(Uri uri) {
                        ...
                    }
                });
            }
        });
    }
}
```

Screenshot of Code for Create Folder in Firebase Storage and Uploads Document or Image into It (Part 1).

```
StringBuilder stringBuilder = new StringBuilder();
stringBuilder.append(order.getOrderId());
stringBuilder.append("@");
stringBuilder.append(order.getSub_orders().get(i).getSubOrderId());
stringBuilder.append("@");
stringBuilder.append(order.getSub_orders().get(i).getResourcesRecord().getresources_id());

foldername=stringBuilder.toString();

//Store it in firebase
StorageReference Folder = FirebaseStorage.getInstance().getReference()
    .child("FYP").child("Document of printer").child(foldername);

final StorageReference file_name = Folder.child(order.getSub_orders().get(i).getResourcesRecord().getFile_name());
file_name.putFile(fileURL).addOnSuccessListener(new OnSuccessListener<UploadTask.TaskSnapshot>() {
    @Override
    public void onSuccess(UploadTask.TaskSnapshot taskSnapshot) {
        file_name.getDownloadUrl().addOnSuccessListener(new OnSuccessListener<Uri>() {
            @Override
            public void onSuccess(Uri uri) {
                ...
            }
        });
    }
});
```

Screenshot of Code for Create Folder in Firebase Storage and Uploads Document or Image into It (Part 2).

APPENDIX

```
private void downloadFile(String fileName) {
    //CREATE FolderName
    //<Order ID>@<Sub Order ID>@<Resources Record ID>
    StringBuilder stringBuilder = new StringBuilder();
    stringBuilder.append(order.getOrderId());
    stringBuilder.append("@");
    stringBuilder.append(sub_order.getSubOrderId());
    stringBuilder.append("@");
    stringBuilder.append(sub_order.getResourcesRecord().getresources_id());

    String folderName =stringBuilder.toString();

    String fileURL= "FYP/Document of printer/"+folderName+"/"+fileName;
    System.out.println(fileURL);
    StorageReference storageReference = FirebaseStorage.getInstance().getReference();
    storageReference.child(fileURL).getDownloadUrl().addOnSuccessListener(new OnSuccessListener<Uri>() {
        @Override
        public void onSuccess(Uri uri) {
            // Got the download URL for 'users/me/profile.png'
            String url = uri.toString();
            System.out.println(url);
            downloadFiles(getApplicationContext(),fileName, DIRECTORY_DOWNLOADS, url);
        }
    }).addOnFailureListener(new OnFailureListener() {
        @Override
        public void onFailure(@NotNull Exception exception) {
    
```

Screenshot of Code to Download Specific File from Firebase Storage (Part1).

```
String fileURL= "FYP/Document of printer/"+folderName+"/"+fileName;
System.out.println(fileURL);
StorageReference storageReference = FirebaseStorage.getInstance().getReference();
storageReference.child(fileURL).getDownloadUrl().addOnSuccessListener(new OnSuccessListener<Uri>() {
    @Override
    public void onSuccess(Uri uri) {
        // Got the download URL for 'users/me/profile.png'
        String url = uri.toString();
        System.out.println(url);
        downloadFiles(getApplicationContext(),fileName, DIRECTORY_DOWNLOADS, url);
    }
}).addOnFailureListener(new OnFailureListener() {
    @Override
    public void onFailure(@NotNull Exception exception) {
        // Handle any errors
    }
});
}

private void downloadFiles(Context context, String fileName, String destinationDirectory, String url){
    DownloadManager downloadManager = (DownloadManager) context.getSystemService(Context.DOWNLOAD_SERVICE);
    Uri uri = Uri.parse(url);
    DownloadManager.Request request = new DownloadManager.Request(uri);
    downloadManager.enqueue(request);
    request.setNotificationVisibility(DownloadManager.Request.VISIBILITY_VISIBLE_NOTIFY_COMPLETED);
    request.setDestinationInExternalFilesDir(context, destinationDirectory, fileName);
}
}
```

Screenshot of Code to Download Specific File from Firebase Storage (Part2).

APPENDIX

```
private class printerImagePrintingSettingBW extends AsyncTask<String,Void,String[]> {
    public printerImagePrintingSettingBW() { dialog = new ProgressDialog(getActivity()); }

    @Override
    // Before doing background operation we should show something on screen Like progressbar or any animation to user.
    protected void onPreExecute() {
        super.onPreExecute();
        dialog.setMessage("Please Wait.");
        dialog.show();
    }

    @RequiresApi(api = Build.VERSION_CODES.KITKAT)
    @Override
    // In this method we have to do background operation on background thread.
    // Operations in this method should not touch on any mainthread activities or fragments.
    protected String[] doInBackground(String... params) {
        action = params[0];
        data = params[1];
        String UserURL = Global.getURL()+"CRUD_printer_imagesPreferencesSetting.php";

        try {
            URL url = new URL(UserURL);
            HttpURLConnection httpURLConnection = (HttpURLConnection)url.openConnection();
            httpURLConnection.setRequestMethod("POST");
            httpURLConnection.setDoOutput(true);
            httpURLConnection.setDoInput(true);
            httpURLConnection.setConnectTimeout(5000);
            httpURLConnection.setReadTimeout(5000);
            OutputStream outputStream = httpURLConnection.getOutputStream();

```

Screenshot of Code for Application Sent HTTP Request to Online Web Server using HTTP POST Method and Received JSON Response (Part 1).

```
try {
    URL url = new URL(UserURL);
    HttpURLConnection httpURLConnection = (HttpURLConnection)url.openConnection();
    httpURLConnection.setRequestMethod("POST");
    httpURLConnection.setDoOutput(true);
    httpURLConnection.setDoInput(true);
    httpURLConnection.setConnectTimeout(5000);
    httpURLConnection.setReadTimeout(5000);
    OutputStream outputStream = httpURLConnection.getOutputStream();
    BufferedWriter bufferedWriter = new BufferedWriter(new OutputStreamWriter(outputStream, StandardCharsets.UTF_8));
    String post_data =
        URLEncoder.encode( "action", enc: "UTF-8")+"="+URLEncoder.encode(action, enc: "UTF-8") + "&" +
        URLEncoder.encode( "data", enc: "UTF-8")+"="+URLEncoder.encode(data, enc: "UTF-8");
    bufferedWriter.write(post_data);
    bufferedWriter.flush();
    bufferedWriter.close();
    outputStream.close();
    InputStream inputStream = httpURLConnection.getInputStream();
    StringBuilder sb = new StringBuilder();
    BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(inputStream));
    String json;
    while ((json = bufferedReader.readLine()) != null) {
        sb.append(json + "\n");
    }
    bufferedReader.close();
    inputStream.close();
    httpURLConnection.disconnect();
    String final_result = sb.toString().trim();
    return new String[]{"connection success",final_result};
} catch (MalformedURLException e) {

```

Screenshot of Code for Application Sent HTTP Request to Online Web Server using HTTP POST Method and Received JSON Response (Part 2).

APPENDIX

```
        return new String[]{"connection success",final_result};
    } catch (MalformedURLException e) {
        e.printStackTrace();
        return new String[]{"connection fail"};
    } catch (IOException e) {
        e.printStackTrace();
        return new String[]{"connection fail"};
    } catch (Exception e){
        e.printStackTrace();
        return new String[]{"connection fail"};
    }
}
@Override
//While doing background operation,
// if you want to update some information on UI, we can use this method.
protected void onProgressUpdate(Void... values) { super.onProgressUpdate(values); }

@Override
//In this method we can update ui of background operation result.
protected void onPostExecute(String[] result) {
    if(result[0].equals("connection success")){
        Response response = Response.JSONTOOBJ(result[1]);
        if(response.getMessage().equals("Success")){
            if(action.equals("read")){
                System.out.println(response.getData());
                imagePrintingSetting = ImagePrintingSetting.JSONTOLIST(response.getData());
                if (!imagePrintingSetting.get(0).getImagePrintingSettingPreferences().equals("default")){
                    initiateVariable();
                    createLayoutView();
                    dialog.dismiss();
                }
            }
        }else{
            System.out.println("Cant fetch data from server");
        }
    }
}
}
```

Screenshot of Code for Application Sent HTTP Request to Online Web Server using HTTP POST Method and Received JSON Response (Part 3).

```
        } catch (Exception e){
            e.printStackTrace();
            return new String[]{"connection fail"};
        }
}
@Override
//While doing background operation,
// if you want to update some information on UI, we can use this method.
protected void onProgressUpdate(Void... values) { super.onProgressUpdate(values); }

@Override
//In this method we can update ui of background operation result.
protected void onPostExecute(String[] result) {
    if(result[0].equals("connection success")){
        Response response = Response.JSONTOOBJ(result[1]);
        if(response.getMessage().equals("Success")){
            if(action.equals("read")){
                System.out.println(response.getData());
                imagePrintingSetting = ImagePrintingSetting.JSONTOLIST(response.getData());
                if (!imagePrintingSetting.get(0).getImagePrintingSettingPreferences().equals("default")){
                    initiateVariable();
                    createLayoutView();
                    dialog.dismiss();
                }
            }
        }else{
            System.out.println("Cant fetch data from server");
        }
    }
}
}
```

Screenshot of Code for Application Sent HTTP Request to Online Web Server using HTTP POST Method and Received JSON Response (Part 4).

APPENDIX

```
private void BlurringImage() {
    Mat imsrc = Imgcodecs.imread( file.getAbsolutePath() );

    int rows = imsrc.rows();
    int cols = imsrc.cols();

    // First instance two Mat as a target matrix to store pictures
    Mat imdest = new Mat();
    // Mat imdest2 = new Mat();

    // Add Blur effect on Mat, size is 10
    Imgproc.blur(imsrc, imdest, new Size( width: 10, height: 10));

    // Because the color order stored in Mat is BGR, it needs to be changed to RGB in ImageView.
    // Imgproc.cvtColor(imdest,imdest2,Imgproc.COLOR_BGR2RGB);

    // Write the image after adding the effect to the 10001.jpg file
    //Environment.getExternalStorageDirectory()

    newFilePath = Environment.getExternalStorageDirectory()+"Blur"+fileName+".jpg";
    System.out.println(newFilePath);

    // Create a bitmap of ARGB_8888 or RGB_565
    Bitmap bitmap = Bitmap.createBitmap(cols, rows, Bitmap.Config.ARGB_8888);
    //Mat converts to Bitmap
    Utils.matToBitmap(imdest, bitmap, premultiplyAlpha: true);
    // put on the ImageView
    iv_blurry.setImageBitmap(bitmap);
}
```

Screenshot of Code for Converting Image to Blurry, Display Converted Image and Save Converted Image to Phone Storage.

```
private void GrayScale() {
    // read the picture
    Mat imsrc = Imgcodecs.imread(file.getAbsolutePath());

    int rows = imsrc.rows();
    int cols = imsrc.cols();

    //Creating the empty destination matrix
    Mat dst = new Mat();

    //Converting the image to gray scale and saving it in the dst matrix
    Imgproc.cvtColor(imsrc, dst, Imgproc.COLOR_RGB2GRAY);

    // Write the image after adding the effect to the 10001.jpg file
    Imgcodecs.imwrite( filename: Environment.getExternalStorageDirectory()+" /GrayScale"+fileName+".jpg", dst);

    newFilePath = Environment.getExternalStorageDirectory() + "/GrayScale"+fileName+".jpg";

    // Create a bitmap of ARGB_8888 or RGB_565
    Bitmap bitmap = Bitmap.createBitmap(cols, rows, Bitmap.Config.RGB_565);
    //Mat converts to Bitmap
    Utils.matToBitmap(dst, bitmap, premultiplyAlpha: true);
    // put on the ImageView
    iv_grayScale.setImageBitmap(bitmap);
}
```

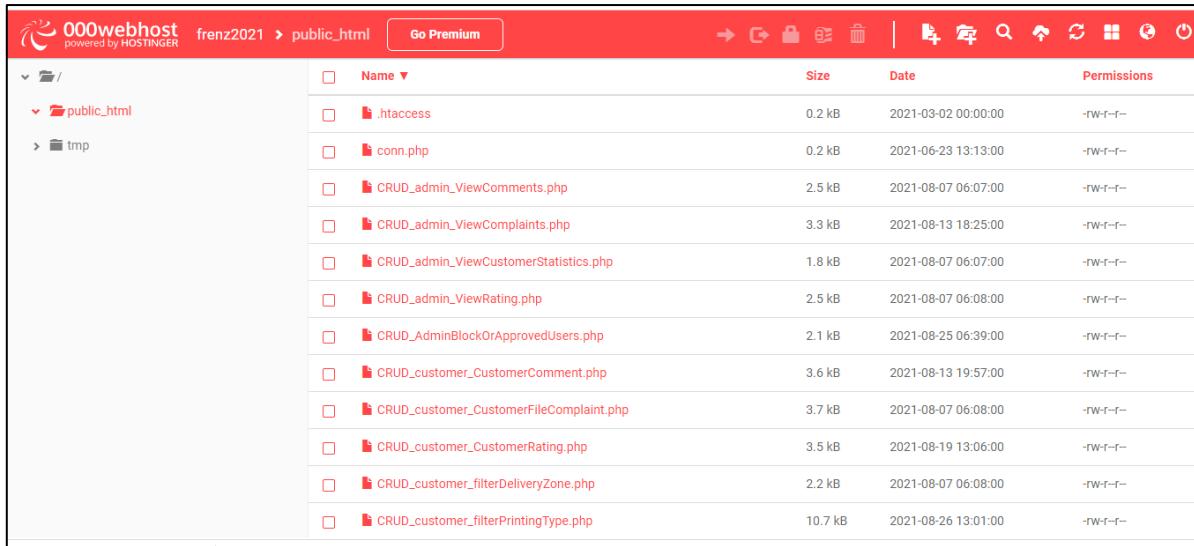
Screenshot of Code for Converting Image to Grayscale, Display Converted Image and Save Converted Image to Phone Storage.

```
//Request Permissions
private void verifyPermissions(){
    int permissionLocation= ActivityCompat.checkSelfPermission( context: CustOrderForthActivity.this, Manifest.permission.ACCESS_FINE_LOCATION);

    if (permissionLocation != PackageManager.PERMISSION_GRANTED) {
        ActivityCompat.requestPermissions(
            activity: CustOrderForthActivity.this,
            LOCATION_PERMISSIONS,
            requestCode: 1
        );
    }
}
```

Screenshot of Code for Application Requesting Permission to Access User Location.

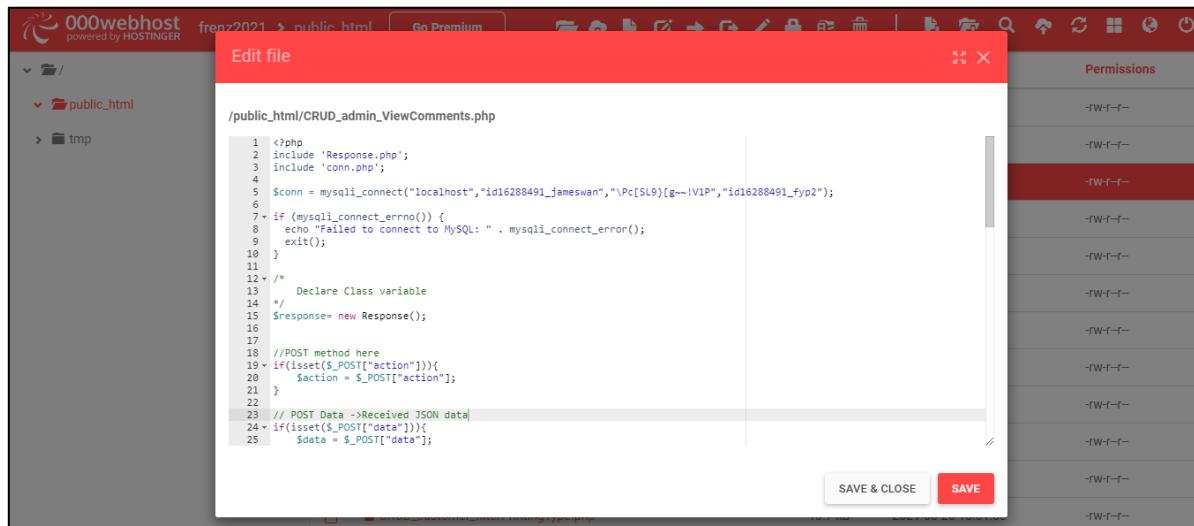
APPENDIX



The screenshot shows the 000webhost file manager interface. The left sidebar shows the directory structure: /, public_html (which contains .htaccess, conn.php, and several CRUD_*_View*.* files), and tmp. The main area displays a table of files with columns: Name, Size, Date, and Permissions. The files listed are .htaccess, conn.php, CRUD_admin_ViewComments.php, CRUD_admin_ViewComplaints.php, CRUD_admin_ViewCustomerStatistics.php, CRUD_admin_ViewRating.php, CRUD_AdminBlockOrApprovedUsers.php, CRUD_customer_CustomerComment.php, CRUD_customer_CustomerFileComplaint.php, CRUD_customer_CustomerRating.php, CRUD_customer_FilterDeliveryZone.php, and CRUD_customer_FilterPrintingType.php. All files have a size of 0.2 kB or larger, were created between March 2021 and August 2021, and have permissions -rw-r--r--.

	Name	Size	Date	Permissions
	.htaccess	0.2 kB	2021-03-02 00:00:00	-rw-r--r--
	conn.php	0.2 kB	2021-06-23 13:13:00	-rw-r--r--
	CRUD_admin_ViewComments.php	2.5 kB	2021-08-07 06:07:00	-rw-r--r--
	CRUD_admin_ViewComplaints.php	3.3 kB	2021-08-13 18:25:00	-rw-r--r--
	CRUD_admin_ViewCustomerStatistics.php	1.8 kB	2021-08-07 06:07:00	-rw-r--r--
	CRUD_admin_ViewRating.php	2.5 kB	2021-08-07 06:08:00	-rw-r--r--
	CRUD_AdminBlockOrApprovedUsers.php	2.1 kB	2021-08-25 06:39:00	-rw-r--r--
	CRUD_customer_CustomerComment.php	3.6 kB	2021-08-13 19:57:00	-rw-r--r--
	CRUD_customer_CustomerFileComplaint.php	3.7 kB	2021-08-07 06:08:00	-rw-r--r--
	CRUD_customer_CustomerRating.php	3.5 kB	2021-08-19 13:06:00	-rw-r--r--
	CRUD_customer_FilterDeliveryZone.php	2.2 kB	2021-08-07 06:08:00	-rw-r--r--
	CRUD_customer_FilterPrintingType.php	10.7 kB	2021-08-26 13:01:00	-rw-r--r--

Screenshot for PHP Scripts Stored in File Manager of Online Web Server – 000webhost.
Each PHP Script Named with the Format of “CRUD_<UserRole>_<Action>”.



The screenshot shows the 000webhost file manager with the edit file dialog open for the file /public_html/CRUD_admin_ViewComments.php. The code editor contains the following PHP script:

```

1 <?php
2 include 'Response.php';
3 include 'conn.php';
4
5 $conn = mysqli_connect("localhost", "id16288491_jameswan", "\Pc[SL9][g~~!VIP", "id16288491_fyp2");
6 if (mysqli_connect_errno()) {
7     echo "Failed to connect to MySQL: " . mysqli_connect_error();
8     exit();
9 }
10 /*
11 * Declare Class variable
12 */
13 /*$Response= new Response();*/
14 /*
15 $Response= new Response();
16 */
17 //POST method here
18 if(isset($_POST["action"])){
19     $action = $_POST["action"];
20 }
21 /*
22 // POST Data ->Received JSON data
23 if(isset($_POST["data"])){
24     $data = $_POST["data"];
25 }

```

The right side of the dialog shows the file's permissions as -rw-r--r--. At the bottom, there are 'SAVE & CLOSE' and 'SAVE' buttons.

Screenshot of PHP Script- Setting Up Connection with MYSQL Database and Declare Two
\$_POST Variables- “action” and “data”

APPENDIX

The screenshot shows a file editor window titled "Edit file" for a file named "CRUD_admin_ViewComments.php". The code is as follows:

```

61     $select_customers_mysql_qry_result = mysqli_query($conn , $select_customers_mysql_qry);
62     $row->customer->$select_customers_mysql_qry_result->fetch_object();
63
64     $cust_user_id = $row->customer->user_id;
65
66     //Fetch user data of customer based on user id
67     $select_user_cust_mysql_qry = "select * from user where user_id like '$cust_user_id'";
68     $select_user_cust_mysql_qry_result = mysqli_query($conn , $select_user_cust_mysql_qry);
69     $row->customer->user->$select_user_cust_mysql_qry_result->fetch_object();
70
71     $tempArray = $row;
72     array_push($Rating_Array, $tempArray);
73
74
75
76     $Response->message="Success";
77     $Response->data=json_encode($Rating_Array);
78
79 } else{
80     $Response->message="Fail";
81     $Response->data=null;
82 }
83 echo json_encode($Response);
84 $conn->close();
85 ?>

```

On the right side, there is a "Permissions" sidebar showing file permissions for various users.

Screenshot for PHP Script Returns JSON Response.

```

$select_comments_mysql_qry = "select * from comments ";
$select_comments_mysql_qry_result = mysqli_query($conn , $select_comments_mysql_qry);
if(mysqli_num_rows($select_comments_mysql_qry_result) > 0){

```

Screenshot for PHP Script in Executing SQL Query.

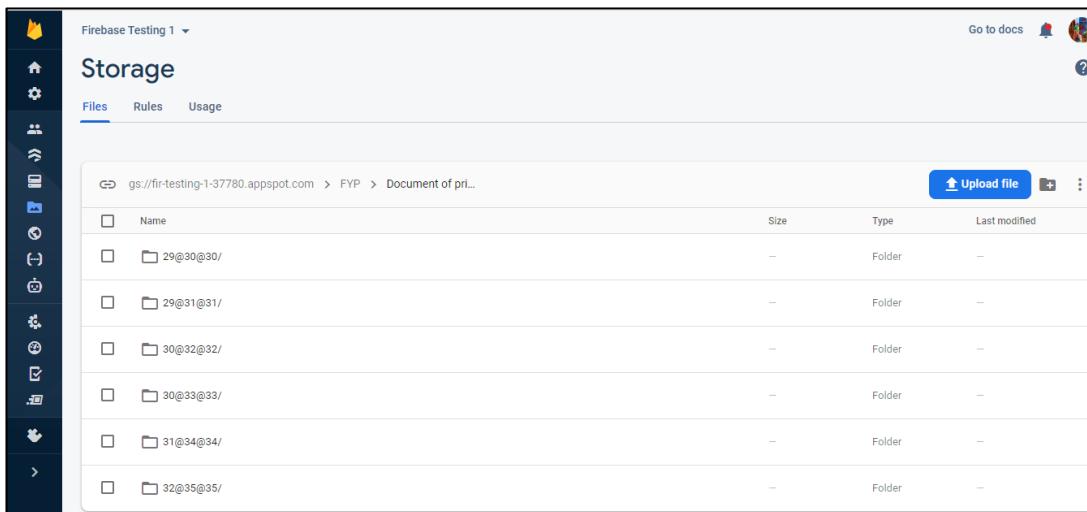
```

// POST Data
if(isset($_POST["data"])){
    $data = $_POST["data"];
}

if($action ==="create"){
    $rating_OBJ= json_decode($data);
    $insert_rating_mysql_qry ="insert into rating(cust_id,printer_id,rating_value)values('$rating_OBJ->cust_id'

```

Screenshot for PHP Script in Decoding JSON Data Received by \$_POST variable- “data”, Then Decoded data Use it in Other Part of Script.



Screenshot of Folders Created in Firebase Storage to Store Specific File.

181

WEEKLY LOGS

WEEKLY LOGS FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: May 2021	Study week no.:1
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Building up several function of mobile application such as

1. Admin viewing user statistics.
2. Admin block or approved certain users
3. Admin view list of ratings and feedbacks received by service provider

Research was carried out on certain matters.

1. Ways to convert valid addresses to latitude and longitude.

2. WORK TO BE DONE

Setup other modules of mobile applications.

Planning on arrangement of reports.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.:2
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Building up several function of mobile application such as

1. Select printer from list of printer by user and display the profile of printer
2. Edit Printing Setting by service provider
3. Admin view complaints filed by customer

Research was carried out on certain matters.

1. Integration of PyTorch model into Android Studio.

2. WORK TO BE DONE

Setup other modules of mobile application.

Planning on arrangement of reports.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.:3
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Collect adult content image and non-adult content-image online to create a database.

Building up several function of mobile application such as

1. Edit Profile function for customer and service provider
2. Edit Business Setting by service provider.

Research was carried out on certain matters.

1. Transform images with OpenCV
2. Counting pdf file pages with PDFrenderer

2. WORK TO BE DONE

Setup other modules of mobile application.

Planning on arrangement of reports.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.:4
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Setup Environment to train and test machine learning model -MobileNetV2 for detection of adult content image.

Building up several function of mobile application such as

1. Make orders for printing by customers.

Research was carried out on certain matters.

1. File Picker for android and get the real path of file

2. WORK TO BE DONE

Setup other modules of mobile application.

Planning on arrangement of reports.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 5
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Building up several function of mobile application such as

1. Provide feedback by customer on service provider.
2. File complaint by customer on service provider.

Research was carried out on certain matters.

1. Rating bar in Android.

2. WORK TO BE DONE

Setup other modules of mobile application.

Planning on arrangement of reports.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 6
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Building up several function of mobile application such as

1. Provide rating by customer on service provider.

Research was carried out on certain matters.

1. Preview image or pdf document in android.

Report:

1. Finalize arrangement of report

2. WORK TO BE DONE

Setup other modules of mobile application.

Finish report.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 7
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Building up several function of mobile application such as

1. Service providers accept or reject orders.
2. Customers view orders.
3. Service provider view orders.

Research was carried out on certain matters.

1. Integration of OpenCV SDK into Android Studio

Report:

1. Finish draft for Introduction, Literature Review

2. WORK TO BE DONE

Setup other modules of mobile application.

Finish the report.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 8
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Building up several function of mobile application such as

1. Mark preparation status of order.

Research was carried out on certain matters.

1. Pytorch Mobile in Android.

Report:

1. Finish draft for System Design

2. WORK TO BE DONE

Setup other modules of mobile application.

Finish report.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 9
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Integration of OpenCV SDK into Android Studio.

Building up several function of mobile application such as

1. Edit image by transform image with OpenCV.

Research was carried out on certain matters.

1. Calculate PPI of Image.

Report:

1. Finish draft for Methodologies and Tools

2. WORK TO BE DONE

Setup other modules of mobile application.

Finish report

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 10
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Integration of MobileNetV2 model into Android Studio project.

Building up several function of mobile application such as

1. Detection of blurry images.
2. Detection and rejection of images that are not suitable to be printed on certain printing size material.

Report:

1. Finish draft for System Implementations, User Requirements and System Architecture

2. WORK TO BE DONE

Setup other modules of mobile application.

Finish report

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 11
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Building up several function of mobile application such as

1. Detection and rejection of images with adult content.

Report:

1. Finish draft for Conclusion

2. WORK TO BE DONE

Setup other modules of mobile application.

Finish report.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT (Project II)

Trimester, Year: May 2021	Study week no.: 12
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Redesign and Improve UI
Perform overall Test.

Report:

1. Finish draft for System Testing and Results
2. Combine all parts of the report and finalize.

2. WORK TO BE DONE

Finalized mobile application project
Check for mistakes in the report.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT
(Project II)

Trimester, Year: May 2021	Study week no.: 13
Student Name & ID: WAN KAR HOU	
Supervisor: TAN TEIK BOON	
Project Title: UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION	

1. WORK DONE

Redesign and Improve UI
Perform overall Test.

Check mistakes in the report.

2. WORK TO BE DONE

Submit Report.

3. PROBLEMS ENCOUNTERED

None

4. SELF EVALUATION OF THE PROGRESS

Moderate



Supervisor's signature



Student's signature

POSTER

POSTER



UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION

Faculty of Information And Communication Technology

WAN KAR HOU, supervised by Mr Tan Teik Boon

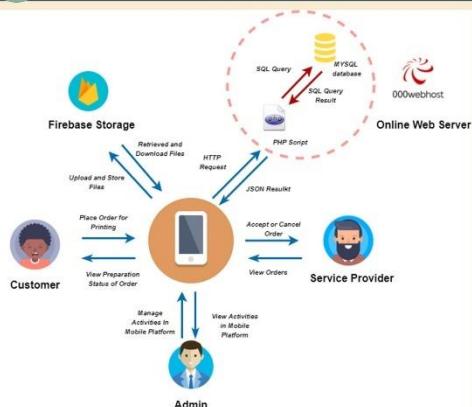


01 OBJECTIVES

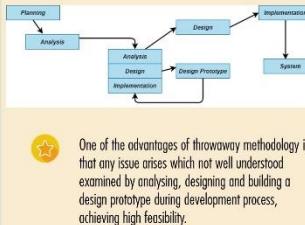
- To develop an interactive mobile application with important features for any users to set up their own online digital printing service and for online printing service customers to apply those service in an effective manner.

- To develop an interactive online digital printing mobile application with advanced features which facilitated business processes for online printing service providers and online printing service customers.

02 SYSTEM ARCHITECTURE



03 METHODOLOGIES



One of the advantages of throwaway methodology is that any issue arises which not well understood examined by analysing, designing and building a design prototype during development process, achieving high feasibility.

04 PROBLEMS

- Difficulties faced by any printing service provider to carry out open door business during this covid-19 pandemic period and users facing difficulty in printing documents as they need to be physically at the shop to print the documents.

- Absence of some advanced features in existing online digital printing mobile app resulted in limited functions for online printing service customers to perform certain tasks such as editing images while online printing service providers facing problems such as receiving adult content images, blurry image and low resolution of image that are not suitable for certain size of printing material.

05 FINAL DELIVERABLES



07 TOOLS



PLAGIARISM CHECK RESULT

PLAGIARISM CHECK RESULT

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**FACULTY OF INFORMATION AND COMMUNICATION
TECHNOLOGY**

Full Name(s) of Candidate(s)	WAN KAR HOU
ID Number(s)	16ACB07221
Programme / Course	COMPUTER SCIENCE (CS)
Title of Final Year Project	UBERIZATION OF ONLINE PRINTING SERVICES WITH MOBILE APPLICATION

Similarity	Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)
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Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

Signature of Supervisor

Signature of Co-Supervisor

Name: Tan Teik Boon

Name: _____

Date: 5/09/2021

Date: _____



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